BETTER PRACTICE:
HEALTH PROMOTION IN THE MUSIC CONSERVATOIRE

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Abstract

This thesis addresses two main questions: 1) What can be learned from existing approaches to promoting musicians' health? 2) How can such approaches be adapted, applied and evaluated across educational and professional contexts in the UK and internationally?

To answer the first question, literature reviews were conducted of interventions aimed at improving health education; preventing music performance anxiety (MPA) and performance-related musculoskeletal disorders (PRMDs); and conserving musicians' hearing. A survey of European conservatoires was conducted to explore their provision of health education. A range of programmes was reported; they vary widely in focus, quality, and outcomes. Only 21 responses were received, so firm conclusions cannot be drawn, but guidelines on health education are clearly worth developing. A study of trends in students' use of counselling at a UK music conservatoire showed year-on-year increases in sessions attended, primarily for issues related to self-esteem, relationships, academic concerns, loss, abuse and anxiety.

To answer the second question, a compulsory health and wellbeing course for 103 first year students at the same conservatoire was designed on the basis of findings described above and in collaboration with members of Healthy Conservatoires. Pre-post testing showed improvements in the students' perceived knowledge of health topics, awareness of risks to health, and self-efficacy; the students enjoyed the course and reported changes in both attitudes and behaviours. Finally, 111 music students at several UK conservatoires took part in a cross-sectional survey designed to investigate a range of potential risk factors for PRMDs. The results showed poor knowledge of official guidelines for physical activity (PA) despite high levels of self-reported PA; relatively high levels of anxiety; and reliance on teachers and lectures for health-related information.

The thesis concludes with a discussion of its implications and suggestions for further research, including an example of relevant ongoing research on musicians' health literacy.

Publications and Presentations

The publications and presentations below are based on material from this thesis.

Peer-reviewed publications

The following peer-reviewed papers can be found in the supplementary material section (pages 345 - 374).

Matei, R., Broad, S. & Goldbart, J. & Ginsborg, J. (2018). Health education for musicians. *Frontiers in Psychology, 9*(1137). DOI: 10.3389/fpsyg.2018.01137

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Matei, R. (2018). *Between complacency and creativity – Bridging the gap through questions?* Paper presented at the Art in Motion - Training for Creative Excellence Conference, Munich, Germany.

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Matei, R., & Ginsborg, J. (2017). *What should health education among music students be about*? Paper presented at the Association for Medical Humanities Conference, Keele, UK.

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Chapter 1

Musicians' health: Introduction and overview of thesis

1 Introduction

Why are musicians not asked to sight-read in chamber music competitions? Why are conservatoire music lessons taught individually? Why do all the string players in an orchestra need to have the same bowings? Why do orchestral musicians almost always play sitting down? Why are they asked to play solo repertoire in auditions? Why do we assume so often that if someone is a successful musician, they must automatically be a good teacher as well? How are music competitions adjudicated? Is it necessarily undesirable that musicians give up their careers? Are we really doing the right thing in classical music by not ever teaching music students how to improvise? How creative are classical music students when following stylistic norms and trying to please teachers and adjudicators as they merely read music that someone else notated, with indications for loudness and phrase direction? Are we doing things the way we are because they make sense only in light of having already done them this way for a sufficiently long time? Do they stand up to scrutiny?

"But would musicians be just as good if they were 'normal'?" a radio broadcaster once asked me, clearly implying that 'normal' is boring and that making music is somehow magical. When I was a student at the Menuhin Academy the director decided, seemingly out of the blue that we should have compulsory yoga classes. "Why?" I asked. "Because Yehudi Menuhin did it… it should be good for you" he replied without hesitation. "Well then, by that reasoning, we are lucky he was not into something else" was on my mind, but I decided to resist the temptation to verbalise it.

Is it the case that music always makes you sick? Or, on the contrary, is it always therapeutic and does it always soothe you? Are pain and anxiety intrinsically bad? Is anxiety something disabling that we absolutely need to get rid of? Musicians often believe ‚No pain, no gain' (Ling, Loo, & Hamedon, 2016). This could be described as a classic case of overgeneralisation and, as such, is not a desirable tenet to live by.

However, is it never true? How about the pain in the fingers of my left hand when I started playing the violin, as the strings bruised my skin? Could I have developed my technique without the pain?

Answers to the questions above are not simple. It may not be an “either/or” question, but rather an issue of intensity and/or proportion. After all, music making can be therapeutic until one performs in front of an audience, when it may provoke anxiety (Fancourt, Aufegger, & Williamon, 2015). But how intense would the anxiety be? Could one realistically *not* experience *any* anxiety in such a context? Would experiencing anxiety inevitably cancel out any other emotion? Different experiences of the same phenomenon can co-exist. Experiencing pain and competition pressure does not mean one is not deriving meaning from one’s music making (Ascenso, Perkins, & Williamon, 2018; Ascenso, Williamon, & Perkins, 2017), while concentrating on increasing the ingredients of wellbeing, such as positive emotions, engagement, relationships, meaning and accomplishment (according to the PERMA model: Seligman, 2011) is not to say that we should abandon attempts to reduce unnecessary stress.

I militate for asking questions and for enabling music students to think for themselves.

I started studying the violin when I was seven and was trained as a classical violinist until the age of 26. Although I was never pushed but chose to do so, I went through conservatoire training and have experienced the pressure and stress of intense training and competition myself. It was at the Menuhin Academy in Switzerland, where I studied with Maxim Vengerov, that I started to lose interest in following this pathway. The reasons were manifold. I grew increasingly frustrated as I noticed how subjective everything was in the interpretation of classical music and yet how fixed my teachers’ and peers’ ideas were about style and how particular pieces of music should be interpreted. I grew disappointed with how little we discussed and questioned things in classical music and how easily we seemed to be persuaded by the superficial excitement created by charismatic musical celebrities who seemed to prefer entertaining audiences so much more than teaching. At the same time, my need to question and my interest in psychology – I had taken a degree in

psychology while I was studying the violin in London – were growing to such an extent that I could no longer ignore them. What really made the difference was keeping in touch with one of my psychology professors, who became a mentor to me, while I was a student at the Menuhin Academy. At that time my greatest interests were in marital therapy and psychotherapy. Two years into my studies in Switzerland, where my studentship was fully funded and I was hosted by one of the wealthiest families in Geneva, I decided to leave and return to London to undertake a Master's in health psychology at University College London (UCL). At that point I had not ever thought about musicians' health problems and was unaware of the growing body of research and practice in the field. At the end of my studies, I entered a competition for funding organised by the British Psychological Society (BPS) for an innovative project aimed at introducing health psychology to a new audience. I wanted to connect my two interests, music and health psychology, and found out about the *Musical Impact* project through Google. I persuaded my supervisor at UCL to support my application, despite the fact that he did not believe the BPS would fund a series of workshops on health psychology for musicians in top London-based orchestras, and won the funding.

I started the AHRC-funded PhD studentship during which I have conducted the research reported in this thesis in 2015 and was finally allowed to immerse myself in a world where thinking is taken seriously and done seriously. Now, as I complete my thesis, I believe this opportunity should be available to musicians too, even those who do not undertake doctoral studies. Rather, thinking skills should be taught, tailored for musicians and embedded into their conservatoire training.

I no longer have bruises on my fingers and my passion for music is not dead. On the contrary, it is more alive than ever. I cannot tell if it has been changed in any manner by doing a PhD in a related field. However, despite the pursuit of a PhD being as complex a task as trying to answer any of the questions posed at the beginning of this chapter, it has provided me with the much-craved opportunity to take thinking seriously and has undoubtedly enriched my experience as a human being.

In the remainder of this chapter the reader is introduced to the broad topic of (predominantly classical) musicians' health and wellbeing. The evidence to date on some of the problems they experience is summarized: work-related stressors, performance-related musculoskeletal disorders (PRMDs), music performance anxiety (MPA), hearing disorders and visual complaints. What is currently known about musicians' attitudes towards health is described; some of the main limitations of the literature are highlighted; and brief definitions of the key concepts underpinning the research reported in the thesis are provided: health, health education and health promotion. Current issues in health promotion in the music profession are discussed. A short section on the Better Practice strand of the AHRC-funded Musical Impact project follows, together with an introduction to my role in the project. The chapter ends with an overview of the structure of the thesis.

1.1 Musicians' health and wellbeing

Although musicians and athletes differ in many respects, they are similar in others: they undertake regular practice and performance; play through pain; and constantly compete at the highest levels, often in demanding environments, both physically and psychologically (Dick et al., 2013). Those who succeed in entering the highly competitive field of classical music must not only possess personal attributes such as determination and resilience but also acquire cognitive, social and instrument-specific motor skills, coping skills adequate to the psychological demands of public performance, and the ability to manage their time and be responsible for their physical and mental health.

The largest survey to date conducted among 2,212 players from 47 American orchestras revealed that 76% struggled with a medical problem severe enough to interfere with their performance, while 36% mentioned they suffered from up to four problems that were independent of each other (Fishbein, Middlestadt, Ottati, Straus, & Ellis, 1988). The most prevalent problems were musculoskeletal, especially in the shoulder (20%), neck (22%) and back (16%); stage fright (16%); acute anxiety (13%); depression (17%); and sleep disturbances (14%). Musicians also seem to be affected by hearing loss (O'Brien, Ackermann, & Driscoll, 2014), visual problems

(Beckers, van Kooten-Noordzij, de Crom, Schouten & Webers, 2016) and eating disorders (Kapsetaki & Easmon, 2017). Recent findings have shown that insomnia is more prevalent among musicians compared to the general population (Vaag, Saksvik-Lehouillier, Bjorngaard, & Bjerjeset, 2016).

1.2 Work-related stressors

Vervainioti and Alexopoulos (2015) carried out a systematic qualitative review of 67 articles and identified an array of stressors faced by classical musicians every day: public exposure, personal hazards such as artistic integrity, perfectionism, interaction with colleagues and career satisfaction; repertoire including task difficulty, errors and technical problems; competition; job context such as touring, financial insecurity, environmental factors and equipment; injury and illness; and criticism. Musicians' working environments can have a considerable influence on their health outcomes. For example, players in pit orchestras report more exertion, greater performance anxiety, more frequent bullying and lower job satisfaction when compared to those who play on concert platforms or play both on stage players and in the orchestral pit (Kenny, Driscoll, & Ackermann, 2016). When attempting to reduce the risks of injury it would be better, and potentially easier, therefore, to focus on modifying the workplace environment and creating healthier cultures in orchestras (Rickert, Barrett, & Ackermann, 2013). Environmental risk factors include the number, duration and intensity of rehearsals; difficulty of repertoire and programming; venue acoustics, lighting and temperature; noise exposure; seating and instrument set-up; and psychosocial factors such as interpersonal relationships, high work demands, tight deadlines, lack of control, low job satisfaction and management styles that are not supportive of employees. Yet the results of a systematic review of correlates and predictors of playing-related pain were inconclusive (Jacukowicz, 2016), perhaps because of the wide range of definitions used for psychosocial factors such as long working hours; work content; high job demands and low control; and lack of social support, all of which could be related to musculoskeletal pain.

1.3 Performance-related musculoskeletal disorders

Performance-related musculoskeletal disorders (PRMDs) are defined as symptoms that have a negative impact on musicians' ability to play (Zaza & Farewell, 1997). Studies of the prevalence and incidence of PRMDs in musicians have now been conducted in many European countries, USA, Brazil and Asia, across most instrumental groups. Estimates of the prevalence of PRMDs in the population of musicians range between 26% and 93%, depending on factors such as how PRMDs are defined and and whether authors report lifetime, 12-month or 7-day prevalence (Ackermann, Kenny, O'Brien, & Driscoll, 2014; Arnason, Arnason, & Briem, 2014; Bragge, Bialocerkowski, & McMeeken, 2006; de Souza Moraes & Antunes, 2012; Kok, Huisstede, Voorn, Schoones, & Nelissen, 2016; Leaver, Harris & Palmer, 2011; Lonsdale & Kuan Boon, 2016; Paarup, Baleum, Holm, Manniche, & Wedderkopp, 2011; Stanek, Komes, & Murdock, 2017; Steinmetz, Scheffer, Esmer, Delank, & Peroz, 2015; Zaza, 1998). A review of literature on the prevalence of pain concluded that the extent to which it can interfere with musicians' ability to play varied between 25.8% and 84.4% (Silva, La, & Afreixo, 2015). Problems of the back, neck and shoulder seem to be the most prevalent (Fishbein et al., 1988; Kok et al., 2016; Silva et al., 2015).

Proportions of music students similar to those of professional musicians report musculoskeletal symptoms, thought to have begun in high school or even earlier (Ackermann, Adams, & Marshall, 2002; Brandfonbrenner, 2009; Lonsdale & Kuan Boon, 2016; Spahn, Richter, & Zschocke, 2002). Retrospective data on 314 student musicians aged 18 and younger found that the most frequently reported symptoms were pain and muscle tension in the upper body (Burkholder & Brandfonbrener, 2004). In another study (Ranelli, Straker & Smith, 2008), 30% of 731 children experienced symptoms sufficiently severe that they were unable to play their instruments as usual. Up to 87% of 106 US college music students reported having experienced playing-related injuries at some point in their lives (Guptill, Zaza, & Paul, 2000) while 25% of music students in Freiburg said they experienced playing-related symptoms in their first academic semester (Spahn, Strukely & Lehmann, 2004). However, more recent data have not necessarily found similar proportions of elementary, middle and

high school string players experiencing musculoskeletal discomfort (Russell & Benedetto, 2014). Meanwhile, Kok, Vlieland, Fiocco, and Nelissen (2013) found in their cross-sectional comparison of a cohort of 83 music students and 494 medical students that a larger proportion of the former experienced musculoskeletal complaints, especially in the upper body.

A wide range of risk factors, both psychosocial and physical, is associated with PRMDs. Psychosocial risk factors include depression (Kenny & Ackermann, 2015); performance anxiety (Leaver et al., 2011; Steinmetz et al., 2015); pressure from self (Wu, 2007); stress and social phobia (Chan & Ackermann, 2014); and personality traits such as perfectionism (Altenmüller & Jabusch, 2010). Physical risk factors are both modifiable and non-modifiable. Modifiable factors include insufficient break periods (Zaza & Farewell, 1997); practice hours per week (Kaufman-Cohen & Ratzon, 2011) and sudden increase in playing time (Robitaille, Tousignant-Laflamme, & Guay, 2018); and awkward posture, instrumental technique, fitness level and suboptimal injury management (Chan & Ackermann, 2014), while non-modifiable factors include instrument type and size (Leaver et al., 2011); musicians' sex and age (Corrêa et al., 2018; Kochem & Silva, 2017; Kok et al., 2016); and playing conditions such as temperature, length of rehearsals and performance, past injury and challenging repertoire (Safety and Health in Arts Production and Entertainment [SHAPE], 2002).

1.4 Music performance anxiety

Performance anxiety has been investigated in a variety of contexts including test-taking, public speaking, writing, sexual performance, sport and the performing arts. Like other forms of performance anxiety, music performance anxiety (MPA) is a complex phenomenon caused by the interaction of many factors, including genetics, environmental stimuli and the individual's experience, emotions, cognitions and behaviours. It manifests itself via three elements, independent to varying extents: cognitions, autonomic arousal and behaviours (Kenny, 2011). MPA is often experienced by musicians, who form one of the occupational groups most at risk for mental health problems (Brodsky, 1996).

According to the Yerkes-Dodson law, which dates from 1908, optimal performance is associated with a moderate level of arousal. A more nuanced extension of this law has been proposed, however, identifying three sources of stress that interact in individuals in different ways: trait anxiety, which is a personality characteristic; situational stress for example when playing auditions and giving public performances; and task mastery, in the context of both undemanding, rehearsed material and complex, largely unknown works (Wilson & Roland, 2002). Thus performers' anxiety is likely to be reduced as they achieve task mastery, transforming a difficult work into one that is both more familiar and easier to play.

While a certain degree of performance anxiety is facilitative and normal, it can sometimes become debilitating and even qualify as a mental disorder. According to the DSM-V, performance anxiety is a sub-type of social anxiety disorder (SAD: American Psychiatric Association, 2013a). However, in order to qualify as suffering from SAD, individuals need to have suffered from persistent fear, anxiety or avoidance for at least six months, with considerably impaired social, occupational, or general functioning. Although correlations have been found between MPA and certain aspects of SAD, such as fear of negative evaluations and the perceived exaggerated consequences of such evaluations, particularly in solo performance, the way they interact remains unclear (Goren, 2014).

Younger musicians (<30 years) experience more anxiety than older ones (>51: Kenny, Driscoll, & Ackermann, 2014), emphasizing the importance of addressing such issues early on. The highest levels of MPA are generally triggered by solo performances, while orchestral players rate auditions as the most likely to produce MPA and practising alone the least (Spahn, Walther, & Nusseck, 2016). Musicians playing in opera, ballet and theatre pit orchestras experience more severe MPA when compared with musicians who combine playing in pit orchestras with performing on stage (Kenny, Driscoll, & Ackermann, 2016). Undergraduate music majors also experience considerably higher levels of MPA than do non-music majors (Robson & Kenny, 2017).

The predictors of MPA that have been identified in the literature include depression; being female; having experienced a breakdown while performing music (Robson & Kenny, 2017); negative cognitions such as

catastrophising (Liston, Frost, & Mohr, 2003); trait anxiety and fear of negative evaluation (Osborne & Kenny, 2008). The three causes of MPA most commonly cited by musicians are ‘pressure from self’, ‘excessive arousal’ and ‘inadequate preparation for performance’ (Kenny et al., 2014). Orchestral players may well find inadequate preparation a general and persistent stressor, since they tour and perform extensively with too little time to rehearse and digest the repertoire, often relying on their ability to sight-read. Experiencing a bad performance can increase performance anxiety in those scoring high on measures of trait anxiety (Ackermann et al., 2014).

Coping strategies reported by musicians include increasing practice, recommended by 91% of respondents to Kenny et al.’s (2014) survey; deep breathing; positive self-talk; mock performance practice; familiarizing themselves with the performance venue; relaxation methods; discussions; and use of medication. Of the musicians from American orchestras who responded to the ISCOM survey (Fishbein et al., 1988), 27% took propranolol or another beta-blocker, most of them without a doctor’s prescription, and of these respondents, 96% reported these effective in reducing MPA. Of the Australian musicians who responded to Kenny et al.’s (2014) survey, 31% reported taking beta-blockers to alleviate MPA, while 12% used alcohol, 5% anxiolytics and 4% antidepressants. Data obtained from 1,500 Norwegian musicians suggests higher use of psychotropic medication (e.g., sedatives, antidepressants, hypnotics and/or ADHD medication), especially among string players, particularly when compared with managers and technicians. Similarly, musicians are three times as likely to use psychotherapy as the general workforce (Vaag, Bjorngaard, & Bjekeset, 2016).

The perception of social evaluation in the case of public performance can interfere with one’s ability to focus on task-relevant cues, thereby increasing one’s subjective experience of anxiety. The stress associated with the knowledge of being watched may also lead to increased muscle activity and force in fine motor performance such as a grip task or playing the piano. This could interfere with performance quality (Yoshie, Kudo, Murakoshi, & Ohtsuki, 2009; Yoshie, Nagai, Critchley, & Harrison, 2016). A tendency towards somatization could also explain the complex interaction between MPA, PRMDs, depression and stress (Kenny & Ackermann, 2015;

Spahn, Ell, & Seidenglanz, 2001). However, such relationships are complex and currently not completely understood.

1.5 Hearing disorders

Many musicians are exposed to volume levels of sound that exceed the recommended limit value of 85 dB(A), which can result in noise-induced hearing loss (NIHL) and/or other disorders such as tinnitus, hyperacusis, distortion and diplacusis, some of which are incurable (HSE, 2008; Laitinen, 2005; Santucci, 2009). The effects of exposure to sound depend on variables such as instrument, repertoire played (Schmidt et al., 2011), exposure time, and the environment (e.g. surrounding instruments and seating arrangements) (Behar, Wong, & Kunov, 2006). Nevertheless a retrospective cohort study investigating the experiences of 2000 professional musicians concluded that, compared to the general population, they had an almost fourfold higher hazard ratio (HR) for NIHL and 57% higher HR for tinnitus (Schink, Kreutz, Busch, Pigeot, & Ahrens, 2014). A survey of almost 600 musicians from eight Australian orchestras found that 43% reported hearing loss (O'Brien, Ackermann, & Driscoll, 2014). In a sample of more than 2,500 musicians from 133 orchestras in Germany, 19% of musicians under 30 years old had already been diagnosed with hearing loss or tinnitus (Gembris, Heye, & Seifert, 2018). Although more than 80% of 429 orchestral players had received information about hearing protection in the form of individually-fitted earplugs (Zander, Spahn, & Richter, 2008), and 94% of 196 orchestral players reported being worried about their hearing, to some extent, hearing protection is often underused (Laitinen, 2005). Similarly, despite having received information about the effect of noise on hearing, music students also underuse hearing protection (Miller, Stewart, & Lehman, 2007). However, in countries where legislation has contributed to raising awareness of such issues, the self-reported use of protective devices increases to 64% (Ackermann et al., 2014).

In addition to the risks presented by the orchestral environment, the findings of a study looking at sound exposure during solitary practice (O'Brien, Driscoll, & Ackermann, 2013) suggest that even if musicians

halved the practice time they report, on average, they would exceed the recommended daily amount of noise that can be experienced safely.

Some improvements have been made to the education of orchestral musicians in relation to hearing health, most notably in Australia and the United Kingdom. A Sound Ear, a project aimed at offering practical guidance with regards to hearing exposure management in orchestras was carried out in 2001 by the Association of British Orchestras (ABO). The project also encompassed training offered to a number of symphony orchestras. A subsequent report containing educational material was published in 2008 and included four case studies of orchestras and their experiences of trying to implement these recommendations, in terms of challenges and areas of improvement (Wright-Reid & Holland, 2008). In 2011, the British Broadcasting Corporation (BBC) published a similar document in the form of a guide for musicians and a toolkit for managers (Hansford, 2011a, b). There are also documented approaches to the prevention of hearing loss in the musicians who play in Australian orchestras. Most notably, the Queensland Symphony Orchestra incorporated some of the ABO recommendations and implemented a long-term strategy that has been in place for more than nine years. The strategy was designed on the basis of a formative evaluation process, literature reviews, and discussions with both orchestral players and staff. It consists of exposure assessment, educational components, various control measures and yearly audiological management; it is also subject to continuous revising, improvement, evaluation, research and maintenance (O'Brien, Driscoll, & Ackermann, 2015).

The Health Promotion in Schools of Music Project (HPSM), which will be described in more detail in Section 3, included in its recommendations that music students should be taught about hearing loss (Chesky, Dawson, & Manchester, 2006) and has published guides containing information for administrators and members of teaching faculties in music schools (NASM/PAMA, 2011; Powell & Chesky, 2017).

1.6 Visual complaints

Sight problems are common in orchestral players, with 61% of professional musicians needing glasses or contact lenses and 19% already wearing distance glasses (Beckers et al., 2016). Although these rates might be higher than those among non-musicians (although convincing evidence is missing), it is unclear how such results compare to the general population, given that prevalence of myopia, for example, is increasing worldwide (Xiong et al., 2017). Although lighting conditions in the orchestra pit, the musicians' perennial complaint, could indeed be to blame, other factors that have already been documented in reviews and meta-analyses of the findings of studies of incidence and prevalence might be responsible too, such as lack of time spent outdoors and/or exposure to daylight (Xiong et al., 2017).

1.7 Musicians' attitudes towards health and wellbeing

Often, in the culture of music making, musicians may be encouraged to focus more on sound quality at the expense of their body and physical sensations such as pain. Musicians identify with and derive considerable meaning from their art; such 'immersion' might temporarily suspend their awareness of physical strain or discomfort. While this form of physiological inhibition might be a form of coping, it could also, if taken to extremes, cancel out any opportunity for the musician to explore it and potentially relieve any unnecessary tension. Given the subjective importance of their art to musicians, the guiding criterion when choosing whom to consult with respect to health might not be the consultant's expertise or the extent to which their specialism is evidence-based but rather whether the musician feels understood and if s/he feels that what s/he does is being recognized in all its complexity. After all, not paying attention to pain because one is fully engaged in perfecting one's art and nothing else can be an effective and sophisticated coping mechanism (Nygaard Andersen, Roessler, & Eichberg, 2013). The key elements of the subjective ways in which musicians experience their art include the almost symbiotic relationship between them and their music; the instrument as an extension of the body; the intense emotional involvement and intimate relationship between

students and their teachers; and the almost automatic blockage of discomfort because of its interference with the experience of flow, so much so that such special components might need to be incorporated into the training of healthcare professionals (Guptill, 2011).

Thus the culture of the orchestra encourages musicians to see injury as weakness and/or professional failure, to such an extent that many conclude that playing through injury must be an intrinsic requirement of the musical profession. Concealment of relatively minor ailments can lead to chronic injuries. Coping with, and recovering from, injury can contribute to depression, social isolation and identity confusion. More social support than is offered currently is therefore required (Rickert, Barrett, & Ackermann, 2014a, b).

Qualitative research exploring how students from British conservatoires experience health and wellbeing focused on enablers and barriers with regards to lifestyle, support services, and the environment more broadly (Perkins, Reid, Araújo, Clark, & Williamon, 2017). Lifestyle enablers include health awareness; healthy choices; effective practice and learning strategies; and coping strategies for wellbeing, while barriers include challenges such as irregular schedules; financial strain; excessive alcohol intake; playing-related problems due to physical causes; and challenges arising from practice and learning. Enablers associated with support services include being able to identify sources of support and the perceived provision of support across departments. Barriers include low health awareness and lack of appropriate support. Finally, with regard to the broader environment, enablers include succeeding at and enjoying performance; and relationships and supportive networks. Barriers include comparison and competition; pressure and stress; psychological distress; negative performance feedback; and workload.

In studies comparing groups of music students and students in a variety of health-related disciplines (Ginsborg, Kreutz, Thomas, & Williamon, 2009; Panebianco-Warrens, Fletcher, & Kreutz, 2015; Spahn, Strukley, & Lehmann, 2004), music students scored lower on measures of health responsibility, physical activity, self-efficacy and self-regulation. Although they valued their subject more highly and showed more professional ambition, they reported suffering from more varied and more severe

symptoms. However, some evidence suggests that both music and medical students have more psychological problems than non-musicians (van Fenema & van Geel, 2014). When compared with members of the general population matched by age, undergraduate and postgraduate students from ten British conservatoires showed higher levels of wellbeing and lower levels of fatigue (Araújo et al., 2017). However, they also scored lower on measures of health responsibility, stress management, sleep quality, self-rated health and use of coping skills. Even in Australia, where considerable efforts have been made to implement health promotion programmes on the basis of research on musicians' health, the findings of a study involving student and professional cellists and orchestral management staff (Rickert, Barrett, & Ackermann, 2015) indicate poor awareness of health and knowledge of health-related behaviours. The findings of a more recent study (Ling et al., 2016) show that piano students in Malaysia have limited knowledge of specific physical injuries and half of almost 200 respondents reported believing that one cannot achieve musical excellence without going through pain, while Monino, Rosset-Llobet, Juan, Garcia Manzanares and Ramos-Pichardo (2017) found that music students in Spain do not feel they receive enough information about strategies for preventing PRMDS or can access the support they need to treat them.

When music performance students experience health problems they are most likely to turn to their instrumental teachers for advice (Stanek, Komes, & Murdock, 2017; Williamon & Thompson, 2006), but the extent to which the latter know how to advise them is unclear; it may be that health-related training is needed for teachers as well as students. An unpublished doctoral thesis by Norton (2016) investigated music teachers' views on their roles in health promotion for their students. Her findings suggest that music teachers believe they are at least partially responsible for their students' health. Many of them already try to address their students' health concerns, although on the whole they lack health-related training and try to prevent health problems developing in their students by referring to their own personal experience. Nevertheless they are interested in learning more so as to be able to provide more reliable information.

Considering that some performance injuries are, at least to some extent, preventable, performing arts medicine specialists and musicians have been encouraged to make interdisciplinary efforts to facilitate the development of

conservatoire-based health programmes (Manchester, 2006). This thesis reports one such effort.

2 Limitations of the existing literature

Despite the potentially alarming nature of the findings outlined above, the available literature on musicians' health and wellbeing needs to be interpreted carefully. Many of the authors of the studies cited above use terms that are only loosely defined, make assumptions and report methodologically flawed investigations. In questionnaires collecting data for a comparison of musicians with non-musicians, it can be useful to ask respondents to report all musculoskeletal symptoms, regardless of the extent to which they affect musical and/or non-musical activities. But it could be even more useful, however, to investigate the degree to which musculoskeletal symptoms a) affect musicians' playing and other behaviours such as sleep and leisure activities, and b) are mitigated by behaviours such as taking a break from playing, using painkillers and seeking professional help (Paarup et al, 2011). Relevant standardised and validated questionnaires already exist, such as the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire (Hudak, Amadio, & Bombardier, 1996) and the Nordic Musculoskeletal Questionnaire – Extended Version (Dawson, Steele, Hodges, & Stewart, 2009). After all, Zaza's definition of PRMDs includes any "pain, weakness, numbness, tingling, or other symptoms that interfere with [musicians'] ability to play [their] instrument at the level [they] are accustomed to" (Zaza, 1998, p. 1022), thus excluding mild complaints, although this definition is not necessarily used in all systematic reviews of research on PRMDs to date (Leaver et al., 2011, Paarup et al., 2011).

Notwithstanding this, according to the most recent systematic review of musculoskeletal complaints in professional musicians (Kok et al., 2016), one-year prevalence of PRMDs has been found to range between 41% and 93%, while lifetime prevalence ranges between 62% and 93%. If it is not made clear that musicians were not asked whether or to what extent these musculoskeletal complaints interfered with their normal activities, these percentages can seem frighteningly high. In fact there may be no problem

to solve, as to some extent pain is part of life. Gratuitous pathologising and sensationalist claims might cause unnecessary stress. For example, Kochem and Silva (2017) recently reported that, in their study of violin players, 86.8% of the total sample experienced pain in at least one bodily region in the last year, a result they describe as ‘alarming’, even though, given the way the question was framed, it is more surprising that *any* of their respondents had not felt pain somewhere in the body in the previous year. By contrast Kochem and Silva report, with apparently disproportionate concern, that 8% of their sample reported absenteeism and temporary suspension of their musical activity as a result of physical symptoms, although too few consulted health professionals. Similarly, Leaver et al. (2011) asked respondents about ‘musculoskeletal’ and ‘disabling’ pain experienced in the previous 12 months. A total of 86% of respondents reported the former but only 41% the latter. This is, of course, not to imply that 41% is a negligible proportion of a sample of respondents, but rather to highlight the difference between the severity and implication of symptoms.

Another recent example of sensationalizing results can be found in the report of a survey of chronic pain in musicians in a large number of publicly-funded German orchestras (Gasenzer, Klumpp, Pieper, & Neugebauer, 2017). Although almost 65% of the respondents reported chronic pain, defined as occurring repeatedly or continuously for more than three months, almost 80% of them rated their health status as either very good or good and most seemed to be proactive in addressing their pain. Although the discrepancy between relatively high levels of chronic pain in the context of even higher levels of positively-rated health can be interpreted in several ways, the authors describe the findings as ‘alarming’, apparently regarding musicians’ failure to equate pain with illness as a problem, albeit without advancing any explanations.

It is still unclear if performance-related pain is completely preventable (Manchester, 2006), whether continuous pain is necessarily abnormal or should be pathologised, and if chronic pain in musicians is most likely to lead to potentially career-ending disability. In fact, although there is anecdotal evidence for an association between a musician’s having a physical injury and their career coming to an end, there is little or no empirical evidence for such an association. Pain is a very complex phenomenon. Pain beliefs such as catastrophising might play an important

part in the biopsychosocial model of pain and have an even greater impact on people's self-efficacy, functioning and health than actual pain. After all, pain catastrophising, characterized by rumination, magnification and helplessness (Sullivan, Bishop, & Pivik, 1995), represents a strong predictor of poor pain outcomes (Quartana, Campbell, & Edwards, 2009).

Although intuition suggests that 'correct posture' should reduce muscle imbalances and thereby the risk of musculoskeletal complaints and/or overuse injuries (Ackermann, Adams, & Marshall, 2002; Ohlendorf, Wanke, Filmann, Groneberg, & Gerber, 2017; Wolf, Thurmer, Berg, Cook, & Smart, 2017), it is unclear whether this is really the case. It is also unclear what the term 'correct posture' means and the extent to which it is relevant to pain and/or musculoskeletal discomfort, if at all. For example, we know that weight is better distributed so muscle imbalances are reduced when standing or sitting in front of, or oriented to the right of a music stand than sitting oriented to its left (Spahn, Wasmer, Eickhoff, & Nusseck, 2014). However, we do not know the relationship between imbalances and PRMDs. Moreover, the postural-structural-biomechanical (PBS) model, according to which postural deviations and muscle asymmetries contribute to various musculoskeletal problems, has already been challenged on the grounds that it mistakes normal variations for pathology, neglects biological and psychological dimensions and fails to recognize the inherent capacity of our bodies to tolerate such variations without alteration in normal functioning (Lederman, 2010). For example, the considerable muscle imbalances exhibited by elite football players do not seem to be related to the amount of injuries they experience (Hides et al., 2010). Although physiotherapists might agree that the most desirable sitting posture would be a 'neutral' one, following the natural shape of the spine, when almost 300 physiotherapists from four different countries were asked to choose the best sitting spinal posture out of nine options, 85% of them chose two that were strikingly different from each other, with those who selected the one that was more 'upright' of the two also displaying more negative beliefs about lower back pain (O'Sullivan, O'Sullivan, O'Sullivan, & Dankaerts, 2012).

Measurement and measurement variability issues occur also in the case of MPA. This is too often conceptualized as unidimensional and there are very few papers that distinguish between debilitating and facilitating anxiety on

one hand and somatic and cognitive anxiety on the other hand (Miller & Chesky, 2004).

3 Health, health education and health promotion

Health is defined holistically in the 1948 World Health Organisation (WHO) constitution, referring not only to the absence of disease, but also "complete physical, social and mental well-being" (WHO, 1998). Health promotion is "a process of enabling people to increase control over, and to improve their health" (Rootman, Goodstadt, Potvin, & Springett, 2001, p. 13), thus empowering individuals. The Ottawa Charter for Health Promotion was developed by the Canadian Ministry of Health in 1974 (Chesky, Dawson, & Manchester, 2006), defining public health in relation to supportive settings: healthy working and living environments, health promotion as part of the daily activities of the setting, and links with the wider community (Dooris, Cawood, Doherty, & Powell, 2010). These are also known as 'settings for health' or 'healthy settings', that is, organizational structures in which health promotion takes various forms, such as schools, work sites, hospitals, villages and cities. The concept of 'settings for health' is based on the understanding of the multiple and interacting factors impacting on health, also called 'determinants of health', which encompass the entire panoply of individual, social, economic and physical or environmental factors that affect the health status of both individuals and societies, such as health-related behaviours, the social gradient, stress, early life, social exclusion, work, unemployment, social support, addiction, food and transport (WHO, 2003).

One example of a healthy setting is the health promoting school. According to WHO, such schools aim to enable a supportive environment for health; provide health education; improve the health of both students and members of staff; and implement relevant policies and practices (WHO, 1998). The healthy settings approach is particularly relevant to higher education in the UK, as it has the potential to affect more than two million students and 370,000 staff members at 169 higher education institutions (HEIs). Dooris, Cawood, Doherty and Powell (2010) argue that the university context might provide particularly fertile ground for the promotion of public health. In 2006

the University of Central Lancashire (UCLan) established the English National Healthy Universities Network[1] to apply the healthy settings approach within the higher education sector and support the exchange of knowledge and practical experience. In 2008, the initiative received extra financial support from the Higher Education Academy Health Sciences and Practice Subject Centre, the Department of Health and the Higher Education Funding Council of England (HEFCE) and joined forces with Manchester Metropolitan University to develop the National Network by bringing together 54 universities and 18 other organisations, create electronic tools, share best practices and facilitate national projects. The Network expanded to include universities from England, Northern Ireland, Scotland and Wales. The healthy settings approach has three dimensions: an ecological model of public health (i.e. approaching health holistically and recognizing its complexity); a systems perspective, and a whole system focus (Dooris et al., 2010). The Network signed the Okanagan Charter for Health Promoting Universities and Colleges, an international framework for health promotion in higher education and post-secondary sector, which emerged as a result of the 2015 International Conference on Health Promoting Universities and Colleges. The Charter's guiding principles for action include using a whole system approach taking advantage of every opportunity for health promotion; engaging all stakeholders including students, staff, administrators in the decision-making processes; facilitating interdisciplinary and cross-sector collaborations; promoting evidence-based policies and practices; building strengths based on an informed understanding of contexts and local social landscapes (e.g. values, cultural diversity, etc.); as well as acting on the basis of the universal human right to health (Okanagan Charter, 2015).

Health promotion thus includes health education and health communication targeting individual health-related behaviour change via a variety of skills and tools. Health education aims at improving health literacy, which is about building health-related knowledge and developing life skills in order to empower the individual to achieve better health, by enhancing his or her capability, motivation and self-efficacy. Life skills include stress management and emotional self-regulation; communication and

[1] Now known as the UK Healthy Universities Network (www.healthyuniversities.ac.uk)

interpersonal skills; decision making; problem solving; critical thinking; and creative thinking (WHO, 1998). Health communication is a component of health education and refers to the provision of information related to determinants of health, risk factors and the use of relevant health services (WHO, 1998). In the context of the Okanagan Charter, however, health promotion goes further, aiming to change actual socio-economic, political and environmental living conditions by building supportive environments; encouraging community action; informing public health policies; and ensuring that health services are oriented towards achieving population health outcomes. As such, health promotion should be distinguished from health education and health communication. Health promotion deals with primary, secondary and tertiary prevention. Primary prevention is concerned with identifying the risk factors and disabling the initial onset of the problem, while secondary prevention targets the delaying of ill health, and tertiary prevention deals with the management of an already infiltrated health problem and attempts to limit its consequences and improve one's quality of life (WHO, 1998). One outcome of the AHRC-funded Musical Impact project, to which the research reported in this thesis contributes, is Healthy Conservatoires (formerly known as the Healthy Conservatoires Network). Healthy Conservatoires implements the Healthy Universities project settings approach but aims to adapt available best practice to the domain of the performing arts (Musical Impact, 2017).

The Health Promotion in Schools of Music (HPSM) project resulted from a collaboration between the University of North Texas and the Performing Arts Medicine Association, bringing together more than 20 organisations to produce a list of consensus-based declarations and recommendations for incorporating health promotion within the professional training of musicians via improved educational programmes and environments that are supportive of health. The recommendations included: to adopt a health promotion framework; to develop and offer an undergraduate occupational health course for all music majors; to educate students about hearing loss as part of ensemble-based instruction; and assist students through active engagement with health care resources (Chesky, Dawson, & Manchester, 2006). Although framed as health promotion, The HPSM's declarations and recommendations target mostly health education and are rather vague about anything else. They mention the importance of influencing values,

beliefs and actions, and raising awareness of musicians' health problems, musculoskeletal, vocal, mental and hearing-related, in both students and music education staff members. Although they also say that music schools should go beyond education for prevention and support actions directed towards the treatment of specific diseases, it is unclear how this might be achieved. The first recommendation for action, the adoption of a health promotion framework, refers to the importance of contributions from all internal stakeholders (i.e. faculty members with expertise in music performance and music education) as primary engines in establishing healthier practices, yet it does not explicitly raise the issue of how one could provide the relevant training to these people before expecting them to be proactive in health promotion (Chesky et al., 2006). Similarly, several institution-based health courses worldwide have been dubbed instances of health promotion (Barton & Feinberg, 2008; Manchester, 2007a, 2007b, 2007c), although they only targeted health education for music students.

The distinction is important, given the fact that health education, although necessary, is not sufficient for behaviour change, and using the term 'health promotion' when referring to health education might imply that education is the only ingredient needed for promoting health. As a result, the managers of music schools may think that they need only incorporate health education programmes into the curriculum and therefore fail to address institutional policies and practices that are potentially deleterious to health. In addition, programmes with different labels are expected to achieve different outcomes. For example, a health education programme should target outcomes such as awareness, knowledge, perception of competency, and responsibility for avoiding or managing risks to health (Laursen & Chesky, 2014), while the evaluation of a health promotion programme would have to measure the extent to which specific actions resulted in specific outcomes for health (WHO, 1998).

Health communication can raise ethical issues, for example when it makes use of certain tactics such as exaggerations or omissions, or when there is a discrepancy between the tentativeness of the actual evidence and the certainty of the health message that is being communicated (Guttman, 2017), particularly when recipients do not engage in critical thinking. Although straightforward and categorical messages might be more convincing, the information they contain might be inaccurate. They may

also have adverse effects on individuals by stigmatizing or labelling them unnecessarily.

Similarly, individuals can feel overwhelmed by the tendency for health communication to emphasize personal responsibility. This is unfair, as the causes of ill-health are complex, and potential solutions should emerge from multiple sources including, for example, environmental restructuring and/or social support. The view of individuals as being completely rational and having free will, or being fully in control of their lives, is outdated and wrong. Strong evidence for a myriad of determinants of health suggests that responsibility for health is diffuse and one cannot separate individual from social actions (Carter, Cribb, & Allegrante, 2012). Health determinants include the social gradient; stress; early life; social exclusion; work; unemployment; social support; addiction; food; and transport (Raphael, 2000). If small institutional changes can make a difference to individuals, then it is unjustified to invest effort solely in empowering people to make changes at the individual level in the interests of increasing their responsibility towards their own health, let alone holding them accountable for it or 'victim-blaming', as pointed out by Carter et al. (2012). Healthier choices, for music students, might depend on social and cultural norms, available options and the willingness of institutional staff such as faculty administrators and teachers to provide appropriate guidance.

An editorial note published in *Medical Problems of Performing Artists* outlined an example of an initiative reported by Ackermann (2017) challenging the practice at the Australian National Academy of Music (ANAM) that on a single day a long rehearsal would be followed by a half-hour break and another, medium-length, rehearsal. In a week-long pilot study, the existing schedule was replaced by one in which three medium-length rehearsals were divided by two shorter breaks. Although no formal evaluation has been carried out to date, the pilot was apparently received very positively.

Ethical issues are raised by the issue of health promotion, particularly in relation to the moral obligations of those responsible to do no harm (non-maleficence) and do good (beneficence). If health promotion is not based on reliable evidence does it really promote people's health? Can health be promoted in such a way that an institution's finite resources are used so as

to maximize their effectiveness? This might be the case when the literature indicates a myriad of potential solutions yet the efforts of those responsible for policy development and implementation are guided by what ‘can’ be done (i.e. what they are aware of and what is technically possible) rather than what ‘should’ be done on the basis of reflection and/or the consideration of effectiveness.

4 Current health promotion issues in the music profession

In spite of the best efforts of bodies such as the HPSM, musicians continue to be bombarded with unsubstantiated health-related claims by the media, which – when they are teachers – they often pass on to their students. Failing to separate such claims from those based on solid evidence can lead to a waste of resources and even suffering. As discussed above, this is especially relevant given that music teachers lack the necessary training to offer minimal advice on health (Norton, 2016), yet music students trust them to do so (Williamon & Thompson, 2006). Furthermore, many conservatoires in the UK, endorse complementary practices such as Alexander Technique and the Feldenkrais method because they have been offered traditionally, without research evidence to support them.

Examples of unsubstantiated health-related claims include those made in the British Association of Performing Arts (BAPAM)’s factsheets, which are widely available. These contain several statements such as “hydration means water, not tea/coffee or alcohol” (*Fit to Sing*: BAPAM, 2007); “fizzy drinks, tea, coffee, and alcohol don’t do the trick, and in fact can dehydrate you” (*Sensible Eating for Performers*, BAPAM, 2008). According to the available evidence, however, moderate intake of coffee every day is as hydrating as water (Killer, Blannin, & Jeukendrup, 2014; Maughan & Griffin, 2003). Although more research is needed if firmer conclusions are to be drawn, the evidence suggests that there might not be any difference between the effects of low-alcohol beer, non-alcohol beer and water on relieving the symptoms of dehydration after mild exercise (Wijnen, Steennis, Catoire, Wardenaar, & Mensink, 2016). Indeed the American College of Sports Medicine (ACSM) recommends that beverages for optimal rehydration should consist of water, carbohydrates, sodium and

potassium, all of which can be found in beer. The extent to which athletes' and musicians' physical exertion are comparable is unclear, however. Guidelines for athletes may not be equally applicable to musicians. It would be worth asking if musicians risk dehydration following performances and what the effects of nutrition are on performance. Still, musicians should be informed as to the national guidelines on nutrition and fluid intake for the general population. The National Health Service recommends six to eight glasses of fluids a day including not only drinking water, but also water consumed from foods and other beverages such as milk, tea, coffee, fruit juices and smoothies (NHS, n.d.; CDC, 2016). *Sensible Eating for Performers* states that "excess salt leads to hypertension" (BAPAM, 2008). Although excess salt is not beneficial to health, insufficient salt has also been associated with negative cardiovascular outcomes, and the WHO recommendation that sodium intake be limited to less than 2g per day has been challenged by the authors of recent studies (Graudal, Hubeck-Graudal, & Jurgens, 2016; Graudal, 2016; Kong, Baqar, Jerums, & Ekinci, 2016).

Ackermann, Kenny, Driscoll, and O'Brien (2015) also make unsubstantiated claims in their *Health Handbook for Orchestral Musicians* and endorse chiropractic, a so-called alternative practice, for reasons that are not specified. They say that the Feldenkrais method aims to reduce pain through "mind/body exercises" (p. 34). Although many musicians find it beneficial, the method is not based on evidence and the mind/body distinction is dubious. They claim that Alexander Technique "can be used to help rehabilitate from a playing related injury or as a preventive strategy" (p. 35). Unfortunately, although many musicians use the technique, the evidence is lacking. Recommendations as to what to eat before a performance are rather arbitrary and might give the false impression they are supported by evidence.

Ackermann et al.'s advice such as "don't forget to drink enough water with your meals to keep up blood volume" (p. 16) is both unnecessarily categorical and imprecise (what is 'enough water'?). Similarly, statements such as "by the time you're thirsty it's too late" (p. 43) seem to be promoted by bottled-water industries rather than being based on evidence (McCartney, 2011). The authors also include a simplified version of the Food Guide Pyramid, the United States Department of Agriculture's

(USDA) 1992 food guidance symbol. This symbol is now out-of-date, the guidance having been revised and the symbol replaced by the MyPlate introduced during the Obama administration (USDA, 2011). This plate-based graphic is simpler, easier to visualize and can be integrated into anyone's routine. It may thus represent a more memorable form of evidence-based health communication with the potential to provide a basis for action (Ratner & Riis, 2014).

As for the section on stress management, Ackermann et al. (2015) imply that it only requires individuals to manage their cognitions, as it focuses only on thinking errors. The section on Psychological First Aid (p. 50) pathologizes anxiety as debilitating and mentions psychological treatment and beta-blockers but not behavioural strategies such as physical activity. In the section on sitting posture, they claim that having a "good performance posture is adopting a position that requires the least effort" (p. 58). This conflicts with the findings of Baadjou et al. (2011) who showed in their study that wind and brass instrumentalists showed higher, not lower energy expenditure when playing in an optimized posture, according to postural exercise therapy, rather than a non-optimised playing posture.

To take examples closer to home, the main websites of Trinity Laban Conservatoire of Music and Dance and RNCM endorse several complementary practices including Alexander Technique, the Feldenkrais method, acupressure massage, acupuncture, craniosacral therapy and reflexology, despite poor or even nonexistent evidence (Aetna, 2016). Although it is claimed that Alexander Technique can be helpful in conditions such as long-term back pain, long-term neck pain and Parkinson's disease (NHS, 2015), and potentially reduce performance anxiety in musicians (Klein, Bayard, & Wolf, 2014), the evidence does not support these claims. The Australian Department of Health commissioned a review of research on natural therapies (Baggoley, 2015) in an attempt to identify those practices that lack a sufficiently rigorous scientific basis for resources to be invested in them. The author concluded that the effectiveness of Alexander Technique can be supported only for conditions other than low back pain in the short term and that its safety and cost-effectiveness are uncertain. A similar conclusion was reached for the Feldenkrais Method: there is insufficient evidence that it is effective for the treatment of any clinical condition and its safety, quality and cost-effectiveness are also unknown.

Another review by Aetna (2016) concluded that alternative practices including acupressure, Alexander Technique, Feldenkrais method, craniosacral therapy, reflexology and many more were purely experimental and lack evidence to support their being considered effective. Although craniosacral therapy has been promoted for decades it has no credible theoretical basis and, again, lacks evidence to suggest that it can be effective for treating musculoskeletal disorders (Flynn, Cleland, & Schaible, 2006). Despite negative research findings and criticism published even in a journal likely to be biased towards supporting alternative therapies, craniosacral therapy continues to be popular (Hartman, 2006).

Ernst (2009) reviewed 18 randomised control trials of reflexology and concluded that its effectiveness for treating any medical condition was unconvincing. As for acupuncture, the evidence suggests it cannot reliably be distinguished from placebo (Madsen, Gotzsche, & Hrobjartsson, 2009) and that it might even have adverse effects (Chan, Wu, Wu, Wong, & Chung, 2017). There is little evidence that acupuncture is effective for pain reduction, although some findings suggest an exception can be made for neck pain (Ernst, Lee, & Choi, 2011). The National Institute for Health and Care Excellence (NICE) guidelines also recommend against the use of acupuncture for low back pain (NICE, 2016). In addition, acupuncture lacks a plausible mechanism (Ramey, 2000).

More rigorous research needs to be carried out on the effectiveness of practices that are particularly popular among musicians, such as Alexander Technique and the Feldenkrais method. Ideally, such practices should be offered or endorsed after sufficient evidence has been gathered, and not before or despite the lack thereof. A recent letter to the editor of *Medical Problems of Performing Artists* suggested that a study might be carried out to test the effects on neck pain in violinists (Taheri, Lajevardi, Shabani, Emami, & Sharifi, 2017) of physiotherapy and Alexander Technique combined with physiotherapy. Before this could be attempted, however, the components of Alexander Technique would have to be conceptualized more precisely than they are at present and its potentially active ingredients made explicit. It is too easy to argue against, as poor conceptualization of its components makes it hard to test using replicable methods. In many accounts to date, it appears to overlap with, if is not in fact the same as pure bodily awareness and release of physical tension.

5 My role in the project

This thesis reports research carried out as part of the one of the three ‘work packages’ or strands of the Musical Impact project, which was funded by the Arts and Humanities Research Council (AHRC) and ran between 2013 and 2017. The grant application was written by Aaron Williamon (Royal College of Music), Emma Redding (Trinity Laban Conservatoire of Music and Dance) and my primary supervisor, Jane Ginsborg (Royal Northern College of Music). It brought together all nine UK conservatoires of music to carry out a series of studies within the three strands, which sought both to explore and enhance the current state of musicians’ health and wellbeing in higher music education in the UK (Musical Impact, 2017).

The three research strands were 1) Fit to Perform (2013-2017), a longitudinal investigation of physical and mental fitness (Principal Investigator: Aaron Williamon); 2) Making Music (2014-2017), exploring the physical and psychological demands of music making (Principal Investigator: Emma Redding); and 3) Better Practice (2014-2017), focusing on health promotion and health education, particularly through the development of an evidence-based curriculum for conservatoires (Principal Investigator: Jane Ginsborg). The grant funded two project students, one on Making Music and one on Better Practice. I replaced an initial appointment as project student in the summer of 2015, when the overall direction of the project and research questions for each strand had already been established by the Musical Impact research team and steering group, and some work had already been done towards addressing the first of the two questions raised by Better Practice. My role has been to answer them to the best of my ability and within the constraints of a three-year programme of PhD studies, although I have also had the freedom to develop and address questions of my own that have arisen from the findings of the studies as the research has unfolded.

These two questions were:

1) What can be learned from existing approaches to promoting musicians' health?

2) How can such approaches be adapted, applied and evaluated across educational and professional contexts in the UK and internationally?

In this chapter I have introduced the broad topic of musicians' health and wellbeing, and summarized and critiqued the evidence to date on some of the problems they experience and their attitudes to health. I have defined the concepts that are key to the research reported in the thesis: health, health education and health promotion. I have discussed some of the issues relating to health promotion that are current in the music profession. In the next and final section of this chapter I set out an overview of the structure of the thesis.

6 Thesis structure and overview

Research Question 1: What can be learned from existing approaches to promoting musicians' health? is addressed in two chapters.

Chapter 2 consists of reviews of the published literature on health education courses for music students. It also contains a report of a survey of health education courses in conservatoires and other institutions of higher music education undertaken after the review of published literature on health education courses had been completed. These courses had not been evaluated, or if they were, the evaluations had not been published. The combination of the review of published and unpublished literature was intended to provide the fullest picture possible of 'existing approaches to promoting musicians' health' through conservatoire curricula.

Chapter 3 consists of reviews of studies describing and reporting evaluations of three types of intervention: for preventing or mitigating MPA, preventing or mitigating PRMDs in musicians and for conserving musicians' hearing. These too contribute to the picture of 'existing approaches to promoting musicians' health'.

Research Question 2: How can such approaches be adapted, applied and evaluated across educational and professional contexts in the UK and internationally? is also addressed in two chapters. Before a health education course could be designed in the form of an intervention to be implemented and evaluated, however, further information was needed as to the issues of primary concern to the undergraduate students who would be taking the course.

Chapter 4, therefore, consists of a report of a study conducted to investigate students' self-referrals for counselling at RNCM based on records held by two student counsellors between 2000 and 2016, in order to explore trends in students' attendance at counselling sessions over time, and identify their reasons for seeking and continuing to attend counselling sessions.

Research Question 2 is directly addressed in Chapters 5 and 6. On the basis of the literature reviews and study reported in this chapter, and Chapters 2-4, a compulsory course entitled Health and Wellbeing for Musicians was designed and delivered to all first-year undergraduate students over two terms from September 2016 to February 2017 as part of a larger module called Artist Development 1. Its design and the evaluation of quantitative data are reported in Chapter 5 and the evaluation of qualitative data is reported in Chapter 6.

Had there been time, I would have liked to have undertaken a second intervention study aiming to explore the effects of physical activity on students' health (i.e. MPA and PRMDs). This proved unfeasible. Instead, a cross-sectional questionnaire survey of UK music students (the majority at RNCM) was undertaken, investigating variables associated with risk factors for PRMDs and their relationships with PRMDs, pain and perceived exertion. This study is reported in Chapter 7.

Chapter 8, the final chapter of the thesis, includes a general discussion and considers the limitations of the research, its implications for practice, introduces a project that has developed from the findings of the present research and makes suggestions for future work in this domain.

Chapter 2

Health education: Systematic review and survey

1 Introduction

This chapter reports two studies of health education for music students:

- A systematic review of literature reporting evaluations of health education courses
- A survey of health education courses implemented and/or planned in European conservatoires during the 2016/2017 academic year

The purpose of the first study was to investigate the effects of health education courses on a range of outcomes by means of a systematic review, so as to identify the opportunities they offer, their limitations, and show how they informed the programme of research reported later in this thesis. It subsequently became clear from discussions with colleagues at other institutions of higher music education that many health education initiatives take place (or are reported to take place) in conservatoires but are not evaluated thoroughly, if at all, and if they are evaluated, the evaluations are not published in peer-reviewed journals and therefore could not have been included in the systematic review. For the sake of completeness and in an attempt to capture the real-life provision of health education courses as accurately as possible, an online survey of conservatoire staff, including administrators, was conducted. This should be regarded as a complement to the systematic review, although its findings did not contribute to the design of the health education course reported in Chapter 5.

While similar in scope, literature reviews and systematic reviews differ in terms of their focus, methods of data collection and extraction, methods of data analysis, and presentation. Unlike literature reviews, systematic reviews ask specific questions that guide the whole research, and imply planned searches of all relevant databases and even the ‘grey’ (i.e. non-peer reviewed) literature using precise keywords. Specific tools for data extraction such as inclusion/exclusion criteria are used and, ideally but not

invariably, more than one researcher conducts the entire process. Finally, but equally importantly, systematic reviews apply specified criteria to assess the rigour and strength of evidence of the papers included and present the data in charts or tables (Robinson & Lowe, 2015).

Like literature reviews, systematic reviews can sometimes be biased, poorly conducted and unnecessarily rigid in their focus (Greenhalgh, Thorne, & Malterud, 2018). Nevertheless, systematic reviews have advantages relevant to the present study: transparency, breadth while keeping focus, and rigour (Mallett, Hagen-Zanker, Slater, & Duvendack, 2012). Intensive resources are needed to evaluate health education programmes and publish the findings in peer-reviewed journals and it is perhaps unrealistic to expect institutions to do so as a matter of routine. As the overall aim of the research reported in this thesis was to improve the effectiveness of such programmes, however, detailed information as to the content of each programme, its methods of delivery and the measurement of outcomes was needed. Without this information it is impossible to know if the aims of an existing course were met or to develop standards and guidelines for future courses.

On the model of Kenny (2005), the systematic review reported in this chapter was undertaken by a single researcher, which could have led to bias. Aware that the topic was potentially too complex to be forced through narrow filters, the researcher used generous inclusion criteria to avoid missing valuable context. Finally, the review was complemented by the survey reported in the next section of the chapter.

The term ‘intervention’ is used throughout this chapter when referring to health education courses, which are understood here as stand-alone courses, modifications to existing courses, seminars, guest lectures, and other relevant activities designed for educating music students on health and wellbeing as a primary strategy for health promotion. A health education programme is an intervention, because it represents an action aiming, at the very least, to change awareness and knowledge. The broad sense in which it is used here is in line with WHO’s International Classification of Health Interventions (ICHI), which refers to education to influence lifestyle behaviours as an intervention and describes a health

intervention as “an act performed for, with or on behalf of a person or population whose purpose is to assess, improve, maintain, promote or modify health, functioning or health conditions” (WHO, 2018b).

The distinction between health education and health promotion was clarified in Chapter 1, Section 3. According to WHO, health education refers to “consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills, which are conducive to individual and community health” (WHO, 2012, p. 59). Health promotion involves a combination of changes initiated at social, environmental and economic levels, and efforts directed towards increasing individuals’ capabilities and health literacy. It is not always easy to draw the line between health education and health promotion, as health-related behaviour is recognised to be based not only on individual autonomous control, but also on living conditions that are socially, culturally and economically conditioned (WHO, 2012). The extent to which health promotion necessarily encompasses or ought to encompass health education is also unclear. After all, ‘nudge’ theory has been implemented successfully in certain health-related areas, without ever having being aimed at making people more health literate, but rather at influencing their decision making through the design of choice architecture (Arno & Thomas, 2016; Broers, De Breucker, Van den Broucke, & Luminet, 2017). While such interventions might have aimed to raise awareness and address the message-action gap they may in fact have had more impact on health behaviours (Brambila-Macias et al., 2011). Improvements in health-related knowledge and behaviour do not, however, automatically translate into improvements in health outcomes or disease prevalence (D’Eath, Barry & Sixsmith, 2012).

According to WHO, health is not only the absence of disease, but rather a state of overall physical, social and mental wellbeing (WHO, 2012). Given the importance of performance quality, and the centrality and meaning of the entire music making process for the musician’s wellbeing, the concept of health might be even broader, so as to include key occupational aspects. There might indeed be a need for holistic, interdisciplinary and biopsychosocial programmes raising awareness and providing training not only for healthy lifestyles, but also training musicians in skills that are

relevant to their profession, such as pre-performance routines, body awareness, relaxation techniques, and/or mental/psychological skills such as imagery (Baadjou et al., 2014; Clark & Lisboa, 2013; Foxman & Burgel, 2006). However, it is unclear whether improving performance quality necessarily has an impact on the musician's health and if so, how. After all, Kreutz, Ginsborg and Williamon (2008) found mixed results for associations between health-related behaviours and practice and performance quality. Psychological skills and/or performance routines are often investigated in various combinations, sometimes as part of complex programmes of intervention, and it is difficult to tease apart their effects independent of each other. For example, while musicians might improve their ability to use imagery in performance, it has not yet been shown that, or how the use of imagery affects health outcomes such as musicians' levels of performance anxiety (Finch & Moscovitch, 2016).

Finally, despite the conceptual complexities described above, one of the main goals of health education is health literacy, which is about imparting knowledge, or the individual's ability to obtain, interpret and understand health information and services, and developing decision-making skills, or the ability to make use of health information so as to improve or maintain health (WHO, 2012). The main focus of the present review is health education. However, given that most authors use health education and promotion interchangeably, both terms were used in search strings. Nevertheless, only outcomes matching the definition of health education most directly were considered.

2 Health education programmes for music students

2.1 Methods

The present systematic review was based on both the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement guidelines for systematic reviews, including an adapted checklist and a four-phase flow diagram (Moher et al., 2009) and the Cochrane Handbook for Systematic Reviews of Intervention (Higgins & Green, 2011). This review was not registered in any database.

2.1.1 Search strategy

Relevant articles were retrieved through computerized search via PubMed, Web of Science, Ovid Full-Text Journals and MEDLINE® (1946 to October 2018), and Google Scholar. Also, manual searches were conducted of relevant journals such as *Psychology of Music* and *Medical Problems of Performing Artists* (*MPPA*), using a purposive list of search terms and their truncations, connected with Boolean operators. The help of a librarian specialising in health from Manchester Metropolitan University was sought and obtained in finalising the search strategy. Three separate word strings were searched in titles and abstracts: 1) health promotion or prevention, 2) programme or intervention, 3) music students. The search strategy was slightly adjusted to meet the requirements of each database, but was largely as follows:

1. health OR health promotion OR prevent* OR prophyla* OR occupational OR performance anxiety OR MPA OR musculoskeletal OR PRMD* OR hearing OR injur* OR pain OR mental OR health behavio* OR wellbeing OR stress OR psychological* OR physical*

2. course OR curricul* OR elective OR training* OR program* OR intervention OR education* OR learning

3. music student* OR musician student* OR conservatoire student* OR music college* OR musician*

Conference proceedings and presentations, dissertations and theses, were searched via ProQuest. Lists of references in articles and publications by relevant researchers were also searched manually. Additionally, the research of relevant authors was monitored via ResearchGate. No date restrictions were applied. The PRISMA flow diagram is shown in Figure 1.

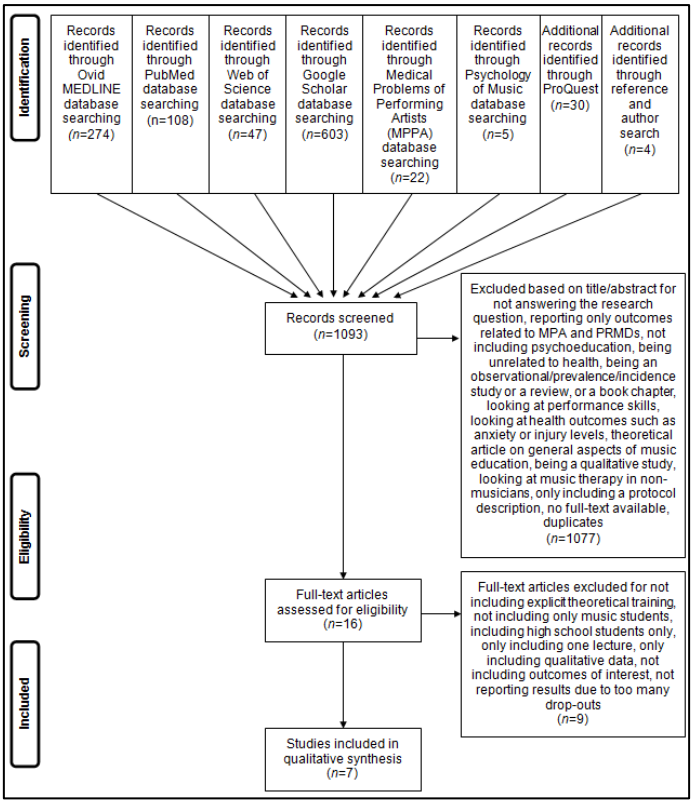

Figure 1. PRISMA flow diagram

The titles and abstract of records were screened to remove the irrelevant ones. Next, the full-text articles of kept records were read and evaluated against the eligibility criteria.

2.1.2 Inclusion criteria

Because this was, to the researcher's knowledge, the first systematic review of health education programmes for music students to be undertaken, inclusion criteria were broad, as follows:

- participants were adult students (singers and instrumental musicians) in higher education music institutions
- samples were from the normal population
- studies were conducted in a school, conservatoire or university setting
- a control group was or was not used
- reported outcomes related to musicians' health and wellbeing
- measurements were quantitative: objective or subjective
- full-text was available

- any design of intervention was considered except case studies
- the study was undertaken anywhere in the world
- any type of publication was considered (e.g. peer-reviewed articles, conference presentations, dissertations, theses, etc.)
- articles were written in English only.

For the purposes of this review, health education and/or health promotion initiatives were eligible if they represented stand-alone interventions or were part of wider health education/promotion courses. Health education components were defined according to WHO (1998) and had to consist of any planned activity or set of activities aiming to increase health literacy (i.e. health-related knowledge including health information and knowledge of risk factors and behaviours; relevant skills and confidence/self-efficacy to take action for health improvements) via counselling, teaching, training or other educational processes such as guided group discussions or behavioural modification strategies (Zhu, Ho, & Wong, 2013). Such programmes could be part of or separate from the formal curriculum, so long as they took place in an institution of music education (college, high-school, conservatoire or university) rather than a clinic, and if they incorporated a sufficiently complex, multi-component intervention comprising both applied sessions and explicit training/education in the form of theoretical sessions and/or lectures with a frequency of at least once a week for a minimum of two weeks. However, courses might focus more on psychological than physical issues or vice versa. Additionally, any delivery method (i.e. face-to-face, via telephone or internet) was accepted. Only studies focusing on universal preventative interventions were included, to fulfil the criterion of “a measure that is desirable for everybody in the eligible population” (Mrazek & Haggerty, 1994, p. 20). Articles that could not be accessed through the libraries of Manchester Metropolitan University or the Royal Northern College of Music were excluded.

Outcomes had to be measurable and included one or all of the following: a) changes in actual or perceived health-related knowledge, awareness, importance, attitude, and self-efficacy, b) health-related behaviour change (self-reported or objective)/lifestyle modification(s), and c) practice-related behaviour changes such as warming up and/or taking breaks. Additionally,

outcomes could include participant satisfaction/feedback and acceptability/feasibility. Outcomes such as performance quality, changes in mental skills such as imagery, mental rehearsal, etc., and/or health outcomes related to anxiety or PRMDs were excluded.

2.1.3 Data collection

Data collection and assessment took place mostly between May 2016 and September 2016 and were constantly updated until October 2018. Data items extracted included study design; sample characteristics; information about the intervention; outcome measures; and results as expressed by the authors such as *p* values, effect sizes where applicable, frequency counts and percentages.

2.1.4 Risk of bias

Quality assessment was completed using an adapted version of the Effective Public Health Practice Project tool for quantitative studies (EPHPP, 1988), which uses the rating scale ‘strong’, ‘moderate’ or ‘weak’, allowing for a final decision based usually on deliberations between the reviewers, but in this case based on the decision of a single researcher, for six components: selection bias; study design; confounders; blinding; data collection method; and withdrawals and dropouts.

2.1.5 Effect sizes

Where possible, Cohen’s *d* was determined by calculating the mean difference between groups or time points (e.g. pre and post/follow-up) and dividing the result by the pooled standard deviation: $d=(M1-M2)/SD_{pooled}$. Effect sizes were considered as follows: $d=0.20$, 0.50 and 0.80 for small, medium and large effects respectively (Cohen, 1988; Kenny, 2005). Where insufficient data were reported, effect sizes were not calculated.

2.2 Results

In total, seven papers were retrieved. Appendix A contains summaries of all included papers. The interventions included were conducted in the Netherlands, Germany, Spain, Iceland, Taiwan, Canada and the US.

2.2.1 Sample sizes and demographics

Sample sizes ranged from 15 (Su, Lin, Tang, Su, & Chen, 2012) to 247 student participants (Zander, Voltmer, & Spahn, 2010) and encompassed a total of 656 students. All interventions were conducted in conservatoire settings. Students' ages ranged from 18 (Barton & Feinberg, 2008) to 25 years (Laursen & Chesky, 2014; Su et al., 2012). Proportions of participants of each sex ranged from 7% (Su et al., 2012) to 58% males (Laursen & Chesky, 2014).

Musical experience and training differed. For example, Barton and Feinberg (2008) included participants whose number of years playing primary instrument ranged from two to nine. Both undergraduate and postgraduate participants in all studies played a variety of instruments. Some interventions also involved music education students (Barton & Feinberg, 2008; Su et al., 2012; Zander et al., 2010) and one study involved music education majors only (Laursen & Chesky, 2014). Most studies focused on undergraduate students, while Su et al. (2012) included only postgraduate students.

2.2.2 Study design

All studies used repeated-measures designs: mostly pre-post (Arnason, Briem, & Arnason, 2018; Laursen & Chesky, 2014); pre-post with six weeks (Barton & Feinberg, 2008), one month (Su et al., 2012), one year follow-up (Zander et al., 2010), and two year follow-up (Baadjou et al., 2018) respectively; pre-post and a time point halfway through the intervention (Lopez & Martinez, 2013). Five studies included a control group (Arnason et al., 2018; Baadjou et al., 2018; Barton & Feinberg, 2008; Lopez & Martinez, 2013; Zander et al., 2010), and only one was a parallel randomised controlled trial (RCT) (Baadjou et al., 2018).

2.2.3 Course structure and delivery

Lengths of intervention ranged from eight weeks (Barton & Feinberg, 2008) to 14 weeks (Su et al., 2012), 15 weeks (Laursen & Chesky, 2014), nine months (Arnason et al., 2018) and one year (Baadjou et al., 2018; Lopez & Martinez, 2013; Zander et al., 2010). Courses incorporated theoretical lectures with applied exercises, instrument-specific sessions, individual sessions in the form of personalized instruction, and small group discussions. Only one study included e-learning (Su et al., 2012). Courses were delivered by a range of health professionals with expertise in occupational therapy, public health, physiotherapy, psychiatry, psychology, otolaryngology and music performance (Arnason et al., 2018; Su et al., 2012; Zander et al., 2010).

2.2.4 Course content

Intervention content varied widely, but was generally fairly broad across studies and included information about the musculoskeletal system, risk factors and preventative strategies for PRMDs such as physical exercise (Arnason et al., 2018); warming up strategies (Lopez & Martinez, 2013); and tools to increase levels of physical activity more broadly via the use, for example, of pedometers, self-monitoring and goal setting (Baaadjou et al., 2018). They included information on healthy lifestyle, including sleep and nutrition, and tools for stress and anxiety management (Barton & Feinberg, 2008; Su et al., 2012); information on national guidelines, where to get help and reliable sources of health-related information (Baadjou et al, 2018; Laursen & Chesky, 2014). They also included sessions on somatic movement, Alexander Technique and the Feldenkrais method (Su et al., 2012; Zander et al., 2010). Only two interventions explicitly included information on hearing loss (Laursen & Chesky, 2014; Su et al., 2012).

According to the names and aims of the courses, two concerned health education and prevention (Arnason et al., 2017; Laursen & Chesky, 2014); three concerned the prevention of musculoskeletal problems (Baadjou et al., 2018; Barton & Feinberg, 2008; Lopez & Martinez); and three concerned health promotion (Barton & Feinberg, 2008; Su et al., 2012; Zander et al., 2010). While all courses seemed to be relevant to musicians,

Laursen and Chesky (2014) added the health-related components of their course to an already existing brass methods course for music education students.

2.2.5 Course design

Only three studies were based on theoretical frameworks. Zander et al. (2010) say their intervention was derived from Festinger's cognitive dissonance and Becker's Health Belief Model and based, in addition, on a stage model for pedagogical purposes dictated by goals such as raising awareness; increasing knowledge and motivation; developing skills and implementing them; and maintenance. They offer no further information, however, as to how the components of the Health Belief Model (including perceived severity, susceptibility, benefits and barriers) fit with their own stage model. Laursen and Chesky (2014) used a conceptual framework inspired by various theories: the Transtheoretical Model, the Precaution Adoption Model, Bloom's Taxonomy of Cognitive Behaviors, the Theory of Reasoned Action/Planned Behavior, Reasoned Action, and Precede-Proceed Models. Finally, Baadjou et al. (2018) compared two interventions that were both based on teaching awareness, motivation and implementation skills so as to influence behaviour changes. The intervention groups received advice on postural awareness while playing; instrument-specific biomechanics; and ergonomics. They also took part in group discussions on psychosocial aspects of music making such as performance anxiety, pain, stress management and practice behaviour.

2.2.6 Use of subgroups

Only Zander et al. (2010) compared male and female participants in control and intervention groups categorised by programmes of study (Certified Music Teacher, Artistic Training and School Music Division).

2.2.7 Outcomes

All outcomes were based on self-report, mostly self-developed. While Appendix A contains all the outcome measures and results, only the outcomes of most interest will be reported in this section.

2.2.7.1 Awareness, perceived competency, perceived responsibility and attitude

Two of the seven articles reported these outcomes. To evaluate awareness, Laursen and Chesky (2014) asked students to report their level of agreement with several health-related statements. Significant results were obtained for three out of five items that asked about awareness of the negative impacts on health of performing music, of national trends aimed at addressing performance-related health issues, and of risk factors for injuries. Perceived competency was assessed via a visual analogue scale (VAS) scale looking at how prepared and comfortable students felt about dealing with health injuries and significant results were obtained for both items. Perceived responsibility was assessed by gauging the extent to which students felt responsible for helping to prevent health problems in their own students, in future. However, no changes were found for these two items. Attitude was assessed by Arnason et al. (2018) who investigated students' body awareness and their perception of the importance of good health. Significant changes were obtained only for body awareness when practising and performing live, but not for body awareness in daily life activities or importance of good health.

2.2.7.2 Knowledge, actual or perceived

Two of the seven articles reported these outcomes. Barton and Feinberg (2008) assessed actual knowledge by asking 15 multiple-choice questions on medical problems, prevalent risk factors for musicians, health promotion and injury prevention solutions. Significant improvements were reported at both the end of the course and six weeks after the completion of the course. However, no information is provided as to how the questionnaire was constructed or the actual items included in the questionnaire. Laursen and Chesky (2014) evaluated perceived knowledge, having included health and safety information in the course of five lessons included in a brass methods course for music education students, by asking participants to describe their theoretical or practical understanding on a 10-cm VAS scale ranging from 'not at all' to 'totally'. There were significant improvements on all knowledge-related items. These related to sound intensity levels associated with hearing loss, how to use a dosimeter and the knowledge

needed to deal with health issues associated with playing a brass instrument.

2.2.7.3 Behaviour change

Five studies investigated self-reported behaviour change, all of which used unvalidated tools. However, an occupational course including lifestyle information and preventative techniques (Barton & Feinberg, 2008) and the e-learning curriculum (Su et al., 2012) produced significant pre-post intervention changes in behaviours related to practice and performance, such as taking regular breaks, stopping practice when in pain, stretching, warming up, advance preparation, etc., but not lifestyle, such as eating healthily, staying hydrated, sitting correctly, etc.

A course on ergonomics and musculoskeletal injury prevention (Lopez & Martinez, 2013) produced improvements in number of people engaging in warm-up exercises, although exact *p* values are not provided.

Zander et al. (2010) found improvements in preventative behaviour in students enrolled on the Certified Music Teacher (CMT) degree programme, defined as actively employing measures aimed at protecting themselves from symptoms of strain related to their activity as musicians, but not the other two programmes. These students spent more time playing their instruments than engaging in other areas of studies, when compared to students enrolled in the Artistic Training (AT) programme. Preventative behaviours included general body training and sports, relaxation techniques, body methods (Feldenkrais method, Alexander Technique, dispokinesis) and psychological measures such as seeking professional help in the form of psychotherapy.

Finally, Arnason et al. (2018) reported significant pre-post changes in the intervention group in warming up before playing, but not in the use of PRMD-preventative methods or engagement in physical activity, although the latter might have been due to most participants already engaging in regular physical activity before the intervention.

2.2.7.4 Satisfaction with course/Acceptability

Arnason et al. (2018) asked students to rate the content of their course and the teacher on a scale from 0 to 5 and obtained scores of 4.5 and 4.8 respectively.

2.2.8 Assessment of bias risks

As shown in Appendix B, the quality of four studies was deemed moderate (Baadjou et al., 2018; Laursen & Chesky, 2014; Lopez & Martinez, 2013; Zander, Voltmer & Spahn, 2010) and the quality of the remainder was deemed weak. Few provided attrition rates or potential reasons for attrition. The study reported by Baadjou et al. (2018) had an attrition rate of approximately 70%, although it followed participants for longest and their reasons for dropping out were specified. Generally, it was difficult to gauge attrition, as authors tended to report only the numbers of participants who completed all outcome measures, rather than also the numbers of participants who were part of the study when the intervention began. The likelihood of selection bias was rather high, as the authors of some studies did not include a control group and in only one study (Baadjou et al., 2018) were participants assigned randomly to groups. In general, when the intervention that was being evaluated was offered as an (optional) elective, participants may have been more likely to need the intervention, thus increasing the selection bias. Most outcome measures used self-developed, unvalidated tools, thus compromising the reliability of findings. Potential reasons for non-significant results include small sample sizes; group differences at baseline such as prevalence of PRMDs and year of study; ceiling effects created by health being generally perceived as important and most participants reporting high levels of physical activity both pre- and post-intervention (Arnason et al., 2018); measurement tools insufficiently sensitive to identify change; high attrition rates; contamination between groups; and comparisons of interventions shown to be equally effective (Baadjou et al., 2018).

2.3 Discussion

The systematic review of the literature reported above found evaluations of seven health education courses for music students. Although scarce, the interventions encompassed a myriad of components addressing broad topics such as the prevention of musculoskeletal injury, the management of stress and anxiety, hearing loss, lifestyle, and ergonomics. Outcomes included awareness and knowledge, perceived competency, responsibility and importance, as well as health- and practice-related behaviour change. Most studies reported some positive associations between interventions and outcomes although the reliability of these findings is compromised by several important limitations. The studies evaluated the effectiveness of health education and health promotion courses using a wide variety of outcomes and used a wide variety of tools to measure similar outcomes. There was a lack of standardisation across studies both in the evaluation techniques used and the durations of interventions. Findings require cautious interpretation, given that a high proportion of studies did not use active control groups or provide inter-group comparisons. Some authors did not report analyses of statistical tests, which further limits the interpretation of results.

There was a lack of rigour with respect to the detailed reporting of all components of each intervention. Detailed reporting would facilitate replication and improve the knowledge of what works and why (Michie et al., 2013), helping to establish better guidelines and practices. This could only be achieved, however, by evaluating each component individually, even though effectiveness must depend on its degree of fit for the individual. Arguably, more economical interventions comprising only the tools deemed most effective could make programmes more appealing, given recruitment issues attributable in part to music students' and teachers' busy schedules and prioritising musical activities over health education sessions (Baadjou et al., 2018; Clark & Williamon, 2011). The nature of health education/promotion is highly interdisciplinary, so the design of programmes aiming to change behaviour would also benefit from the use of the latest comprehensive frameworks (Michie, Stralen & West, 2011). Chan and Ackermann (2014) recommend that an occupational programme for enhancing musicians' health should be designed and

implemented with maximum rigour to increase the likelihood of its effectiveness. More specifically, they advise that all stakeholders, such as researchers, clinicians and music teachers, should be involved in its development, and they argue for the use of formative and pilot testing methodologies. Formative methodologies include reviewing the literature thoroughly and arriving at the solutions most appropriate to the context via discussion between different stakeholders. Pilot testing would allow for necessary adjustments to take place based on the feedback from the sample it is being piloted on. In only one of the articles reviewed above was evidence of such co-operation with stakeholders reported: Baadjou et al (2018) designed their biopsychosocial course in collaboration with therapists specialised in postural methods and experienced in treating musicians and conservatoire staff, according to the RCT protocol published elsewhere (Baadjou et al., 2014). The course, however, included postural exercise therapy based on Mesendieck or Cesar methods for which empirical evidence is missing. Given the course's focus on behaviour change, perhaps a health psychologist should also have been included, given that one of the core competencies that a health psychologist has, at least if accredited in the UK, is in designing and evaluating behaviour change interventions based on needs assessment and formulating working models accordingly (British Psychological Society, 2018).

According to Ingle (2013) the most effective strategy for establishing a culture of health promotion and injury prevention is to ensure that appropriate training forms a compulsory component of curricula for music students. While an elective course is likely to draw the attention of students already suffering from various problems, a course that is incorporated into the core curriculum might have a more important preventative function (Spahn, Hildebrandt, & Seidenglanz, 2001). Some of the courses described in the studies above were electives and therefore optional (Arnason et al., 2018; Lopez & Martinez, 2013), but others were compulsory (Barton & Feinberg, 2008; Zander et al., 2010). One course was made compulsory for all first year undergraduate students after it had been evaluated (Arnason et al., 2018). Aside from the potential disadvantages to those who do not choose to attend, it is difficult to make firm recommendations on the basis of the findings of research on elective courses since the likelihood of selection bias in the intervention group is high and the distinction between

prevention and treatment blurred given that members of intervention groups are more likely to display existing symptoms (Spahn et al., 2001; Zander et al., 2010). It is particularly important that music educators are aware of this distinction, so training should differentiate between clinical assessment (diagnosis) and treatment of symptoms, on the one hand, and education for the prevention of injury, on the other (Spaulding, 1998). Those who develop courses for health promotion should be wary of the many components of the courses reported in the studies reviewed that incorporated elements poorly supported by research evidence. Often, the content of interventions included popular practices such as Feldenkrais and Alexander Technique that are rarely questioned, let alone evaluated systematically (Klein et al., 2014; Baggoley, 2015). Arguably, such choices lack justification and might detract from the use and further exploration of practices that have already been shown to be effective, depending on their intended purpose. Such choices may also unnecessarily burden music students' timetables.

The discrepancy between the large number of results obtained after the initial search in some of the databases and the final number of records included in the review can be explained in several ways: the search strings might have been too inclusive, while the inclusion criteria – despite their intended generosity – were nevertheless too strict. Once having been set, however, eligibility criteria should not be adjusted according to the researcher's prior knowledge of the current literature and its limitations. Relevant articles in languages other than English could have been included. It might have been better, too, to include articles reporting courses focusing on mental skills and performance skills, since these often report outcomes for self-regulated learning; technical proficiency; self-efficacy; mental imagery; focus and concentration; memorisation; mental rehearsal; and coping with work (Clark & Williamon, 2011; Osborne, Greene, & Immel, 2014; Spahn et al., 2001). Yet, important for musicians' performance and wellbeing as these skills might be, the decision had been made to distinguish (however artificially) health- and practice-related behavioural changes such as warming up or engaging in physical activity, on the one hand, and psychological and/or performance skills, on the other. The latter were often linked to performance enhancement and performance anxiety.

Recommendations arising from this review can be made as follows. Future intervention studies should include larger studies with more participants, making use of randomization, validated questionnaires and more objective measures. Longer follow-ups would be particularly valuable given that physical health and psychological wellbeing are determined at least in part by health-related behaviours and improvement, where necessary, can take time (Zander et al., 2010; Barton & Feinberg, 2008). Performance quality should be included as an outcome, even though it was not included in this review and inter-rater reliability can be low when it is measured (Clark & Williamon, 2011), as it is potentially self-reinforcing, leading to greater self-confidence and reduced anxiety (Kenny, 2005). In addition the objectives of a health education programme might be framed as 'performance-enhancing' rather than 'preventative' since this is likely to be more attractive to students. However, this should only be done when the information delivered is supported by evidence, as it remains unclear whether improved wellbeing leads to better performance (Osborne et al., 2014).

To conclude, the evidence on health education courses for music students derives from sparse research betraying considerable methodological limitations and is too varied for firm conclusions to be drawn. Future work should aim to specify desired outcomes for health education and the most robust measures for assessing the extent to which they have been achieved. The effectiveness of individual strategies should be investigated separately before they are incorporated, into an ideal health education course, using the criterion of evidence rather than, as so often hitherto, popularity.

3 Health education in European conservatoires

3.1 Background

While undertaking a review of articles reporting evaluations of health education programmes might be considered a rigorous approach to assessing the state of health education in conservatoires, it may produce a picture that does not match reality. First, most forms of health education are not developed systematically, tested using approved research protocols or

reported in peer-reviewed journals. Rather, they occur spontaneously and are likely to change constantly, their content depending on the culture of the institution and the availability of local resources. These characteristics result in a diversity of practices, often implemented quickly and in less orderly fashion than is conventional when a health education programme represents an intervention in the context of a research study. Second, health education programmes are intrinsically complex and delivered in the real world. This makes it hard for researchers to capture their effects and identify the ingredients causing them.

3.2 Rationale and research questions

A small-scale study was therefore carried out to complement the systematic review reported in Section 2. It consisted of a survey of initiatives related to health education that had been completed or were scheduled to take place in 2016-2017 at European higher education music institutions, to discover their aims and objectives; how they were designed; to and by whom they were delivered; their content; and if and how they were evaluated. This survey is reported in the next section of the chapter.

3.3 Method

3.3.1 Design

This study was a cross-sectional questionnaire survey.

3.3.2 Respondents

The survey was open to school administrators, course leaders and other relevant personnel at all the higher music education institutions in Europe, providing they played a key role in the design, implementation and/or evaluation of a health education programme. They were recruited by the researcher via emails addressed to each institution and the newsletter of the Association Européenne des Conservatoires (AEC: European Association of Conservatoires), which described the study and requested participation.

3.3.3 Questionnaire

A 42-item questionnaire was created by the researcher specifically for the purposes of the study (see Appendix C). In the preamble, health education was defined as comprising "consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health" (WHO, 1998, p. 4). Respondents were told that, according to WHO, life skills could include decision making and problem solving, creative thinking and critical thinking, self awareness and empathy, communication skills and interpersonal skills, coping with emotions and managing stress. Respondents were asked to submit a separate questionnaire for each health education programme completed in or planned for the 2016-2017 academic year only. These could include stand-alone courses, modifications to existing courses, seminars, guest lectures, and other activities designed for educating student musicians or music teachers on health and wellbeing as a primary strategy for health promotion. Respondents were told that completing the questionnaire would take 15-20 minutes. Questions concerned aims and objectives, underlying theoretical assumptions, format, content, length, teaching staff, target population, and evaluation methods. Response options included yes/no and multiple-choice answers, Likert scales and free text.

3.3.4 Procedure

The questionnaire was created using the Bristol Online Survey tool, a UK-based platform permitting the design of easy-to-use online surveys for research and education purposes, as well as for public sector organisations (BOS, n.d.). The link to the questionnaire was distributed to institutions that are part of the AEC, a network bringing together approximately 300 member institutions in 57 countries (AEC, n.d.). The network encompasses organisations both inside the European Higher Education Area (EHEA), which includes 48 countries and the European Commission (EHEA, n.d.) and outside Europe, defined as countries characterised by "increased

cooperation under the European Neighbourhood Policy" (AEC, 2017) whose institutions offer the same level of training.

Institutions named on the AEC website were approached initially on the basis of their locations in Europe (as opposed to the EHEA) via individual emails sent between August and December 2017. I then used my personal contacts (fellow musicians and former colleagues) to recruit further institutions. Ultimately, 240 institutions in 38 countries were contacted, as shown in Table 1.

Table 1. Institutions contacted by country

Country	No of institutions	Country	No of institutions
1. Albania	1	20. Ireland	3
2. Austria	10	21. Italy	53
3. Belarus	1	22. Latvia	1
4. Belgium	9	23. Lithuania	2
5. Bosnia and Herzegovina	2	24. Luxembourg	2
6. Bulgaria	2	25. Macedonia	1
7. Catalonia	1	26. Norway	8
8. Croatia	2	27. Poland	8
9. Cyprus	2	28. Portugal	2
10. Czech Republic	2	29. Romania	4
11. Denmark	4	30. Serbia	3
12. Estonia	2	31. Slovakia	1
13. Finland	9	32. Slovenia	1
14. France	19	33. Spain	16
15. Georgia	1	34. Sweden	9
16. Germany	27	35. Switzerland	8
17. Greece	3	36. The Netherlands	9
18. Hungary	1	37. UK*	8
19. Iceland	1	38. Ukraine	2

*RNCM was excluded

In December 2017, the AEC expressed interest in the results of the survey and therefore agreed to include the link to the questionnaire in their newsletter and promote it via social media. It was thus sent to all AEC members, including those that had not been contacted initially by email. Ethical approval was granted by the Conservatoires UK Research Ethics Committee (see Appendix D).

3.3.5 Analysis

The data were exported into an SPSS file. Descriptive statistics were calculated. The researcher performed a content analysis of data by categorising the open-ended responses.

3.4 Results

3.4.1 Demographic data

As shown in Table 2, 21 responses to the survey were received from 17 institutions in 11 countries (Austria, Belgium, Finland, France, Germany, Iceland, Italy, Poland, Sweden, Switzerland, and the Netherlands).

Table 2. Survey respondents

Country (*n*)	City	Institutions
Austria (*n*=1)	Vienna	Universität für Musik und darstellende Kunst Wien
Belgium (*n*=2)	Bruxelles, Antwerp	Conservatoire Royal de Bruxelles; Royal Conservatoire Antwerp
Finland (*n*=1)	Turku	Turku Arts Academy
France (*n*=2)	Bordeaux, Lille	Pôle d'Enseignement Supérieur de la Musique et de la Danse Bordeaux Aquitaine; Ecole Supérieure Musique et Dance Nord de France
Germany (*n*=5)	Munich x 2, Hannover, Wuerzburg, Dresden	University of Music and Performing Arts Munich; University of Music, Drama, and Media Hannover; University of Music, Wuerzburg; University of Music Carl Maria von Weber (Institute of Musicians' Medicine)
Iceland (*n*=2)	Reykjavik x 2	Iceland Academy of Arts
Italy (*n*=1)	Padua	Padua Music Conservatory
Poland (*n*=1)	Lodz	The Grażyna and Kiejstut Bacewicz in Łódź
Sweden (*n*=3)	Stockholm x 2, Malmo	Stockholms Musikpedagogiska Institut (SMI)
Switzerland (*n*=2)	Zurich, Basel	Zurich University of the Arts; Basel University of Music
The Netherlands (*n*=1)	Rotterdam	Codarts

Responses from two institutions (Athens Conservatoire and the Saint Louis College of Music in Rome) indicated that they did not have any health education programmes. Other responses were from representatives of

institutions offering more than 20 programmes who said it was too time-consuming for them to complete individual questionnaires for each one. They did not reply to me when I proposed alternatives such as phone conversations).

3.4.2 Content analysis of open-ended responses

Aims and objectives of programme: to raise awareness, improve knowledge, provide adequate training, improve students' resilience, and prevention.

Date of first implementation (month and year) and status: Programmes had first been implemented between 1979 and 2017 (one in 1979, four between 1994 and 1998, and 14 between 2008 and 2017). Nineteen were ongoing and one had stopped.

Modifications to the initial course: A total of 17 had been modified while only two (implemented in 2014 and 2016 respectively) had not. Two respondents did not know.

Basis/reasons for modifications: A total of 17 responses were provided, including students' feedback and evaluation (*n*=7); the expertise of different guest lecturers and course leaders (*n*=4); current research (*n*=3). In the ‚Other' textbox two respondents cited ‚increased curriculum' and single respondents cited a new partnership between the conservatoire and the college of physiotherapy, the introduction of a stress management course, a greater focus on prevention, ‚increased emphasis on strength training' and ‚resources available'.

Extent to which the course was embedded in the school curriculum: Seventeen courses were and four were not embedded in the school curriculum.

Compulsory or optional: Fourteen courses were compulsory and seven optional.

Stakeholders involved in course design: Health professionals (*n*=17); music teachers (*n*=16); music students (*n*=12); managerial staff (*n*=10); researchers (*n*=8); administrative staff (*n*=5); and a dance teacher (*n*=1). In one case the course had been designed exclusively by music teachers and

in another, it had been designed exclusively by music students. Most involved a three or four different stakeholder groups.

Basis on explicit theoretical assumptions or model: Yes (*n*=17); No (*n*=2); I don't know (*n*=2).

Numbers of responses to each category of assumptions and models listed are shown in Table 3. Specific models mentioned (one response each) included the biopsychosocial model; the general salutogenesis approach combined with adaptations of models from the literature; current models of musicians' performance anxiety with reference to Kenny (2011) and literature on pain perception; the Music in Health Settings model initiated by the European Research, Development and Innovation (RDI) cooperation 2011-2013. Responses in the ‚Other' textbox included experience and knowledge from previous years (*n*=2); the expertise of the course director/leader (*n*=2); recommendations from the German Association of Music Physiology and Musicians Medicine (DGfMM: *n*=2); team teaching (*n*=1); and the assumption that musicians can be compared to athletes and therefore the incorporation of sports medicine into the course (*n*=1).

Table 3. Theoretical assumptions and models that informed the courses

Theoretical asssumptions	*N*=17
Somatic education models such as Alexander Technique, the Feldenkrais Method or Body Mapping	10
Any set of assumptions based on published scientific articles on musicians' health and wellbeing	10
Any set of assumptions based on internal institutional data (e.g. surveys)	7
A known psychological model such as the Health Belief Model (or other similar models)	5
Recommendations made by the Health Promotion in Music Schools (HPMS)	4
Any set of assumptions based on opinions (of experts or not)	4
Any set of assumptions based on anecdotal evience (i.e. evidence collected in an informal manner, based on personal testimony)	3
Other	9

Target audience: The students to whom the course was delivered are shown in Table 4. Responses in the ‚Other' textbox comprised (one response each) Erasmus and mobility students; ‚Rhythmic students'; ‚A variety of students, including composers'; and ‚all students (including theatre, film, sound technique, etc.)'.

Table 4. Target audience

To whom was/is the course addressed?	*N*
Undergraduate students	18
Postgraduate students	10
Both undergraduate and postgraduate students	8
Piano and/or keyboard students	19
String players	19
Brass players	19
Wind players	19
Percussionists	19
Singers	18
Music education students	17
Pop music students	13
Music teachers	10
Joint degree students	8
Other	4

Length of course: between an hour per year (*n*=1); one day (*n*=3), less than one month (*n*=1); one term (*n*=5); one year (*n*=4); and more than two years (*n*=4).

Frequency of classes: weekly (*n*=7), biweekly (*n*=2); monthly (*n*=2); yearly (*n*=1); twice a year (*n*=1); and irregularly (*n*=2).

Group size: Six respondents reported the exclusive use of small groups (fewer than 15 students), five the exclusive use of large groups (15 or more students). Four reported a combination of small and large groups, and three a combination of small groups, large groups and one-to-one.

Type of sessions: See Table 5. Theoretical sessions included lectures (*n*=6), seminars (*n*=2) and both (*n*=12). There was one response in the ‚Other' textbox: tutorials, demonstrations and workshops.

Table 5. Type of sessions

Type of sessions	*N*
Both theoretical and practical	11
More practical than theoretical	8
Purely practical (e.g. performing in front of peers and applying various techniques, warm-up activities, breathing exercises)	4
More theoretical than practical	1
Other	1

Methods of delivery: Twenty courses were delivered face-to-face and one both face-to-face and online.

Lecturers: See Table 6. Most respondents reported using lecturers from different disciplines in combination. One used music teachers exclusively and another reported using a Dalcroze Eurhythmics teacher with a specialisation in ergonomics. ‚Other health professionals' comprised an ear specialist, medical doctor, dietician, speech and vocal therapist, nursing lecturer and sports researcher. ‚Other specialists' comprised the Dalcroze Eurythmics teacher referred to above, a ‚mental coach', hearing specialist, performance/presentation coach, movement teacher/researcher, and teachers of Alexander Technique, Feldenkrais, breathing techniques, yoga, and Pilates/fitness conditioning.

Table 6. Lecturers

Lecturers	*N*
Physiotherapists	13
Musicians	10
Music teachers	9
Medical doctors	8
Psychologists	7
Researchers	6
Specialists in occupational health	6
Specialists in public health	4
Nurses	2
Psychiatrists	2
Other health professionals	6
Other specialists	6

Topics covered: See Table 7. ‚Other' topics included ‚artistic dedication and self-concept', and training for musicians to work within healthcare settings.

Table 7. Course topics

Course topics	*N*
Anatomy and/or Physiology	17
Ergonomics	17
Performance-related musculoskeletal disorders (PRMDs)/Physical injury	15
Prevention and/or treatment of PRMDs	15
Pre-performance routines	15
Physical activity/Exercise	15
Mental skills	14
Stress and stress management	14
Effective solutions for dealing with performance anxiety	13
Practice strategies and/or practice planning	12
Performance anxiety	11
Information on relevant health services within the institution, or within close geographical proximity	11
Mental health	10
Noise-induced hearing loss (NIHL) and use of hearing protection	10
Sleep	10
Nutrition	8
Memorisation techniques	8
Time management techniques	8
Alcohol abuse	7
Substance use	6
Smoking	5
Other	2

Information sources: ‚Staff knowledge and expertise' (*n*=19); ‚textbooks/books' (*n*=13); ‚journal articles' (*n*=13); and ‚links to websites' (*n*=13). A single response in the ‚Other' textbox consisted of a compendium written by the teacher. Five courses used staff knowledge and expertise exclusively.

Course assessments: A total of 14 courses were assessed by written essays (*n*=7), oral exams (*n*=5), both (*n*=3) and ‚other' (*n*=9): performance, multiple choice tests, attendance, written health projects, questionnaire, written exams, and discussion with students.

Evaluating course effectiveness: A total of 19 respondents said they had evaluated or intended to evaluate course effectiveness via the methods shown in Table 8. Four respondents used both ‚questionnaire(s) on health-related behaviour change' such as the 36 Health Survey, questionnaires designed specifically for the purpose of the course and/or as part of larger

research projects, and ‚questionnaire(s) on health outcomes' such as the Pain Vigilance and Awareness Questionnaire, Pain Catastrophizing Scale; Beck Depression Inventory, and an *ad hoc* questionnaire. Two used only questionnaire(s) on health-related behaviour change.

Table 8. Methods of evaluating course effectiveness

Methods of course effectiveness evaluation	*n*
Students' feedback via survey(s)	17
Students' feedback via interviews	7
Questionnaire(s) on health-related behaviour change (e.g. changes in physical activity, diet, sleep, etc.)	6
Questionnaire(s) on health outcomes (e.g. anxiety, physical pain, stress, etc.)	4

Evaluating health education outcomes for students: See Table 9 for numbers of respondents reporting the assessment or intended assessment of 1) competency with respect to health risks associated with professional singing/playing an instrument, 2) perceived responsibility for avoiding health risks associated with professional singing/playing an instrument, 3) awareness and 4) perceived or actual knowledge. Methods of assessing perceived competency included quality assurance, interview and questionnaire, as part of practical activities such as concerts and performances, seminar paper and personal feedback, and via actual or planned research studies by the respondents or relevant staff. Methods of assessing perceived responsibility included self-evaluation, interview, feedback from instrument teacher, as part of a reflective task, questionnaire, and scientific studies. Methods of assessing perceived awareness included students' resumés, observation and self-evaluation, questionnaires, reflective tasks, feedback from students' council, and a research study on the effectiveness of the course. Methods of assessing perceived and actual knowledge included quality assurance, observation and self-evaluation, questionnaire, seminar paper and written test.

Table 9. Evaluating health education outcomes

	Yes (*n*)	No (*n*)
Perceived competency	12	9
Perceived responsibility	10	11
Awareness	10	11
Perceived or actual knowledge	9	11

Evaluation methods: ‚Only at the end' (*n*=10); ‚pre-post' or ‚at various time points including pre-post' (*n*=8); and ‚other' (*n*=1) via anonymous course evaluation at the end which was being prepared for publication.

Who conducts analysis of 1) quantitative data: ‚an administrative staff member' (*n*=6); a ‚researcher' only (*n*=5); combinations of researcher, PhD student, an administrative staff member and ‚other' (*n*=4) including teacher, dean of faculty, vice-rector for didactic affairs and quality assurance officer; 2) qualitative data: ‚an administrative staff member' (*n*=5); ‚a researcher' (*n*=6); combinations of researcher and PhD student (*n*=3); researcher, PhD student and psychologist (*n*=2); researcher, administrative staff member and ‚other' (*n*=1).

Dissemination of findings: A total of 13 respondents said the findings would be disseminated to relevant stakeholders, four said they would not be and three did not know. Eighteen said findings would be used to improve the course, one said they would not be and one did not know. Finally, nine said that findings had been or would be published in journal articles; nine said they would not be and two did not know.

3.5 Discussion

Responses obtained from 21 European higher music education institutions reveal a wide variety of health education/promotion initiatives and the rigour with which they were implemented. Courses aimed to raise awareness, improve knowledge, provide adequate training, improve students' resilience and increase prevention of health-related problems. Most had been modified since their first implementation, largely on the basis of students' feedback and evaluation, but also on other factors such as changes in guest lecturers and course leaders, and the findings of current research. Most courses were embedded in the school curriculum and were compulsory; only seven were optional. Stakeholders involved in course design included health professionals, music teachers, and music students; to a lesser extent they involved researchers, managerial and administrative staff.

Most courses were based on explicit theoretical assumptions and models such as the biopsychosocial model; fewer on those derived from published research, and anecdotal evidence was cited as a basis too. Popular educational practices such as Alexander Technique, the Feldenkrais method and Body Mapping were included. Target audiences consisted of undergraduate and postgraduate students in all disciplines including popular music and music education. The length of courses and frequency of sessions varied widely, as did size of student group. Some courses were primarily theoretical, others primarily practical while most combined theory and practice. All but one course with an online component were delivered face-to-face.

Courses were delivered by lecturers with a range of specialisms: physiotherapists, musicians, music teachers and to a lesser extent medical doctors, psychologists, researchers, nurses and specialists in occupational and/or public health. Most covered topics such as anatomy and/or physiology, ergonomics, PRMDs and their prevention and treatment, pre-performance routines, physical activity/exercise, mental skills and stress management. Other topics included effective solutions for dealing with MPA, practice strategies, information on health services, mental health, hearing health, sleep, nutrition, memorisation and time management techniques, alcohol abuse, substance abuse and smoking. Courses were largely informed by staff knowledge and expertise, supported by books, journal articles, and links to websites.

Students on most courses were assessed. The effectiveness of most courses, in terms of health outcomes for students was evaluated, largely by researchers or members of the administrative staff using methods including questionnaires and interviews, although a minority involved pre-post evaluation. Findings were or would be used to improve the course, be disseminated to stakeholders and/or be published.

Using the WHO definition of health education in the introduction to the questionnaire proved problematic since the definition is so broad. In addition, respondents were invited to refer to stand-alone courses, modifications to existing courses, seminars, guest lectures, and other relevant activities. The survey thus produced evidence of a wide diversity of initiatives.

The very low response rate makes it difficult to draw firm conclusions. Nor can it be claimed that the programmes described by respondents are generalisable. Respondents were presented with a large number of items and there might have been more responses had the questionnaire been shorter. It would have been interesting and useful to gauge the number of institutions not offering any health education programmes at all. There may have been selection bias such that respondents only reported the ‚best' health education initiatives: half the respondents had published or intended to publish the findings of their evaluations, which seems an improbably high proportion.

Some of the items might have been too vague. To give just two examples, it is unclear if respondents distinguished accurately between students in music education and music teachers; "links to websites" (as a source of information) could have been interpreted as those that are both reliable and more dubious. It was sometimes difficult to categorise responses to open-ended items since they varied so much.

Despite the limitations of the survey it nevertheless revealed worrying results such as the fact that only half of the programmes described used ‚any set of assumptions based on published scientific articles on musicians' health and wellbeing' in the programme design while half included practices that are currently poorly supported by evidence, if at all (e.g. Alexander Technique, Body Mapping, the Feldenkrais method). More rigour should be used in conceptualising, designing and evaluating health education programmes for musicians.

The results of this survey suggest that some health education programmes are apparently organically and seamlessly integrated into institutions' broad approaches to music education while others arise from the intuitions or convictions of particular teachers. Thus they are not all separate, stand-alone interventions, as might be inferred from the systematic review of the published literature reported in Section 2 of this chapter.

Ideally, health education for musicians should not rely on personal intuitions or convictions. It would be good to develop ‚best practice' consciously and responsibly, so far as possible, although this is not likely to be easy, given that evidence is often inconclusive or lacking. Nonetheless, this might be a

better approach than bombarding institutions of higher music education with a wide variety of initiatives, hoping that some of them will work.

4 Conclusion

This chapter described the findings of a systematic literature review of published health education courses. The results helped to inform the programme of research reported in Chapter 5, namely the introduction of a health and wellbeing course at RNCM. Given the sparse nature of the published literature, the decision was taken subsequently to carry out an online survey of unpublished health education courses and their evaluations, where available, to complement the systematic review. This too produced very few results but does go some way to filling out the picture of what is currently offered to music students by way of health education relevant to their studies and future profession.

Chapter 3

Interventions aimed at MPA, PRMDs and conserving musicians' hearing: Reviews of the literature

1 Introduction

In addition to the systematic review of health education courses reported in Chapter 2, literature on the following interventions was reviewed so as to answer Question 1: What can be learned from existing approaches to promoting musicians' health?:

- Interventions to prevent or mitigate music performance anxiety (MPA)
- Interventions to prevent or mitigate performance- or playing-related musculoskeletal disorders (PRMDs)
- Interventions to conserve musicians' hearing

The purpose was to investigate their content and assess their effects so as to identify potentially effective tools and strategies, evaluate their limitations, and discuss how they informed the health and wellbeing course reported in Chapter 5. Interventions aimed at MPA and conserving musicians' hearing were evaluated by means of literature reviews, and interventions aimed at PRMDs were explored by conducting a systematic review.

Large sections of the review of literature on interventions aimed at MPA have already been published elsewhere (Matei & Ginsborg, 2017) (see Supplementary material).

2 Interventions aimed at MPA in musicians

To date, two systematic reviews of interventions aimed at preventing and mitigating MPA have been published by Kenny (2005) and Burin and Osorio (2016). Goren (2014) conducted an unpublished meta-analysis of 29 studies and concluded that a total of four therapies, behavioural, complementary and alternative, cognitive and combined, were moderately

effective, with a mean effect size of .64. The most effective therapy involved a combination of two or more types of therapies.

Burin and Osorio's (2016) review is the most recent systematic review of interventions aimed at MPA. It includes 23 articles published between 2002 and 2016, with no age limit on participants. The types of interventions ranged from CBT, yoga, meditation, virtual reality exposure, biofeedback and music therapy to the Alexander Technique. The review is in line with previous reviews in finding CBT therapies to be associated with positive outcomes such as reduction in MPA and trait anxiety scores, and improvements in performance quality and self-efficacy. The authors conclude that most studies were reported in unpublished papers that carry the risks associated with a lack of rigorous peer review. Methodological limitations were similar to the ones identified by previous reviews: small sample sizes, lack of randomisation, the use of non-validated outcome measurements and the variety of techniques used and intervention durations that make comparisons difficult.

Computerised and manual searches through relevant databases, journals and reference lists of papers on the topic of MPA were conducted by the researcher to look for evaluations of interventions aimed at MPA that appeared after Burin and Osorio's (2016) systematic review was published and/or were not included in it. Databases included PubMed and Google Scholar, while relevant journals included *Medical Problems of Performing Artists*. A selection of the most recent relevant papers will be described next.

Finch and Moscovitch (2016) published a review looking only at interventions based on imagery. The authors found three unpublished papers and five peer-reviewed articles but could not draw any firm conclusions. Because of methodological limitations, the authors were unable to separate the effects of imagery from relaxation.

Spahn, Walther and Nusseck (2016) evaluated the combination of behavioural exposure via mock orchestral auditions and recorded performances with group discussion, expert feedback and cognitive strategies; Steyn, Steyn, Maree, and Panebianco-Warrens (2016) added mindfulness training to an array of cognitive–behavioural elements. In both cases interventions produced lower scores for both MPA and state anxiety.

Virtual reality exposure training also reduced performance anxiety and improved performance quality, especially among anxiety-prone musicians (Bissonnette, Dube, Provencher, & Moreno Sala, 2015).

Juncos and Markman (2016) were the first to report an investigation of the effects of acceptance and commitment therapy (ACT). ACT, unlike CBT for example, is not about attempting to reduce undesirable cognitions and emotions. Rather, it is about enhancing the client's psychological flexibility through the cultivation of specific behavioural processes despite the presence of intruding thoughts. These behavioural processes include being in the present moment; accepting undesirable experiences; becoming less reactive; redefining one's self as reaching beyond one's internal experiences; and establishing one's values and acting according to them (Juncos & de Paiva e Pona, 2018). An undergraduate violinist with debilitating MPA showed both clinically significant improvements in MPA and better performance quality after ten sessions. Similarly, a set of 12 sessions of the same multimodal intervention was associated with improvements in cognitive defusion ("observe [one's] thoughts and see them for what they are" according to https://workingwithact.com/what-is-act/some-definitions/), acceptance of the symptoms of MPA, psychological flexibility, performance quality and a decrease in MPA-related shame in seven student vocalists (Juncos et al., 2017). ACT could also be incorporated as part of broader performance enhancement approach, similarly to the Mindfulness-Acceptance-Commitment approach for enhancing performance among athletes (MAC). MAC was created to replace popular techniques such as goal setting, imagery and self-talk, which are not well-supported empirically.

Kenny and Halls (2017) implemented two brief interventions among 68 community musicians, including those in brass and military bands, community choirs, regional conservatoires and private music studios (age range: 16-81, mean age=44.51) in Australia. Notably, 66% of all participants did not want to be professional musicians. Participants were divided into two groups. One group received three sessions of CBT and the other group received an anxiety sensitivity (AS) intervention. Anxiety sensitivity is the belief, accompanied by catastrophising and misinterpretation, that anxiety symptoms could have seriously negative consequences (Anderson & Shivakumar, 2013). Both groups also received

a placebo intervention that consisted of a PowerPoint presentation including practice strategies, information on lifestyle, goal setting and focused practice. Participants were asked to prepare a 2-3 minute public performance to be assessed at four different time points: at baseline, post-placebo session, post-intervention, and at four to six weeks follow-up. Audio-visual recordings were made of performances, which were assessed by two judges. The procedure was as follows: baseline data (state anxiety and performance quality) and Performance 1 → Placebo → Performance 2 → Treatment 4 sessions CBT/AS → Performance 3 → (after one month) Performance 4. The results showed that AS participants, but not CBT participants, experienced a decrease in state anxiety between Performances 2 and 3. Performance quality improved in both groups across performances. Although the CBT intervention had a stronger cognitive focus and the AS intervention had a stronger physiological focus, they shared elements such as psychoeducation and exposure.

Brooker (2018) evaluated an intervention based on cognitive hypnotherapy (CH) and eye movement desensitisation and reprocessing (EMDR) involving 46 pianists in the UK (age range: 18-53 years). Both CH and EMDR are based on the assumption that implicit and explicit memories can increase MPA and are aimed at desensitising clients to debilitating cognitions and memories. Participants were randomly assigned to a therapy or control group. The therapy groups received both interventions in a two-week period between two concerts. Results suggested that both intervention groups had significantly lower MPA, as well as state and trait anxiety scores after therapy. The low scores were maintained when followed-up at four months, one year and two years after the intervention.

Finally, an unpublished master's thesis by Page (2017) looked at running as a solution for MPA in ten music students in the US (age range: 19-40, mean age=25.4). The intervention group undertook a six-week running programme in which they were asked to complete three 30-minute run/walks per week, while the nine participants in the control group engaged in a breathing exercise before giving a performance. A phone app was used by participants in the running group and the researcher to monitor their compliance and if the participants failed to comply they were sent a reminder email. No differences in levels of MPA were found between the intervention and control group. However, many participants struggled to

make time for the running intervention and only 60% of participants completed it.

Training in psychological skills such as goal setting, concentration, imagery, self-talk and arousal regulation has been used successfully in sports for the last five decades, but rarely with musicians (Hatfield, 2016). Some data on the thoughts of musicians under pressure suggest that unproductive coping strategies might be correlated positively with both MPA (Thomas & Nettlebeck, 2014) and performance quality. Musicians who succeed in maintaining high levels of performance quality often report focusing on music-related information, physical elements such as breathing and other bodily experiences, and confidence-building thoughts (Buma, Bakker & Oudejans, 2015). Similarly, musicians often attribute their successful performances to their having a positive mindset (Clark, Lisboa, & Williamon, 2014). The relationship between performance quality and performance anxiety is indeed complex and there might be scope for studying them separately. However, it is difficult to assess performance quality other than subjectively. Furthermore, although reframing performance anxiety as excitement may not reduce levels of anxiety (Brooks, 2014), performance quality might nevertheless improve.

3 Interventions aimed at PRMDs in musicians

3.1 Method

Like the systematic review described in Chapter 2, the systematic review of interventions to prevent or mitigate PRMDs in musicians used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement guidelines, including an adapted checklist and a four-phase flow diagram (Moher et al., 2009) and the Cochrane Handbook for Systematic Reviews of Intervention (Higgins & Green, 2011).

3.1.1 Search strategy

A computerized search of relevant articles was conducted via PubMed, Web of Science, Ovid Full-Text Journals and MEDLINE® (1946 to October 2018), and Google Scholar. Furthermore, manual searches were conducted of relevant journals such as Psychology of Music and Medical

Problems of Performing Artists (MPPA), using a purposive list of search terms and their truncations, connected with Boolean operators. The assistance of a librarian specialising in health from Manchester Metropolitan University was obtained in finalising the search strategy. Three separate word strings were searched in titles and abstracts: 1) musculoskeletal problems, 2) programme or intervention, 3) music students or musicians. The complete search string, albeit slightly modified according to the requirements of different databases, was as follows:

(Musculoskeletal Diseas* OR Musculoskeletal disorder* OR Musculoskeletal complaint* OR Musculoskeletal pain OR musculoskeletal sign* OR musculoskeletal symptom* OR strain* OR sprain* OR Occupational Injur* OR Occupational Diseas* OR cumulative trauma disorder* OR repetitive strain injur* OR overuse syndrome OR Repetitive Motion Disorder* OR Repetition Strain Injur* OR PRMD* OR musculoskeletal problem*) AND (musician* OR music academy student* OR music student* OR instrument player* OR Orchestra* OR professional musician* OR instrumentalist* OR music major*) AND (Health education OR health promotion OR interven* OR program* OR prevention OR therap* OR treatment* OR rehabilitati* OR prophyla*)).ab.

Conference proceedings and presentations, dissertations and theses, were searched via ProQuest. Lists of references in articles and publications by relevant researchers were also searched manually. Additionally, the research of relevant authors was monitored via ResearchGate. No date restrictions were applied. The PRISMA flow diagram is shown in Figure 2.

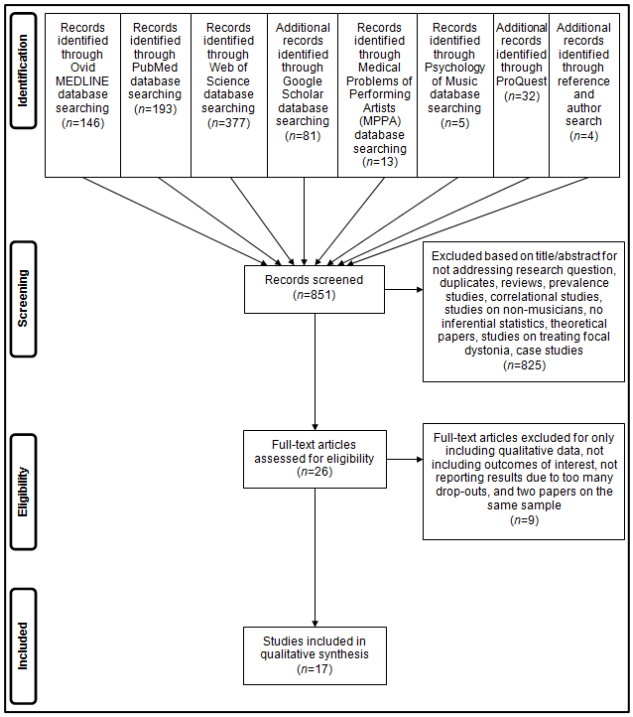

Figure 2. PRISMA flow diagram

3.1.2 Inclusion criteria

Inclusion criteria were the same as for the review of health education courses reported in Chapter 2:

- participants were music students or professional musicians (singers and instrumental musicians) in higher education music institutions
- samples were from the normal population
- studies were conducted in a school, conservatoire or university setting
- a control group was or was not used
- measurements were quantitative: objective or subjective
- full-text was available
- any design of intervention was considered except case studies
- the study was undertaken anywhere in the world
- any type of publication was considered (e.g. peer-reviewed articles, conference presentations, dissertations, theses, etc.)
- articles were written in English only.

Additionally, for the purposes of the present systematic review, interventions aimed at both primary and secondary prevention were

included. Interventions were eligible for inclusion if they were stand-alone or components of wider health education or health promotion courses. Outcomes had to be expressed in the form of quantitative data from either self-reports or fully objective measures and had to include one or more of the following: a) severity and frequency of PRMDs; pain intensity and frequency; tension, because according to Rardin, 2007, it is a concomitant symptom of pain; muscle fatigue; perceived exertion; and/or physical symptoms; and b) physical fitness; aerobic capacity; endurance and/or strength, assessed by field measurements such as weights and maximum repetitions or dynamometer-based measurements of flexions and extensions). Acceptability and/or feasibility outcome measures were also considered.

3.1.3 Data collection

Data collection and assessment took place between May 2016 and September 2017 and were updated constantly until October 2018. Data items extracted included: study design; sample characteristics; information on interventions; outcome measure; and results as expressed by the authors such as *p* values, effect sizes where applicable, frequency counts and percentages.

3.1.4 Risk of bias

Quality assessment was completed using an adapted version of the Effective Public Health Practice Project tool for quantitative studies (EPHPP, 1988), which uses the rating scale ‘strong’, ‘moderate’ or ‘weak’, in this case based on the decision of a single researcher, for six components: selection bias; study design; confounders; blinding; method of data collection; and withdrawals and dropouts.

3.2 Results

In total, 17 papers were retrieved, six of which reported interventions aimed at music students in institutions of higher music education (mainly conservatoires), two at teenage music students, and the remainder at orchestral players and/or professional musicians. Appendix E contains

summaries of all included papers. Of the interventions included, five were conducted in USA, three in Australia, two in the Netherlands, and one in each of the following countries: Canada, Germany, Switzerland, Sweden, Denmark, Spain, and Portugal.

3.2.1 Sample sizes and demographics

Sample sizes ranged from 14 (Kava, Larson, Stiller, & Maher, 2010) to 247 student participants (Zander et al., 2010) and encompassed a total of 265 teenagers, 63 young residential musical fellows, 643 conservatoire and university students and 294 professional orchestral musicians playing a range of instruments across each study. Participant mean age ranged from 16 (Khalsa, Butzer, Shorter, Reinhardt, & Cope, 2013) to 63 years (Lundborg & Grooten, 2018).

3.2.2 Study design

All studies used repeated-measures designs: mostly pre-post testing (Chan, Driscoll, & Ackermann, 2014b; Kava et al., 2010; Khalsa & Cope, 2006; Khalsa et al., 2013; Nygaard Andersen, Mann, Jull-Kristense, & Sogaard, 2017; Roos & Roy, 2018; Sousa, Coimbra, Machado, & Greten, 2015; Spahn et al., 2001). Some used pre-post testing with follow-up at three months (de Greef, van Wijck, Reynders, Toussaint, & Hesseling, 2003), six months (Chan, Driscoll, & Ackermann, 2014a), one year (Khalsa, Shorter, Cope, Wyshak, & Sklar, 2009; Zander et al., 2010), and two years respectively (Baadjou et al., 2018). Others used pre-post testing and follow-up at a time point between pre- and post-testing (Ackermann et al., 2002; Lopez & Martinez, 2013; Nygaard Andersen et al., 2017). Five studies randomized participants (Ackermann et al., 2002; Baadjou et al., 2018; de Greef et al., 2003; Roos & Roy, 2018; Sousa et al., 2015). Sixteen studies included active control groups (Ackermann et al., 2002; Baadjou et al., 2018; Kava et al., 2010; Khalsa et al., 2009; Nygaard Andersen, et al., 2017; Sousa et al., 2015) or passive/no intervention/usual routine control groups (Chan et al., 2014a; de Greef et al., 2003; Khalsa & Cope, 2006; Khalsa et al., 2009; Khalsa et al., 2013; Lopez & Martinez, 2013; Rardin, 2007; Roos & Roy, 2018; Spahn et al., 2001; Zander et al., 2010). One study did not include a control group at all (Chan et al., 2014b).

3.2.3 Participant eligibility and recruitment

With regards to participant eligibility and recruitment, few studies revealed any information as to inclusion and/or exclusion criteria. Some mentioned low scores in terms of PRMDs and rating of perceived exertion (RPE) at baseline (Khalsa & Cope, 2006; Khalsa et al., 2009; Khalsa et al., 2013), others a certain level of pain not interfering with daily life or their participants' not engaging in any regular physical exercise at the time of recruitment (Ackermann et al., 2002; Kava et al., 2010; Lundborg & Grooten, 2018). Although de Greef et al. (2003) mention that their intervention targeted secondary prevention and that musicians with PRMDs were randomly selected to the experimental group, it is unclear what the authors meant by 'PRMDs', or whether they might have used any cut-off score. For some of the interventions, participants had to be free of significant medical conditions or serious illnesses that could have interfered with their participation (Ackermann et al., 2002; Chan et al., 2014a; Kava et al., 2010; Nygaard Andersen et al., 2017; Roos & Roy, 2018). However, Sousa et al. (2015) only accepted participants who had been experiencing musculoskeletal pain during the last three weeks. Also, existing PRMDs were diagnosed by a physiotherapist. These included complaints affecting the spine (57%), the shoulder joint (27%) and the arms, hands, fingers and face (16%). Roos and Roy (2018) recruited participants regardless of whether they experienced PRMDs or not. Their exclusion criteria included present injuries unrelated to performance; fewer than 15 hours per week of playing the instrument; corticosteroid injections six weeks before recruitment; and anti-inflammatory drugs three weeks before recruitment. Other authors excluded participants with neurological symptoms, with upper body tendonitis and nerve entrapment and with pain radiating into the upper body (Kava et al., 2010). While some papers made their definitions of PRMDs explicit (e.g. Ackermann et al., 2002; Chan et al., 2014a; Rardin, 2007) and included any physical symptoms that interfere with the ability to play one's instrument while excluding any mild symptom, others did not, occasionally mentioning that PRMDs include overuse syndrome, carpal tunnel syndrome, focal motor dystonias and muscle cramping (Khalsa & Cope, 2006), that is, medical conditions that might have counted as exclusion criteria for other authors.

For their yoga programme, Khalsa and Cope (2006) selected only ten participants from a pool of 25 applicants based on an expression of interest, although no details were offered with regards to the assessment criteria. Recruitment processes included a range of activities such as displaying written notices and verbal public announcements (Ackermann et al., 2002; Kava et al., 2010; Nygaard Andersen et al., 2017); written expression of interest (Khalsa & Cope, 2006), remunerating controls (Khalsa & Cope, 2006; Khalsa et al., 2013), email announcements (Chan et al., 2014a; Khalsa et al., 2009) and flyers (Chan et al., 2014a; Kava et al., 2010). Baadjou et al. (2018) mention offering small incentives to participants throughout the study, but even the study protocol (Baadjou et al., 2014) does not specify what these were.

The authors of few studies report differences between experimental and control groups at baseline. Some reported no significant differences between them (Khalsa & Cope, 2006; Khalsa et al., 2009; Khalsa et al., 2013; Sousa et al., 2015). Chan et al. (2014a) report that intervention group participants had higher scores for the severity and frequency of PRMDs than controls at baseline, while controls were more physically active. Some authors report differences between intervention and control groups at baseline in terms of gender, instrumental group, degree programs and even severity of symptoms and coping with work (de Greef et al., 2003; Spahn et al., 2001; Zander et al., 2010). Chan et al. (2014a) list a series of confounding factors. Kava et al. (2010) also report significant baseline differences between groups in terms of endurance, but they merged the two experimental groups post-intervention having not found any differences between the effects of the two types of exercises undertaken by participants. Some authors matched the intervention and control groups in terms of age, gender, hand-dominance, course of study, instrument and number of years spent studying music (Lopez & Martinez, 2013; Spahn et al., 2001).

3.2.4 Interventions

Interventions included complex programmes encompassing both educational units and exercises (Baadjou et al., 2018; Lopez & Martinez, 2013; Spahn et al., 2001; Rardin, 2008; Zander et al., 2010); exercise

programmes based on endurance and/or muscle strengthening (Ackermann et al., 2002; Chan et al., 2014a, 2014b; de Greef et al., 2003; Kava et al., 2010); yoga and meditation (Khalsa & Cope, 2006; Khalsa et al., 2009; Khalsa et al, 2013), and Tuina therapy (Sousa et al., 2015). Length ranged from six weeks (Ackermann et al., 2002; Kava et al., 2010; Khalsa et al., 2013) to one year (Zander et al., 2010; Lopez & Martinez, 2013), but most took between six weeks and 12 weeks, while two lasted 15 and 17 weeks respectively (de Greef et al., 2003; Spahn et al., 2001). In all studies reported, session frequency was mostly weekly. Interventions were conducted in a variety of settings including conservatoires, a high school, orchestral workplaces and summer schools.

3.2.4.1 Complex interventions in the form of courses

Four complex interventions were delivered in the form of courses for university students. One lasted 17 weeks (Spahn et al., 2001), and the others lasted one year each (Baadjou et al., 2018; Lopez & Martinez, 2013; Zander et al., 2010). Additionally, a 10-week injury prevention programme was delivered to high school music students (Rardin, 2007).

Spahn et al. (2001) implemented a 17-week elective course in Switzerland with weekly theoretical and practical sessions on proprioception, anatomy, instrument-specific ergonomic information, breathing techniques, practice and learning strategies, mental training and stage fright, as well as applied postural exercises. Compared to a control group who did not receive the intervention, the students on the course had lower scores representing frequency and severity of symptoms, improved scores for physical wellbeing and better coping with work. However, the experimental group started out with significantly more symptoms, so firm conclusions cannot be drawn.

In Spain, Lopez and Martinez (2013) implemented a one-year course called Ergonomics and the Prevention of Musculoskeletal Injuries among conservatoire students. It was divided into 1) a theoretical section including information about existing injuries among musicians; correct postures for standing and sitting; and the human body more broadly; 2) a practical session comprising a variety of warm-up exercises; and finally, 3) personalized instruction in the form of private lessons. Compared to the

control group, the intervention group reported improvements such as warming up the entire body before practising, fewer injuries, and better body awareness. However, the measurements used were not standardised, it was unclear how the items were phrased, and the authors do not report any descriptive or inferential statistical results other than percentages.

In the Netherlands, Baadjou et al. (2018) initiated PRESTO-Play, a biopsychosocial course comprising 11 classes spread across one year. Classes focused on postural awareness and strategies to induce health behaviour change based on raising awareness, increasing motivation and encouraging implementation of the strategies. The course also included discussions on various psychosocial themes in small groups of eight students. The course was compared to PRESTO-Fit, a five-session programme offering education on recommendations for physical activity also based on increasing awareness, motivation and the implementation strategies such as the use of pedometers, self-monitoring and goal setting, and including discussions in groups of up to 16 students. This was a parallel RCT with measurements at five different time points across two years. Although the study began with a total of 170 undergraduate students, only 52 participants provided data at the fifth time point, which limits the robustness of the findings. No differences were found between the two groups in terms of disability, pain, quality of life and PRMDs (yes/no single item). The authors speculate that both interventions might have been similarly effective.

Zander et al. (2010) implemented the Musician-Specific Health Promotion course in Germany with 144 students and evaluated its effects on the psychological and physical health of students in their first two years of university, through a longitudinal pre-post design with a one-year follow-up compared with a passive control group of 103 students. The two-semester course had a theoretical part, a practical part and a concluding instruction block. The theoretical part consisted of six sessions on anatomy, physiology and lectures on the Feldenkrais Method, while the practical part comprised four sessions on music students' personal experiences of health, personal health in relation to practising, coping with performance and preventative strategies. Finally, the concluding instruction block had eleven units lasting eight hours in total and encompassed preventative strategies, practical exercises such as relaxation methods and the

Feldenkrais method, and instrument-specific risk factors offered individually. The course was not associated with any changes in the physical symptoms of the intervention group.

Finally, Rardin (2007) implemented a ten-week complex injury prevention programme in the US and reported it in an unpublished doctoral thesis. It involved 65 high school string players who were compared to 65 students in a passive control group who continued with their normal routine. The intervention consisted of education on injury risk factors, warm-up instructions, bodily awareness via Alexander Technique and the Feldenkrais method, and gentle strengthening and stretching exercises. Participants in the intervention group met weekly with the researcher for 12 classes. Additionally, they were told to repeat the warm-ups at home and given specific instructions as to how to evaluate their execution. Results showed post-intervention improvements in the frequency and severity of pain, for the intervention group, but higher levels in the frequency of tension/discomfort. The author associated the latter results with increased sensitivity, but potential reasons for this remain unclear.

3.2.4.2 Complex intervention in the form of a rehabilitation programme

Roos and Roy (2018) conducted a randomized control trial (RCT) in Canada comparing an intervention group of 30 professional and student orchestral musicians who took part in an 11-week rehabilitation programme with a no-intervention control group. The intervention consisted of a 40-minute educational presentation on the importance of various muscles, the importance of physical activity, and injury management. Short emails about healthy practice habits and risk factors for PRMDs were sent to participants during the 11-week period. Additionally, an exercise programme based on Chan et al.'s (2014a) study, described in Section 3.2.4.5, was offered via a set of exercise videos. The exercises themselves included warming-up and cooling-down routines, and endurance and strengthening exercises; they covered five bodily areas (neck, shoulders, abdominal muscles, back and hips). Participants received materials such as resistance bands and were given two one-to-one sessions in which they were given instructions and demonstrations face-to-face. The intervention also included two group sessions. Participants were asked to do a minimum of ten minutes of

warming-up and cooling-down daily and two 35-minute sessions per week. Significant pre-post improvements were found in the intervention group for the intensity of pain and the extent to which it interfered with practice and performance but there were no significant improvements in the prevalence or frequency of symptoms.

3.2.4.3 Yoga

There were no changes in PRMD-related outcomes for participants in two similar intensive two-month programmes (Khalsa & Cope, 2006; Khalsa et al., 2009) and one six-week programme (Khalsa et al., 2013) including sessions on Kripalu yoga, meditation, yoga-related lifestyle and group discussions. Khalsa and Cope (2006), Khalsa et al (2009) and Khalsa et al. (2013) found low scores representing the frequency and severity of PRMDs, and for RPE – floor effects that may explain non-significant results.

3.2.4.4 Tuina

Sousa et al. (2015)'s study explored the effects of Tuina, a form of Chinese manual therapy comprising self-administered exercises based on vibration and pressure. A total of 69 orchestral players took part in this study, after having been divided into the intervention group (Tuina exercises) and the control group (Tuina exercises away from the common acupuncture points). Participants were shown how to do the exercises and asked to repeat them twice a day for the next three weeks. Outcomes were evaluated on a scale measuring pain intensity. The intervention group were shown to experience significantly lower levels of pain intensity on six out of 21 days. The authors claim that pain intensity remained low in the intervention group, but not in the control group, although no other significance values are provided. Although participants were blinded as to whether they were in the intervention or control group, the Tuina practitioner was not.

3.2.4.5 Exercise programmes for musicians

Seven papers report evaluations of the effects of exercise-based programmes (Ackermann et al., 2002; de Greef et al., 2003; Chan et al.,

2014a, 2014b; Kava et al., 2010; Lundborg & Grooten, 2018; Nygaard Andersen et al., 2017).

De Greef et al. (2003) describe a study in which 45 orchestral musicians took part in a 15-week programme based on warming-up and cooling down, general conditioning and specialised instrument movement exercises as part of an RCT. After the programme the intervention group had lower scores for PRMDs and higher perceived physical competence than controls. The intervention was labelled as Groningen Exercise Therapy, but the authors fail to describe it in detail or explain how it might differ from any other eclectic combination of various forms of physical activity, awareness and mindfulness. Although it is described as a physiotherapeutic intervention aimed at reducing PRMDs, it is unclear whether it is superior and if so, why, to any other combination of exercises and/or physiotherapy. The complexity of the intervention makes it hard to establish which elements were the most effective. The authors mention that theirs was the first intervention aimed at secondary prevention. It is unclear how this was defined, as most other interventions for preventing and mitigating PRMDs involved participants who were already reporting physical symptoms and therefore target both primary and secondary prevention. Nevertheless de Greef et al.'s study is the only one reviewed that looked at physical competence, understood here as physical self-efficacy, or a self-assessment of one's physical skills, and its potential influence on PRMDs.

Chan et al. (2014a) administered an exercise-based programme delivered face-to-face by a physiotherapist to orchestral players. The programme included a series of neck, shoulder, spinal, abdominal and hip exercises, and warming up and cooling down exercises, accompanied by booklets with pictures and detailed instructions for executing the exercises. The intervention but not the control group experienced significant reductions to the frequency and severity of PRMDs, as well as improvements in perceived exertion, immediately after the intervention and follow-up six months later. In an attempt to address the issue of the variability of musicians' schedules, the authors tested the same intervention delivered to 50 orchestral musicians in the form of a DVD, but without a control group (Chan et al., 2014b). Physiotherapists who had been video-recorded gave instructions and demonstrated all the exercises. Participants were also provided with resistance bands. After 12 weeks, pre-post measurements

showed statistically significant decreases in both the frequency and severity of PRMDs.

Ackermann et al. (2002) compared a strength-training programme characterised by a series of exercises using higher weights and lower repetitions with endurance training, a programme of lower weights and higher repetitions. Both programmes included biceps curl, reverse fly, lateral raise, triceps extension, shoulder forward flexion, bent-over row, back extension, shoulder extension, opposite shoulder and hip extension, and sit-ups and push-ups. Endurance training significantly reduced students' perceived exertion while playing an instrument and both interventions were associated with significant improvements in field measurements of the actual exercises. According to dynamometer results, significant muscle strength improvements were found in both the strength and endurance training groups with regards to the horizontal plane, but not the vertical one. The authors speculate that this might be due to the fact that musicians make more horizontal than vertical movements of the shoulders and arms.

Kava et al. (2010) investigated the effectiveness of trunk muscle training by comparing two groups of music students who took either a six-week Pilates class or a six-week standard trunk and upper extremity endurance class. While frequency and intensity of PRMDs declined following both programmes, the reductions were not statistically significant. Both programmes were equally effective in increasing endurance, measured via scores for extensors, right lateral and left lateral trunk muscles; decreasing general pain while playing; intensity and frequency of pain; muscle fatigue; and perceived exertion.

Nygaard Andersen et al. (2017) conducted a feasibility study to assess the differences between the effects on orchestral players of a nine-week specific strength training (SST) focusing on the neck and shoulder muscles and a general fitness training (GFT) focusing on the legs only. The SST group reported significant within-group reduction in pain while the GFT group showed a significantly better aerobic capacity and self-reported muscle strength. All significant results were associated with a moderate effect size. Adherence, however, was rather low – 57% for GFT and 31% for SST. Although participants mentioned lack of time as a reason, the

perceived impact of the interventions might have influenced effect size. While 80% participants in the GFT were satisfied with the programme they took part in, only 57% were satisfied with the SST programme. Half the participants, regardless of group, mentioned that the intervention had had a positive impact on their performance and three reported a negative impact.

Finally, most recently, Lundborg and Grooten (2018) evaluated the effects of an 11-week functional resistance training intervention on 24 professional string players from three Swedish orchestras. The study used a pre-post design but no control group. The authors designed individually tailored training sessions on the basis of clinical examinations of each participant. Each training session consisted of 5-10 minutes of warming up, followed by 30-40 minutes of resistance training. The exercises were aimed at strengthening the muscles in the shoulder, arm and trunk and comprised five functional resistance training exercises. Each participant received a personal introduction to the exercises, was encouraged to do them twice a week, keep a diary during the training, and given follow-up sessions to encourage adherence. In addition, participants were offered videos of themselves carrying out most of the exercises. Results showed significant improvements in isometric strength for both sides of wrist extensors, shoulder abduction and neck flexors, as well as in the endurance of the back extensors. No changes were found in the occurrence or intensity of PRMDs.

3.2.5 Intervention design and delivery

Few studies made use of theoretical frameworks. De Greef et al. (2003) mention the use of the load-overload model of van Dijk et al and the reasoned action model. It is, however, unclear, how these models were used. Rardin (2007) says her intervention was designed in cooperation with experts in performing arts medicine, physiotherapy, the Feldenkrais method and Alexander Technique. Zander et al. (2010) based their intervention on Festinger’s cognitive dissonance and Becker’s Health Belief Model. Baadjou et al.’s (2018) intervention combined awareness, motivation and implementation principles with postural exercises.

In terms of intervention design, Chan et al.’s (2014a) study was the only one that was based on a rigorous approach to design reported in a different

paper by the same authors (Chan, Driscoll, & Ackermann, 2012). This includes reviews of the literature on exercise interventions and preventative models, including health education programmes, existing best practices and clinical guidelines. These led to the development of proposals for exercise programmes that were then discussed further by physiotherapists, before being revised and piloted. This formative approach to evaluation allows for a programme to be thoroughly examined before being implemented. It also ensures that the existing literature is investigated systematically. By contrast, the Ergonomics and the Prevention of Musculoskeletal Injuries course implemented at a Spanish conservatoire was designed by a professor of percussion who was also an osteopath (Lopez & Martinez, 2013). Being a musician and an osteopath does not make one an authority on evidence-based health education and course design, regardless of how well-acquainted one is with students' injuries, although Lopez and Martinez might disagree. In addition, given the highly interdisciplinary nature of a health education programme, it is doubtful that one person can design it. In terms of expertise, Khalsa et al. (2013) reported that the yoga instructor who delivered the entire six-week intervention also approached the topic of flow as part of the course content. Although the reader is informed that the instructor was a trained classical musician, a background in psychology might be needed to address such issues. Chan et al.'s study (2014a, 2014b) was one of the very few to standardize programme delivery by producing a manual and offering training by one of the authors to the psychotherapists involved.

Programmes were delivered by a range of health professionals: a physiotherapist (Lundborg & Grooten, 2018), a physiotherapist and an assistant (Ackermann et al., 2002); three trained physiotherapy students (Nygaard Andersen et al., 2017), a senior social worker with training in counselling and psychotherapy and an assistant (Khalsa & Cope, 2006; Khalsa et al., 2009) and a yoga instructor also trained as a classical musician (Khalsa et al., 2013); physiotherapists with at least five years of experience who, in addition, received training from the authors (Chan et al., 2014a); virtual expert-based instructions (Chan et al., 2014b); a physiotherapist who was also a Pilates instructor (Kava et al., 2010); a 'therapist' (discipline unspecified: de Greef et al., 2003). Zander et al.'s (2010) course was delivered by two physicians also qualified in musicians'

medicine with a background in psychosomatic medicine. Some authors provided no information as to who delivered the courses or what the instructors' credentials were (Rardin, 2008; Spahn et al., 2001).

3.2.6 Outcomes

Measured outcomes included self-report and/or fully objective measurements of PRMDs, pain, muscle fatigue, perceived exertion and physical fitness. Self-report measurements included visual analogue scales (VAS) for the severity and frequency of PRMDs, the Numeric Verbal Scale (NVS) for pain intensity; the Musculoskeletal Pain Intensity and Interference Questionnaire for professional orchestral Musicians (MPIIQM), the Nordic Musculoskeletal Questionnaire (NMQ), global rating of change (GRC) questions designed to quantify a patient's perceived improvement or deterioration over time; the Borg scale for reported perceived exertion (RPE), the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire with the performing arts module, the Pain and Disability Index, the Short-Form 36 (quality-of-life) questionnaire, the Kiel Modification Sensitive Symptom List (KASSL), the Frankfurt Body Concept Scales (FKKS), and the Epidemiological Questionnaire for Musicians, which includes information about symptoms and the extent to which they interfere with playing. Objective measurements were taken of aerobic capacity, hand-grip strength, and endurance via field measurements such as recording weights and repetitions maximus, dynamometer-based flexions and extensions.

3.2.7 Feasibility

Satisfaction with programme was evaluated in several studies. Most participants in the yoga programme found it to be beneficial in general and would have recommended it to other musicians (Khalsa et al., 2009; Khalsa et al., 2013). However, only half of the participants reported being satisfied with the interventions based on muscle strengthening and general fitness training and 18% mentioned a negative impact, as described earlier (Nygaard Andersen et al., 2017). Evaluating such outcomes is essential, as poor satisfaction with an intervention and perceived negative interference with one's playing can make it unacceptable (Nygaard Andersen et al.,

2017). In Chan et al.'s (2014b) study, the 18 musicians who had participated in both the face-to-face and DVD-based exercise intervention rated the latter as equally good or better. No participant rated the programme negatively and most were satisfied with its effects on a variety of measures such as self-reported strengthening of the muscles that support playing, ease of movement, flexibility and posture. The smallest effect was reported for coping with stress in playing or non-playing situations (Chan et al., 2014a, 2014b). Kava et al. (2010) also asked participants about their general experience of the intervention, perceived changes in functional activities and the effect on personal wellness. Spahn et al. (2001) found that participants who had taken their elective course on anatomy, mental training and postural exercises were satisfied with the quality of the course, felt that the connection between theory and practice was important, and reported they would recommend the course further and that they wanted the course to continue.

Few studies offered any information as to adherence or compliance rates (Ackermann et al., 2002; Chan et al., 2014b; Kava et al., 2010; Khalsa & Cope, 2006; Khalsa et al., 2009; Khalsa et al, 2013; Nygaard Andersen et al., 2017; Roos & Roy, 2018; Sousa et al., 2015) although some included a complete flow diagram of participants throughout the intervention (Baadjou et al., 2018; Chan et al., 2014a, 2014b; Nygaard Andersen et al., 2017; Roos & Roy, 2018; Sousa et al., 2015). For example, Roos and Roy (2018) had high adherence and no drop-outs, while Lundborg and Grooten (2018) report that compliance was high and no participant experienced undesirable side effects after the resistance training intervention. However, Baadjou et al. (2018) lost 40% to follow-up during the study and 69% at the two-year follow-up. Although the authors report the participants' stated reasons for dropping out, which included organizational issues, lack of time and quitting school, other reasons are not given. In Nygaard Andersen et al.'s (2017) study adherence to the specific strength (SST) and general fitness training (GFT) programmes respectively was as low as 57% and 31%.

3.2.8 Assessment of bias risk

As shown in Appendix F, the quality of six studies was deemed moderate (Baadjou et al., 2018; Kava et al., 2010; Lopez & Martinez, 2013; Lundborg & Grooten, 2018; Roos & Roy, 2018; Zander et al., 2010) and the quality of the remainder was deemed weak (see Appendix F). Some studies provided attrition rates or enough information for them to be calculated (Ackermann et al., 2002; Chan et al., 2014a, 2014b; Khalsa et al., 2009; Khalsa et al., 2013; Lopez & Martinez, 2013; Lundborg & Grooten, 2018; Nygaard Andersen et al., 2017; Zander et al., 2010) and potential reasons for attrition (Ackermann et al., 2002; Baadjou et al., 2018; Chan et al., 2014a, 2014b; Kava et al., 2010; Nygaard Andersen et al., 2017; Zander et al. 2010). The authors of only one study discussed the differences between dropouts and other participants (Zander et al., 2010). Selection bias was probably high, as some studies did not include a control group and only a few studies assigned participants randomly to groups (Ackermann et al., 2002; Lopez & Martinez, 2013), or randomized only the experimental groups and not the control groups (Khalsa & Cope, 2006; Khalsa et al., 2009). Most participants in most of the studies were self-selected or selected according to an expression of interest, thus more likely to be motivated and engage in the intervention. In some cases, measurement tools included unstandardized questionnaires, while others (e.g. de Greef et al., 2003; Lopez & Martinez, 2013) used such measures exclusively, thus compromising the reliability of their findings. Blinding was rarely possible due to the nature of the interventions, but when it was possible, it was mostly single (Roos & Roy, 2018; Sousa et al, 2015). Also, it is unclear how often and to what extent the purpose of the research was disclosed to participants. In terms of analyses performed, only some authors explicitly used intention-to-treat analysis (Baadjou et al., 2018; Lundborg & Grooten, 2018; Nygaard Andersen et al., 2017; Roos & Roy, 2018). This is important, as it gives a more realistic indication of noncompliance and changes attributable to the intervention.

4 Interventions aimed at hearing conservation in musicians

Due to high exposure to intense sounds over long periods of time, both professional musicians and college students are at risk of noise-induced hearing loss (NIHL: Olson, Gooding, Shikoh, & Graf, 2016; Schink et al.,

2014). An exposure management guide was produced by the BBC for UK players and managerial staff (Hansford, 2011a, b), while a comprehensive hearing conservation strategy has been in place in Australia since 2005 (O'Brien et al., 2015). Efforts to identify effective initiatives in this regard are to be encouraged.

4.1 Method

The same method was used as for the review of interventions aimed at PRMDs. However, given the scarcity and variability of available data a more relaxed approach was adopted. For example, no quality assessment was conducted.

4.1.1 Search strategy

The same databases were consulted as for the review of interventions aimed at PRMDs. Three separate word strings were searched in titles and abstracts: 1) hearing loss or noise-induced hearing loss, 2) programme or intervention, 3) music students or musicians. The following search string was updated to various databases:

(hearing OR hearing loss OR noise-induced hearing loss OR NIHL OR hearing disorder* OR tinnitus OR hyperacusis OR diplacusis OR distortion OR occlusion OR occlusion effect) AND (course OR curriculum OR elective OR training* OR program* OR intervention OR education* OR learning OR conservation OR seminar*) AND (music student* OR musician student* OR music teacher* OR conservatoire student* OR music college* OR orchestra* OR musician*)

4.1.2 Inclusion criteria

Criteria for inclusion were largely the same as for the review of literature on interventions to prevent or mitigate PRMDs. Participants included music students and/or professional musicians. Interventions were eligible for inclusion if they were stand-alone or components of wider health education or health promotion courses. Outcomes had to be expressed in the form of quantitative data from either self-reports or fully objective measures and had to include one or more of the following: a) attitudes, awareness, self-efficacy, motivation, beliefs, actual or perceived knowledge in relation to hearing, and/or b) behaviours including changes in relevant behaviours such as increased use of hearing protection.

4.1.3 Data collection

As above, data items extracted included: study design; sample characteristics; information on interventions; outcome measure; and results as expressed by the authors such as *p* values, effect sizes where applicable, frequency counts and percentages; and items of qualitative data.

4.2 Results

In total, four papers were retrieved, of which one reported an intervention designed for orchestral players and management, one for jazz band instructors and two for undergraduate music students. The interventions were conducted in the USA and Australia (see Appendix G).

Zeigler and Taylor (2001) carried out a questionnaire survey of 248 first-year students majoring in music in the USA that both explored the prevalence of tinnitus and functioned as an intervention study in that it contained information about tinnitus and listed strategies for preventing it. The same survey was administered to 137 respondents 30 weeks later. Results found no pre-post differences in terms of noise exposure or hearing conservation behaviours (i.e. wearing hearing protection devices). Confounding factors included differences in the time of the year between baseline administration of the survey, at the beginning of the first semester, and 30 weeks later; there was also a confusing item in the questionnaire. College students exposed to more consistent and continuous education on hearing conservation responded more favourably to the survey (e.g. by answering ‘yes’ when asked about the likelihood of their using hearing protection).

Laursen and Chesky (2014)’s health education course is described more fully in the systematic review of health education courses (Chapter 2 Section 2.2). It was embedded in a brass methods course, and one of the five health sessions addressed hearing health. It included information on risk factors for noise-induced hearing loss, criteria for recommended daily exposure, noise exposure assessment and discussion on how the information can be implemented. Pre-post self-report results revealed

significant increases for items associated with awareness, knowledge, perceived competency and perceived responsibility related to musicians' health issues, including perceived knowledge of sound intensity levels associated with hearing loss and using a sound level meter or dosimeter.

O'Brien, Driscoll, and Ackermann (2015) evaluated a hearing conservation programme first implemented by the Queensland Symphony Orchestra in 2005 and maintained ever since. The programme incorporates exposure assessment, control measures, education and annual audiological measurements. The evaluation, which took place over four weeks, was conducted via interviews and focus groups with management committee members and the musicians themselves and collected data on the description, delivery and reception of the programme. According to thematic analyses, the programme coordinator focused on the need for more financial resources for the noise monitoring programme and on his constant negotiations with management staff; the management committee members highlighted their belief that musicians had become increasingly aware of the importance of hearing conservation over the years, which they described as a 'cultural change'; the musicians' focus group revealed their difficulties playing with earplugs. Common themes explored by all participants were resourcing, education and awareness, as well as organisational engagement.

Powell and Chesky (2017) report the first study based on human-computer interaction, which used ambient technology to reduce the risk of NIHL. Ambient information systems (AIS) use different kinds of display to translate dosimeter data into useful information that might provide valuable risk-related feedback and trigger relevant behavioural changes or adjustments. The authors of the study used this as a training method for six jazz instructors and looked at whether they manifested any behavioural changes as a result of being exposed to two different series of AIS displays (no display followed by 1) bubble followed by 2) histogram and no display followed by 1) histogram followed by 2) bubble) via a counterbalanced within-subjects design. After three weeks of no display, each of the two displays was presented for three weeks. Behavioural changes were assessed according to a set of sound level parameters such as mean, median, coefficient of variation, skew (asymmetry of the frequency distribution), kurtosis ('peakedness' of the frequency distribution), uniformity

of the frequency distribution, dose (noise exposure risk) and percent of time talking (or time associated with less than 73 dB(A)). Structural change tests were performed to assess where significant changes occurred (i.e. when the display changed). Results showed behavioural changes that significantly altered the pattern in dosimeter data across instructors, according to different sound level parameters, most notably in the bubble display, regardless of the display order.

5 Summary and conclusions

This chapter reviewed literature reporting three kinds of intervention.

5.1 Interventions to prevent and mitigate MPA

This review encompassed studies that were either not included in the latest relevant systematic review by Burin and Osorio (2016) or were published thereafter. Kenny's (2005) systematic review, while comprehensive, did not enable any firm conclusions to be drawn. Many of the studies it included were the only ones of their kind in terms of treatment genre, so they could not be compared meaningfully. Additionally, most studies had considerable methodological limitations. Burin and Osorio (2016) concur, although they found more evidence to support CBT than any other type of treatment. Finch and Moscovitch (2016) failed to show that imagery on its own is an effective method for preventing or mitigating MPA, despite its popularity, because the interventions testing it were both complex and methodologically weak.

The same is true of many of the studies reviewed in this chapter. Limitations acknowledged by their authors include design, participants, intervention characteristics and outcome measures. Several studies were conducted over short periods with small samples and/or no control group. Given that anxiety is not necessarily debilitating – it can facilitate and enhance performance – and that compliance is likely to influence therapeutic outcomes, it is perhaps surprising that these are so rarely considered by researchers. Although it can be hard to isolate their active

ingredients, complex interventions, particularly those involving cognitive-behavioural elements, hold the most promise in terms of helping musicians manage MPA. More rigorous investigations, however, are warranted.

Effective interventions for MPA include training programmes combining cognitive with behavioural strategies, group discussions and mindfulness (Spahn et al., 2001; Steyn et al., 2016); brief interventions based on different combinations of psychoeducation, exposure, cognitive and physiological elements (Kenny & Halls, 2017); virtual reality exposure (Bissonnette et al., 2015); therapeutic interventions based on ACT (Juncos & Markman, 2015; Juncos et al., 2017); and hypnotherapy-based interventions such as cognitive hypnotherapy or eye movement desensitisation and reprocessing (EMDR: Brooker, 2018).

While complex interventions reflect the different ways in which MPA manifests itself and may therefore be preferable to simple interventions, identifying their key ingredients would be worthwhile, as effort and resources could be spared if it were known that some are more effective than others in particular circumstances. Interestingly, Kenny and Halls (2017) found a decrease in state anxiety following mere exposure to performance, before participants received their first intervention. Their participants were of course a heterogeneous sample of community musicians, rather than conservatoire students or professional classical musicians. It could therefore be worth investigating simple interventions such as exposure on its own or exposure and one potentially effective ingredient at a time instead of combining so many that it is impossible to tell what works and for whom.

5.2 Interventions to prevent and mitigate PRMDs

This review included 17 studies involving young music students, conservatoire students and professional orchestral players. The evaluations described complex programmes in the form of courses, so comprising both educational units and applied physical exercises (Baadjou et al., 2018; Rardin, 2007; Spahn et al., 2001; Zander et al., 2010); a rehabilitation programme also based on education on injury management and an exercise programme (Roos & Roy, 2018); yoga and meditation-based interventions (Khalsa & Cope, 2006; Khalsa et al., 2009; Khalsa et al.,

2013); a set of self-administered sessions based on Tuina manual therapy (Sousa et al., 2015); and seven exercise-based programmes (de Greef et al., 2003; Chan et al., 2014a, 2014b; Kava et al., 2010; Lundborg & Grooten, 2018; Nygaard Andersen et al., 2017).

Two courses produced reductions in the frequency and severity of pain and physical symptoms (Rardin, 2007; Spahn et al., 2001). The main limitations of the studies reviewed included high attrition rates, failure to use control groups and lack of inferential analyses. Roos and Roy's (2018) rehabilitation programme based on education and an exercise routine encompassing warming-up and cooling-down routines, and endurance and stregthening exercises showed good results in terms of decreasing intensity of pain and its interference with playing. None of the three yoga- and meditation-based interventions was associated with reduced PRMDs and/or RPE. However, participants in all three studies had low scores for all these outcomes, which render their findings inconclusive. The only study based on Tuina produced some lessening of the intensity of pain in the intervention group on six out of 21 days, but this is inconclusive. The Tuina practitioner was not blinded and due to their having to tailor the treatment to individual needs, an intervention protocol was not used (Sousa et al., 2015). The seven exercise-based programmes were associated with reductions in PRMDs (de Greef et al., 2003), and PRMDs and RPE (Chan et al., 2014a, 2014b). Interventions based on muscle strengthening were associated with improved strength and endurance in horizontal movements (Ackermann et al., 2002), less pain while playing, reduced intensity and frequency of pain, muscle fatigue and perceived exertion, as well as increased endurance (Kava et al., 2010), and less pain (Nygaard Andersen et al., 2017). Endurance-based training was also associated with better aerobic capacity (Nygaard Andersen et al., 2017) and improved strength and endurance in horizontal movement (Ackermann et al., 2002). Finally, resistance training was associated with better isometric strength in wrists, shoulders, neck and shoulders, but there were no changes in frequency or intensity of PRMDs (Lundborg & Grooten, 2018).

Floor and ceiling effects may have compromised Chan et al.'s (2014b) findings. Rigour was variable. Some authors registered their RCT protocols (Baadjou et al., 2018; Roos & Roy, 2018), while others incorporated elements that are poorly supported by empirical studies. Spahn et al.

(2001), for example, refers to Dispokinesis, a method based on neurophysiology and functional anatomy, as having a central role in their practical sessions. It is difficult to assess how this is conceptualised and how it is different from a simple combination of postural movements and breathing exercises. Also, one must doubt some of the authors' critical thinking when they say that the students' satisfaction with osteopathy must mean that osteopathy is an effective therapy for musculoskeletal problems, completely ignoring other factors that might explain such outcomes (Lopez & Martinez, 2013). Of course, longitudinal study designs are needed, given that decreases in physical symptoms could take place over longer periods of time.

It remains unclear whether some interventions are more effective for preventing PRMDs than mitigating them, or *vice versa,* and if so, which. In their intervention study Roos and Roy (2018) included both musicians who suffered from PRMDs and those who did not, which may mean their intervention is effective for both prevention and mitigation. Also, it took place between the middle and the end of the orchestral season, a time when musicians might suffer the most. This study, of all those reviewed, may have produced the most reliable findings. Despite the limitations raised above, it would seem that what musicians most need in terms of health education and training is not only an emphasis on the importance of physical activity and its multiple benefits in general, but also a focus on training to strengthen muscles and develop endurance, particuarly for the dynamic postures required to play their particular instruments (Roos & Roy, 2018).

5.3 Interventions to conserve musicians' hearing

No firm conclusions can be drawn from this review, since the four very different studies reviewed looked at a variety of outcomes including the attitudes, perceived knowledge and actual behaviours of jazz instructors, music students and professional orchestral players. It is possible, however, to assess the current status of hearing conservation and address the question of what needs to be done in the future. At the very least, the findings of these studies suggest that even minimal information embedded in educational strategies can help to raise awareness and improve perceived knowledge. It is very likely that behavioural changes require not

only more resources and effort to designing interventions that could influence and assess them, but also multi-level adjustments at instructional, institutional, professional and cultural levels.

Chapter 5 reports and discusses the ways in which the findings of the reviews of the literature, systematic and otherwise, were incorporated into the design of the health and wellbeing course at RNCM.

Chapter 4

Students' use of counselling: Reasons and trends

1 Introduction

The aims of study reported in this chapter were to a) explore trends in students' use of counselling over time; b) identify the reasons why and issues for which they seek counselling; c) investigate differences by sex, programme, nationality and instrument. The aims were addressed by analysing data from the records kept between 2000 and 2016 by RNCM student counsellors.

1.1 Background

1.1.1 Higher education in the UK

The broader context of higher education in the UK in terms of relevant legislation and policies needs to be acknowledged. The Robbins Report of the Committee on Higher Education, commissioned by the government and produced in 1963 militated for the expansion in the number of students in higher education. As a consequence, higher education became increasingly more inclusive and diverse; at the same time there were changes in legislation regarding disability, discrimination, equality and data protection, and duty of care began to be discussed. However, a more inclusive higher education landscape meant catering for more international students and students from poorer backgounds, and thus higher levels of disability including mental health problems (Royal College of Psychiatrists

[RCP], 2011). Following a review of higher education, the Dearing Report (1997) revealed that the increase in student numbers placed financial pressures on institutions and raised concerns as to the quality of education they provided. Among other things, it recommended the levying of tuition fees, in part to pay for support services. Yet widening participation and rising tuition fees place pressure on support services. Student debt is associated with higher levels of psychological distress (Cooke, Barkham, Audin, Bradley, & Davy, 2004). To address the consequences of wider access, legislative developments included the Disability Discrimination Act 1995 and its further amendments, which required institutions to encourage students to disclose disability and made it unlawful to discriminate against them. The number of students disclosing a mental health disability increased by 269% between 1998 and 2004. The further expansion of student support, including counselling services, and the adoption of settings-based, holistic approaches to mental health and wellbeing are needed more than ever. For example, the Universities UK's Mental Wellbeing in Higher Education Working Group (MWBHE) aims to facilitate cross-sector collaborations promoting mental wellbeing and influence policy-making. Its Good Practice Guide endorses the following: integrating student mental wellbeing at all institutional levels and ensuring that institutions have strong links with the voluntary sector, statutory agencies and relevant partners; assessing the extent to which support services' resource needs are met; designing effective policies in collaboration with students' unions and those experiencing mental health problems; and providing adequate training for members of staff (MWBHE, 2015).

1.1.2 The conservatoire setting

Stresses associated with higher education are experienced by students at conservatoires as well as universities and include: sexual maturation and the process of transitioning into adulthood, being away from home and family and having to create a new social support system, peer pressure to use alcohol and drugs, needing to manage finances and/or having work responsibilities, adopting new learning strategies, and exam pressures. Additional stresses associated with conservatoires include their emphasis on ‚talent' and performance rather than purely academic achievement,

competitive ethos, and, often, authoritarian approaches to teaching (Macaskill, 2012; Mental Health Foundation [MHF], 2016; Perkins, 2013a, b; Pedrelli, Nyer, Yeung, Zulauf, & Wilens, 2015; Porter, 1998; RCP, 2011).

In universities and conservatoires alike, Student Services departments (and their equivalents) provide students with health and wellbeing-related help via specific wellbeing, counselling and disability services. According to the websites of the Royal Academy of Music; RNCM; Trinity Laban Conservatoire of Music and Dance; and Guildhall School of Music and Drama (all viewed in 2018), UK conservatoires seem to offer similar services, which are perceived to enable optimal health (Perkins et al., 2017). They provide chaplaincy, learning, accommodation- and financial-related support, and address the specific needs of international students and those with disabilities. They also offer advice and treatment for most health-related issues, including performance-related injuries, in conjunction with a variety of medical specialists and general practices. Alexander Technique lessons, sports massage, physiotherapy, acupuncture, acupressure massage, craniosacral therapy, and nutritional advice are often available, for a fee. Free health advice is offered by specialists in occupational health, and students can also be referred to Help Musicians UK, which funds treatment from BAPAM-registered practitioners. Each conservatoire employs between one and five counsellors who provide students with free, in-house, one-to-one counselling, typically in the form of eight 45-minute weekly sessions, although students can be referred externally. They may be encouraged to seek counselling even if they are not in crisis.

1.1.3 Terminology: anxiety, mental health, mental wellbeing or distress?

Different terms are used in different contexts. ‚Anxiety’ has a specific meaning in the American Psychiatric Association (APA)’s Diagnostic and Statistical Manual of Mental Disorders (DSM: Baxter et al., 2014). Thus psychologists use ‚anxiety’ as a diagnosis, while lecturers might refer to ‚normal levels of anxiety’ in stressful everyday situations. Counsellors are more likely to refer to ‚psychological distress’. Other terms for mental disorders are used interchangeably: 'mental illness' and 'mental health

problems' or ‚difficulties' or 'issues' (Equality Challenge Unit [ECU], 2014). Mental disorders vary in their severity (RCP, 2011), from mild conditions to schizophrenia and bipolar disorder, which are likely to require psychiatric intervention. Similarly, WHO (2018c) describes mental disorders as presenting in a variety of ways and says that "they are generally characterized by a combination of abnormal thoughts, perceptions, emotions, behaviour and relationships with others".

Defining mental disorders in these ways is known as the ‚disease model’. One of its critics is Peter Kinderman, a former president of the British Psychological Society, who argues that mental health problems are social as well as psychological in their nature. While not denying the existence of distress, he rejects the use of diagnostic labels to categorise people as ‚normal’ or ‚abnormal’ since not only do such labels have considerable implications for potential discrimination in relation to law and employment, but they are also based on invalid criteria on which groups of experts do not even agree. Kinderman recommends a more inclusive approach that focuses on addressing social challenges such as inequality. This approach aims to provide richer descriptions of the whole spectrum of human experience, understand the diverse ways in which people make sense of the world and offer better-tailored support to individuals with complex needs (BPS, 2017a).

Treating normal reactions to life events and mild problems (e.g. grief following bereavement) as though they were diseases (e.g. depression) can lead to over-diagnosis and over-treatment. For example, DSM-IV stated that a patient who had been bereaved could not be diagnosed as suffering a major depressive disorder (the so-called 'bereavement exclusion') (APA, 2013b). Critics claim the exclusion was removed to justify pharmaceutical intervention (PLoS, 2013) and thus benefit the pharmaceutical industry (Sabin & Daniels, 2017). Failure to diagnose depression in the presence of grief means that appropriate treatment may not be prescribed, while blurring the normal and the pathological can lead to over-medicalization and thus unnecessary treatment, and increased help-seeking from individuals who do not need it (APA, 2013c; Friedman, 2012). The bereavement exclusion has now been reinstated in the DSM-5: its manual distinguishes between 'normal' bereavement or grief and the symptoms of major depressive disorder, specifying that mental disorders

cause "clinically significant distress or impairment in social, occupational, or other important areas of functioning" (Olfson, Druss, & Marcus, 2015) and that "periods of sadness are inherent aspects of the human experience" (Pies, 2014, pp. 21). Ultimately, however, it is unclear whether the potential benefits of broadening the diagnostic criteria for mental illness outweigh its disadvantages (Pies, 2014), as drawing the line between health and illness tends to depend on the judgement of the individual clinician who has to make the decision.

1.1.4 Students' health and wellbeing

Mental health issues are among the main causes of the overall disease burden globally, with depression and anxiety being the most prevalent (MHF, 2016). Approximately 75% of those suffering from mental health disorders will have experienced their first onset by the age of 24 years, with anxiety being the most prevalent disorder in university students (Kessler et al., 2007; Pedrelli et al., 2015). Young women (aged 16-24) are three times as likely as young men to report common mental health issues. Young people of both sexes, despite being generally more satisfied with their health than people from all other age groups, report experiencing loneliness and mental health problems more often than older people. They are also less likely to report having someone to rely on (ONS, 2018a, b). Students have lower levels of wellbeing than non-students, measured in terms of life satisfaction, feeling that things done in life are worthwhile, happiness and low anxiety (Thorley, 2017). They are especially likely to experience higher levels of anxiety and lower levels of psychological wellbeing during their first year, compared with the years before they began their university studies, and may never decrease to pre-university levels (Bewick et al., 2010). The prevalence of depression and anxiety can be as high as 15.6% in undergraduates and 13% in graduate students (Eisenberg et al., 2007). In a study of 1135 undergraduate students, McIntyre et al. (2018) found that loneliness was the strongest overall predictor of mental distress and assessment anxiety was the most notable predictor of academic achievement. Specific groups of students, such as those at ballet schools and sports academies, may be more at risk of eating disorders. Music

students are at similar risk, although the evidence for this is limited (Kapsetaki & Easmon, 2017; RCP, 2011).

Among 739 students enrolled at a university in Northern Ireland, lifetime prevalence for mental health, substance disorders, ADHD or suicidal ideation was slightly more than 50%. Some reported unwillingness to seek help for emotional issues, and the majority failed to make use of the services available and therefore did not receive treatment (McLafferty et al., 2017). According to Macaskill (2012) and Topham and Moller (2011), despite high levels of psychological distress and social anxiety, only around a third of students with mental health issues seek counselling in the UK. The situation is nevertheless better than it was a decade ago: Raunic and Xenos (2008) estimated that between only 2% and 4% of students with mental health issues, across a range of countries, accessed university counselling services. Emotional distress is prevalent among university students and is often related to undesirable outcomes such as poor academic results, burnout, stress, low occupational preparedness and occupational performance post-university (Winzer et al., 2018). Poor mental health has also been associated with academic failure, dropping out of university and/or suicide (Stallman, 2010; Thorley, 2017). By contrast, self-efficacy, resilience, emotional regulation, relationship quality and perceived support are associated with better adjustment. It is these very social and emotional skills, intrapersonal and interpersonal, that can be compromised during the university years (Conley, Durlak & Kirsch, 2015). Mental health is influenced, of course, by a wide range of social determinants beyond age, sex, hereditary factors and individual lifestyle factors. These include socioeconomic, cultural and environmental conditions including education; work / unemployment; living conditions including the availability of food, sanitation, healthcare and housing; and access to social and community networks (Dahlgren & Whitehead, 1993).

1.1.5 Counselling in higher education

Counselling was first introduced to higher education in the UK approximately 70 years ago, with almost all universities providing counselling nowadays (RCP, 2011). Several sessions are usually offered

as part of a „systematic process of reflection and action" (British Assocation for Counselling and Psychotherapy [BACP], 2017, p. 6) by professionals who have a good understanding of the institution's culture. According to BACP (2017), students view counselling as helpful in improving their academic experience and gaining more skills relevant to employment.

Counselling is designed for clients with low levels of mental distress, rather than diagnosing or treating clinical mental health conditions. Counsellors are nonetheless trained to recognise such conditions and refer clients accordingly (RCP, 2011). The functions of counselling services include supporting students with psychological distress, helping them improve their life skills and promoting students' wellbeing (Ghilardi, Buizza, Carobbio, & Lusenti, 2017). Counsellors' main responsibilities are to address the client's problems related to wellbeing, including relationship issues, stress, bereavement, problems with sexual, personal and/or gender identity, anxiety, depression, eating disorders, cutural issues and coping with abuse (BACP, 2017). Ways in which they work preventatively includes involvement in Freshers' (introduction or induction) weeks and special days dedicated to mental health; training other members of staff; helping to develop mental health policies; collaborating with colleagues such as Student Union officers, chaplains and/or disability advisers, and liaising with external health professionals (BACP, 2017).

1.1.6 Is counselling effective?

Evidence suggests that counselling services are effective in improving students' adjustment to university and their academic performance, and helping them cope with emotional and relational issues, through cognitive reframing and lowering their sense of guilt (Biasi, Patrizi, Mosca, & De Vincenzo, 2016; Devi, Devaki, Madhavan, & Saikumar, 2013; Ghilardi, Buizza, Costa, & Teodori, 2018; Hinderaker, 2013).

Connell, Barkham, and Mellor-Clark (2008) conducted an analysis of student counselling effectiveness in seven UK services using the Clinical Outcomes in Routine Evaluation-Assessment (CORE-A) tool, which comprises two forms completed by counsellors: the Therapist Assessment Form (TAF) and the End of Therapy Form (EOT). On the basis of clinical

cut-off scores and a reliable change index they concluded that 70% of clients improved from pre- to post therapy. A subsequent study of counselling effectiveness at a UK university with a sample of 305 clients showed that counselling was associated with reliable improvement in 63% of clients, including almost half of those with a clinical cut-off score at baseline (Murray, McKenzie, Murray, & Richeliu, 2016).

1.2 Rationale

In light of growing interest in music students' health and wellbeing, the present study investigated the main reasons why students at RNCM seek counselling and their presenting concerns. Data such as these have not been reported thus far and offer insights into existing issues, further pathways for exploration and potential solutions to the question of how to deliver more effective health education and health promotion.

1.3 Research questions

The research questions were:

- What were the demographic characteristics of all students registered between 2000 and 2016 and those attending counselling sessions?
- What proportion of all students registered were students attending counselling sessions in each year between 2000 and 2016?
- Why did students attend counselling sessions? What were their presenting concerns and main reasons for continuing to attend?
- How severe were students' presenting concerns?
- What were the associations among students' demographic characteristics?
- How were each of students' demographic characteristics associated with their use of counselling?
- What were the potential effects of students' demographic characteristics on the number of counselling sessions they attended?

- What were the associations between the programme on which students were registered, their presenting concerns and the main reasons they continued to attend counselling sessions?

2 Method

2.1 Design

A secondary analysis was conducted of data collected from 645 RNCM students by two RNCM counsellors between 2000 and 2016 as part of their day-to-day record-keeping. Analogous data on all students registered during the same period were also obtained for comparison. Both research question- and data-driven approaches were employed (Cheng & Phillips, 2014). The first approach was based on asking why music students seek counselling, while the second emerged from the researcher's discovery of an unexplored database. The analysis was dictated by the data that had already been collected, independent of the researcher's objectives.

2.2 Materials

Data recorded and stored by two counsellors, both BACP-accredited, comprised demographic information; year of (self-)referral; number of sessions attended; and presenting and emerging concerns categorised by degree of severity. Data from students on the undergraduate course in Popular Music, 99 of whom attended counselling, were excluded since the course was only introduced in 2015. Data from students on the ‚joint programme' (a small cohort of students are registered each year at the University of Manchester where they take a BMus degree for three years and spend their fourth year at RNCM) were also excluded.

- Demographic information consisted of the student's date of birth, sex, nationality, school of study, programme, and year of study. A

new variable called 'Age' was computed by the researcher by subtracting the year of birth from the year of the first counselling session.

- Year of first session and number of sessions attended.
- Presenting concerns (the main reason that the client sought the counsellor's help) and emerging concerns (any problem that emerged during the inital session or subsequently and was observed by the counsellor and/or raised by the client). The Association for University and College Counselling (AUCC) Categorisation of Client Concerns, the system used by counselling services in the UK and Ireland since 2000 to collect data for the Annual Survey of Counselling in Further and Higher Education, was employed to label presenting and emerging concerns. It lists over 280 concerns, organised into 15 categories (see below). The complete list is shown in Appendix H.

  - Abuse
  - Academic
  - Anxiety
  - Addictive Behaviour
  - Depression, Anger and Mood Change or Disorder
  - Loss
  - Other Mental Health Conditions
  - Physical Health
  - Eating Disorders
  - Relationships
  - Self and Identity
  - Sexual issues
  - Transitions
  - Welfare and Employment
  - Self Harm

  Concerns were categorised in terms of their severity on a scale of 0 to 7 anchored by 'Experiencing normal issues of living, mood stable, functioning well' (0) and 'Not coping; out of control; despair and hopelessness; emotionally overwhelmed; suicidal thoughts/intent' (7). The scale is shown in full in Appendix I. Its use is dependent upon the counsellor's subjective evaluation of the severity of the concern either i) at the initial assessment and at its peak, or ii) at the beginning, peak and end, although counsellors

are recommended to take one or the other approach consistently. Since their evaluations of severity are subjective rather than objective they have to take into account contextual information such as the client's personality, coping ability, the time of the academic year, previous experience of counselling and/or the support available to the client.

- Matching demographic data on all students registered between 2000 and 2016 were also obtained from the RNCM Registry so as to make comparisons.

2.3 Procedure

Ethical approval was granted by the Conservatoires UK Research Ethics Committee (see Appendix J). Access to the raw, hand-written records was facilitated by the main counsellor and data were entered into SPSS to obtain a computerised database and analyse it between July and September 2016.

The numbers of counselling sessions attended in each year conveyed information as to whether they rose, fell or stayed the same, but they needed to be contextualised by the number of students registered at the same time. These data were provided by the RNCM Registry and included the number of all students registered for each year between 2000 and 2016 and the following characteristics: sex, nationality, school of study, programme, and year of study. Data referring to those who were labelled as alumni, interrupted, withdrawn and/or transferred were removed before the analyses were conducted

2.4 Analyses

Data analyses were run using SPSS version 22.0. Chi-square and non-parametric (Mann-Whitney U and Kruskal-Wallis H) tests of association between groups were run. Effect sizes, confidence intervals and Bonferroni corrections of significance values were also calculated.

3 Results

3.1 Demographic characteristics

As shown in Table 10, the total number of students registered between 2000 and 2016 ranged from 140 in 2000-2001 to 567 in 2015-2016. They were fairly equally distributed between males and females. Most were undergraduate students, played string, wind, brass and percussion instruments, and were British.

Table 10. Characteristics of students registered in 2000-2016

		Sex		Programme*		School**					Nationality***		
Academic year	Registered students	M	F	UG	PG	SKS	SS	SVOS	SWBP	SC	EU	Home	OS
00-01	140	59	81	118	22	22	39	30	44	5	11	121	8
01-02	248	114	134	224	24	32	83	43	85	5	16	212	20
02-03	370	164	206	332	34	41	137	54	120	15	27	324	19
03-04	327	153	174	308	19	42	131	36	103	14	19	283	25
04-05	328	149	179	307	19	47	118	33	113	16	24	267	37
05-06	375	175	200	335	39	46	139	36	140	14	38	302	35
06-07	443	195	248	400	38	54	152	61	160	14	30	368	45
07-08	435	188	247	360	67	53	151	70	147	12	27	354	54
08-09	432	206	226	387	42	56	136	74	129	12	23	360	49
09-10	455	228	227	360	95	57	131	85	131	17	34	355	66
10-11	483	243	240	373	105	59	136	91	121	24	44	382	57
11-12	454	231	223	369	82	59	108	93	139	17	40	362	52
12-13	463	225	238	377	78	68	113	104	127	13	36	366	61
13-14	499	262	237	425	74	54	106	123	131	19	42	389	68
14-15	504	259	242	419	83	59	113	96	125	24	38	392	74
15-16	567	302	265	477	90	46	144	91	137	28	47	435	85
Total	6523	3153	3632	5571	991	795	1937	1120	1952	249	496	5272	755

*UG = Undergraduate, PG = Postgraduate; **SKS = School of Keyboard Studies, SS = School of Strings, SVOS = School of Vocal and Opera Studies, SWBP = School of Wind, Brass and Percussion, SC = School of Conducting; ***EU = European Union; Home = UK & Channel Islands; OS = Overseas

The ages of the 645 students who attended counselling sessions between 2000 and 2016 ranged between 18 and 33 years (*M*=22, *SD*=2.89; *MD*=21). They attended between one and 69 sessions with one student having attended a total of 130 sessions (*M*=8, *SD*=11.19, *MD*=4; *Mo*=1). As shown in Table 11, the majority were female (63%), and registered on the undergraduate programme (72.5%). They were divided between string players (29%), wind, brass and percussion players (28%), singers (27%), and composers (5%: students in the joint programme and those studying popular music were excluded). The majority were British (79%).

Table 11. Characteristics of students attending counselling sessions: sex, programme, nationality, and school of study

Sex (*N*=640)	Frequency	Percentage
Female	403	63%
Male	237	37%
Programme (*N*=633)		
UG	459	72.5%
PG	174	27.5%
School (*N*=633)		
Strings (SS)	183	28.9%
Wind, Brass and Percussion (SWBP)	180	28.4%
Vocal Studies (SVS)	171	27%
SKS School of Keyboard (SK)	66	10.4%
School of Composition (SC)	33	5.2%
Nationality (*N*=630)		
UK	498	79%
OS	85	13.5%
EU	44	7%
IS	3	0.5%

It was mostly first-year students who attended counselling sessions (*n*=160, 35.1%), followed by second-year (*n*=129, 28.3%), third-year (*n*=100, 21.9%) and fourth-year students (*n*=67, 14.7%).

The 645 students attended 5005 sessions in all. The male counsellor delivered sessions to 520 students (80.6% of the total) between 2000 and 2016 and a female counsellor delivered them to the remaining 125 (19.4%) between 2012 and 2016.

3.2 Students attending counselling sessions as proportion of all students registered

Students were counted as attending counselling sessions in the year of their first session only, regardless of whether they attended counselling during that year only, or for more than one year. For example, if a first-year undergraduate student attended their first session in 2005 and continued to have 70 counselling sessions spreaded over 2006, 2007, 2008 and, on becoming a postgraduate student, 2009, he or she would be counted, alongside the total number of counselling sessions, as a member of the cohort of students who attended counselling sessions in 2005 only.

Table 12 shows that the numbers of students attending counselling sessions increased from two in 2000-2001 to a total of 71 in 2015-2016, in the context of a similar increase in the numbers of students registered each year, from 140 to 567. Represented as percentages of all students registered, those who attended counselling sessions ranged from 1% to 17%. There were, however, both increases and decreases from year to year within the period.

Table 12. Numbers and percentages of students attending counselling sesions relative to all registered students in each year

Academic year	Number of all registered students	Number of students attending counselling sessions	Percentage represented by students attending counselling sessions
00-01	140	2	1%
01-02	248	14	6%
02-03	370	47	13%
03-04	327	27	8%
04-05	328	17	5%
05-06	375	27	7%
06-07	443	31	7%
07-08	435	34	8%
08-09	432	28	7%
09-10	455	41	9%
10-11	483	46	10%
11-12	454	38	8%
12-13	463	60	13%
13-14	499	86	17%
14-15	505	76	15%
15-16	567	71	13%

3.3 Why students attend counselling sessions

3.3.1 Presenting concerns

The 20 most common concerns, of the 280 listed by the AUCC (see Appendix H), and the percentage of students who presented with them in their first counselling sessions, are shown in Table 13.

Table 13. Presenting concerns

Presenting concerns	Total no of counts	% (of all counts)
1.Self-esteem/self-confidence/ego strength/coping ability	62	9.6%
2.Relationship with partner	35	5.4%
3.Performance anxiety – not exams	33	5.1%
4.Letting go after a relationship ends	31	4.8%
5.Bereavement – a loss of a relationship through death	26	4.0%
6.Relationships in the family or with a family member	26	4.0%
7.Lack of academic motivation/concentration and procrastination	23	3.6%
8.Anxiety – mild and/or generalised	23	3.6%
9.Relationship with other/s (including staff)	22	3.4%
10.Severe anxiety state	20	3.1%
11.Panic attacks	20	3.1%
12.Struggling academically	17	2.6%
13.Poor study skills/time management	15	2.3%
14.Disappointment with course/course content	14	2.2%
15.Personal growth/search for values and meaning	13	2.0%
16.Low mood	11	1.7%
17.Depression	11	1.7%
18.Bulimia	11	1.7%
19.Relationship with friend(s) and/or house mates	11	1.7%
20.Employment and vocational	10	1.6%

Undergraduate and postgraduate students presented with similar concerns in their first sessions, as shown in Table 14.

Table 14. Top five presenting concerns by programme

UG (no. of students)	PG (no. of students)
1.Self-esteem (45)	1.Self-esteem (16)
=2.Bereavement (23)	2.Performance anxiety – not exams (15)
=2.Relationship with partner (23)	=3.Letting go after relationship ends (9)
3.Letting go after a relationship ends (22)	=3.Relationship with partner (9)
4.Relationship with family (21)	=4.Relationship with others (including staff) (8)
=5.Performance anxiety-not exams (18)	=4.Anxiety – mild or generalised (8)
=5.Lack of academic motivation (18)	=5.Employment and vocational (5)
	=.Severe anxiety state (5)

3.3.2 Main reasons for attending counselling

The previous section reported students' presenting concerns. Most students continued to attend counselling after their first session and their main reasons for so doing were not necessarily the same as their presenting concerns. Table 15 shows the 20 most common concerns, that is, main reasons, ordered by the frequency with which the counsellors nominated them, nested within the 15 categories listed in the AUCC Categorisation of Client Concerns. Each concern was counted only once per student. The frequencies therefore represent the number of students who presented with each concern. Accordingly, the most common reasons by category and concern were Self and identity (82%), mostly for self-esteem; Relationships (73%), mostly for relationships within the family; Academic (48%), mostly for ‚performance anxiety unrelated to exams'; Loss (31%), mostly for letting go after a relationship ends and bereavement; and equally common, Abuse (20%) and Anxiety (20%).

Table 15. Main reasons why students attended counselling sessions (AUCC categories)

Main reasons by category	*n**	%**
1. Self and identity	530	82%
a) Self-esteem	376	58%
b) Personal growth/search for values and meaning	80	12%
c) Other	74	11%
2. Relationships	469	73%
a) Relationship in the family or with a family member	173	27%
b) Relationship with partner	77	12%
c) Relationship with other/s (including staff)	71	11%
d) Relationship with friend(s) and/or house mates	44	7%
e) Difficulties in relationship with the opposite gender	26	4%
f) Other	78	12%
3. Academic	311	48%
a) Performance anxiety – not exams	49	8%
b) Lack of academic motivation/concentration and procrastination	47	7%
c) Poor study skills/time management	40	6%
d) Struggling academically	33	5%
e) Disappointment with course/course content	24	4%
f) Other	118	18%
4. Loss	203	31%
a) Letting go after a relationship ends	71	11%
b) Bereavement – a loss of a relationship through death	62	10%
c) Other	70	11%
5. Abuse	128	20%
a) Persecution/bullying/harassment/stalking	47	7%
b) Other	81	13%
6. Anxiety	126	20%
a) Anxiety mild	38	6%
b) Severe anxiety state	27	4%
c) Panic attacks	22	3%
d) Other	39	6%
7. Physical Health	70	11%
8. Services, Welfare and Employment	66	10%
a) Employment and vocational	36	6%
b) Other	30	5%
9. Depression, Anger and Mood Change or Disorder	44	7%
10. Self Harm	44	7%
a) Intentional self-harm	25	4%
b) Other	19	3%
11. Eating Disorders	39	6%
12. Transitions	33	5%
13. Other Mental Health Conditions	25	4%
14. Sexual issues	21	3%
15. Addictive Behaviour	14	2%

**n*=number of all students who raised concern in this category; **%=percentage of all the students who attended counselling between 2000 and 2016

3.3.3 Severity of presenting concerns

The severity of presenting concerns, regardless of their nature, was rated by the counsellors on a scale from 0 to 7. Mean severity was 4 (*SD*=1.06), i.e. 'the issue is causing considerable anxiety and distress which in turn is affecting several areas of functioning'.

Additionally, as shown in Table 16, 68.6% of students presented with concerns rated 4 (*n*=220, 34.3%) and 5 (*n*=220, 34.3%).

Table 16. Presenting concerns by degree of severity

Presenting concern	Degree of severity (*N*=642, %)
0	1 (0.2%)
1	5 (0.8%)
2	25 (3.9%)
3	108 (16.8%)
4	220 (34.3%)
5	220 (34.3%)
6	55 (8.6%)
7	8 (1.2%)

3.4 Associations between demographic characteristics and use of counselling; effects of characteristics on numbers of sessions attended

3.4.1 A preliminary analysis was carried out to explore associations between demographic characteristics: students' sex, programme, nationality and school of study, using chi-square tests of association, post-hoc tests, Cramer's V coefficients, 95% confidence intervals and Bonferroni-corrected significance values. Cases were excluded listwise to deal with missing values.

Significant associations were found between sex and school ($X^2(4)=20.70$, $p=.001$, Cramer's V=.18); programme and nationality ($X^2(2)=53.34$, $p<.001$, Cramer's V=.29); programme and school ($X^2(4)=14.97$, $p=.005$, Cramer's V=.15); and nationality and school ($X^2(8)=23.56$, $p=.003$, Cramer's V=.13).

Post-hoc analyses were conducted using adjusted standardized residuals to find out the groups between which the associations were found: adjusted residuals or z scores greater than 1.96 were considered statistically significant. Bonferroni corrections (Beasley & Schumacker, 1995; Garcia-Perez & Nunez-Anton, 2003) were performed by adjusting *p* values to 0.05 divided by the number of analyses. Next, z scores were transformed into chi-square scores and new *p* values calculated. These were then compared to the adjusted Bonferroni- corrected *p* values.

Composers were found significantly more likely to be male ($X^2(1)=16.72$, $p<.005$); postgraduate students were more likely to be from the UK ($X^2(1)=42.90$, $p<.008$) or overseas ($X^2(1)=50.83$, $p<.008$) and students in the school of keyboard studies were more likely to be from overseas ($X^2(1)=12.32$, $p<.003$). No other significant associations were found.

3.4.2 Associations were explored, using the strategies described above, between students' use of counselling and each demographic characteristic. Weak associations were found between use of counselling and sex ($X^2(1)=36.463$, $p<0.001$; Cramer's V=.07), programme ($X^2(1)=104.809$, $p<0.001$; Cramer's V=.13) and school of study ($X^2(4)=38.992$, $p<.001$; Cramer's V=.080), but not nationality. Female students were 1.67 times as likely as male students (OR=1.67; 95% CI [1.41, 1.98]) and postgraduate students 2.63 times as likely as undergraduate students to use counselling (OR=2.63; 95% CI [2.17, 3.18]). Post hoc analyses with Bonferroni-corrected significance levels showed that students in the school of vocal studies were twice as likely as those in the school of keyboard studies ($X^2(1)=20.895$, $p<.005$; Cramer's V=.10; OR=0.50, 95% CI [0.37, 0.68]), 1.75 times as likely as those in the school of wind, brass and percussion ($X^2(1)=25.113$, $p<.005$; Cramer's V=.09; OR=0.57, 95% CI [0.45, 0.71]) and 1.69 times as likely as those in the school of strings ($X^2(1)=22.457$, $p<.005$; Cramer's V=.080; OR=0.59, 95% CI [0.47, 0.73]) to attend counselling sessions.

3.4.3 The potential effects of each demographic characteristic on the number of sessions attended, computed as a continuous variable, were assessed using Mann-Whitney U and Kruskal-Wallis tests as appropriate. The assumption of normality was violated so the non-parametric Levene homogeneity of variance test was conducted (by median with adjusted degrees of freedom). Statistical significance was considered at p=0.05. Confidence intervals of 95% were used throughout. Effect sizes were calculated using the following formula: $\eta 2=Z^2/(N-1)$, where N is the total number of participants.

Undergraduate students attended significantly fewer counselling sessions than postgraduate students (U=33560, Z=-3,052, p=.002, $\eta 2$=0.01).

An association was found between school of study and number of counselling sessions attended with a medium effect size ($X^2(4)$=10.567, p=.032, $\eta 2$=0.17). Pairwise comparisons revealed that students in the school of keyboard studies attended more counselling sessions than those in the school of wind, brass and percussion (U=4484, Z=-2.914, p=.004, $\eta 2$=0.03). No other significant differences were found.

3.4.4 Associations were explored between programme, presenting concerns and main reasons for attending counselling sessions. Only two significant associations were found. Undergraduate students' presenting concerns were 3.42 times as likely as those of postgraduate students to involve bereavement following a death ($X^2(1)$=4.481, p=.03, Cramer's V=.08, OR=3.42, 95% CI [1.02, 11.45]). Postgraduate students' main reasons for attending counselling were 1.88 times as likely as undergraduates' main reasons to involve ‚performance anxiety – not exams' ($X^2(1)$=4.354, p=.04, Cramer's V=.08, OR=0.533, 95% CI [0.29, 0.97]) although it is not clear whether counsellors interpreted ‚exams' as including assessed musical performances.

4 Discussion

4.1 Summary and discussion of findings

The study reported in this chapter consisted of a secondary data analysis to investigate RNCM students' use of counselling between 2000 and 2016. The data analysed included students' demographic characteristics, their presenting and emerging concerns (‚main reasons' for continuing to attend counselling sessions), and the severity of their presenting concerns as rated by the counsellors. Trends in the numbers of students using counselling each year, as percentages of all students registered at the same time, were calculated. The associations between students' demographic characteristics and use of counselling were explored, as were the associations between the programme on which they were registered, their presenting concerns and main reasons.

- What were the demographic characteristics of all students registered between 2000 and 2016 and those attending counselling sessions?

The demographic characteristics of all students registered in each academic year were shown in Table 10. Students studying popular music and those on the joint programme were excluded. A total of 645 students attended a mean of eight and a median of four counselling sessions over the whole 16-year period. Sixty-three percent were female, 79% were from the UK, 72.5% were registered on the undergraduate programme and all schools of study were represented (see Table 11). Numbers of undergraduate students attending counselling sessions decreased from the first to the fourth year of study. As mentioned in Section 1.1.4, first year students might be more likely to have lower wellbeing scores and higher anxiety than pre-tertiary students (Bewick et al., 2010). Or perhaps they become accustomed to college life and become more resilient and/or more able to cope with it after their first year.

- What proportion of all students registered were students attending counselling sessions in each year between 2000 and 2016?

There were year-on-year increases in the numbers of students registered annually during the period. Numbers and percentages of students attending counselling sessions fluctuated but there was an overall increase from 2

(1%) in 2000-2001 to 71 (13%) in 2015-2016 with a peak of 86 (17%) in 2013-2014 (see Table 12). The peak might be explained at least partially by the rise of UK's undergraduate tuition fee cap to £9,000 per year from 2012 (Department for Business, Innovation & Skills, 2010).

The overall increase could be due to various factors including increasing destigmatisation of counselling, better promotion of counselling services in-house and a tendency towards the increasing normalisation of help-seeking with regards to psychological issues. It could also be due, however, to a tendency towards pathologising or medicalising otherwise normal reactions to real-life situations, to such an extent that the difference between the inevitable struggles of young people in their late teens and early 20s and disordered functioning requiring clinical diagnosis and treatment becomes increasingly blurred.

- Why did students attend counselling sessions? What were their presenting concerns and main reasons for continuing to attend?

The presenting concerns of almost one in ten students who sought counselling (see Table 13) were related to self-esteem, self-confidence, ego strength and coping ability, for undergraduate and postgraduate students alike (see Table 14). Their main reasons for continuing to attend counselling were also to do with self and identity, relationships, academic concerns, loss, abuse and anxiety (see Table 15).

These findings contribute to the literature showing that relationship issues, besides stress, anxiety, depression, grief, and academic difficulties, constitute the most common presenting concern in students seeking counselling (Barr, Krylowicz, Reetz, Mistler, & Rando, 2011; Cairns, Massfeller, & Deeth, 2010; Connell, Cahill, Barkham, Gilbody, & Madill, 2006; Connell et al., 2008; Hope & Henderson, 2014; Ibrahim, Kelly, Adams, & Glazebrook, 2013; Pérez-Rojas et al., 2017; Raunic & Xenos, 2008; Said, Kypri, & Bowman, 2013). Analysis of data obtained from almost 4800 students in Spain revealed that one of the factors most predictive of poor wellbeing was having a precarious relationship with living companions (Bernaras Iturrioz, Cerretani, & Bully Garay, 2018).

One of the main social determinants of health is access to social support. For young adults, the better their relationships with family and friends, the higher their levels of wellbeing. For all adults, wellbeing is positively

associated with the quality of their personal relationships and the wellbeing of their partner, and negatively associated with the recent death of someone close to them. Within couples, higher levels of depression and anxiety are associated with negative interactions between spouses or partners. Social cohesion in the community, more widely, affects the mental health of the individual (MHF, 2016; NatCen, 2013). Thus relationships are clearly important to everyone, not just students. Their prevalence as presenting concerns, however, suggests that it would be worth discussing relationships in the context of the conservatoire curriculum.

Although it is unclear whether ‚performance anxiety – not exams' and, anxiety – mild and/or generalised' referred to music performance anxiety, it is not surprising that these were prevalent presenting concerns, as there is a great deal of evidence that young musicians both experience relatively high levels of music performance anxiety and make limited use of coping strategies (Araujo et al., 2017; Kenny, Driscoll, & Ackermann, 2014).

- How severe were students' presenting concerns?

The counsellors rated most students' presenting concerns as causing considerable or severe anxiety and distress affecting several or all areas of functioning, including their coping ability (see Table 16). This is in line with similar findings suggesting that students wait until their coping ability is impaired before seeking help (Broglia, Millings, & Barkham, 2018). This too is not surprising since the concern must reach a threshold of severity before the individual's decision to contact a counsellor is triggered.

- How were each of students' demographic characteristics associated with their use of counselling?

While associations between use of counselling and sex, programme and school of study were weak, female students, postgraduate students and those in the school of vocal studies were most likely to attend counselling sessions.

There is evidence that females are more likely than males to disclose mental health conditions and make use of counselling (RCP, 2011; Schwarts, 2006; Thorley, 2017), and that psychological distress, depression and anxiety all increase during undergraduate years (Andrews & Wilding, 2004; Bewick et al., 2010; Connell et al., 2006). This may help explain why a comparatively large proportion of postgraduate students

attended counselling sessions. Furthermore, the relatively high levels of distress reached during the undergraduate years may not return to baseline (Andrews & Wilding, 2004; Cooke, Bewick, Barkham, Bradley, & Audin, 2006). Singers are said to draw on their emotional resources, particularly when singing operatic roles. They may be more open to counselling than instrumental performers. Some evidence suggests that, in samples of music students, string players have the highest levels of performance anxiety, while singers have the lowest (Tamborrino, 2001). It can be speculated that perhaps singers make more and better use of coping strategies when it comes to stress and anxiety, or because they tend to struggle with them less, for whatever reason, they are more willing to talk about them openly.

- What were the potential effects of students' demographic characteristics on the number of counselling sessions they attended?

Postgraduate students attended more counselling sessions than undergraduates and students in the School of Keyboard Studies attended more sessions than those in the School of Wind, Brass and Percussion. As mentioned in section 3.4.1, students in the School of Keyboard Studies were more likely to be from overseas. It might be the case that being a foreigner or from a different cultural background makes it harder to adapt, and therefore have a greater need for counselling. Yet, as reported in section 3.4.2, no associations were found between nationality and students' use of counselling.

- What were the associations between the programme on which students were registered, their presenting concerns and the main reasons they continued to attend counselling sessions?

Undergraduate students were more likely than postgraduates to mention bereavement as a presenting concern, while postgraduate students were more likely to report performance anxiety as a main reason for continuing to attend counselling sessions. This may have been because some postgraduate students come from backgrounds such as universities in which they had not been expected to perform at such competitive levels. Additionally, postgraduate students are likely to be auditioning for professional orchestras and/or opera companies. Increasingly aware of the

uncertainty of the professional world outside college, they see auditions as important and thus find them stressful.

4.2 Limitations of the study

A number of limitations are associated with the secondary analysis of existing data as a research method. New research questions arise that cannot be answered using the data available. More importantly, the researcher may not have access to all the information needed as to how data were collected or the types of problems that might have occurred while it was being collected. In this case the counsellors were helpful in explaining, for example, the meaning of abbreviations that were unfamiliar to the researcher. Nevertheless they were not able to explain exactly how they distinguished between very similar concerns such as shock state and post-traumatic stress disorder (PTSD); stress and anxiety; and difficulties in the workplace and work-related stress. That said, the AUCC categories they used span a huge spectrum of types of mental illness experienced at different levels of severity. Rating a concern as most severe, namely describing the client as 'Not coping; out of control; despair and hopelessness; emotionally overwhelmed; suicidal thoughts/intent', implies that addressing the concern reaches beyond the clinical expertise of a counsellor. It might be expected that students so described were referred on to psychiatric services but the data do not specify whether this was so or not.

Dichotomous yes/no variables were computed for each concern rather than continous variables to capture frequencies, so total counts of main reasons for attending counselling sessions may not be as accurate as those for presenting concerns only. It was rare for the same concern to be mentioned in all of the sessions attended by a single student. While the dataset is comparatively extensive, it may or may not be generalisable to all UK conservatoire students, although there is also no reason to believe RNCM students are any different from other conservatoire students. The data derive from counsellors' rather than students' notes and ratings: given that counsellors are motivated to see improvements in their clients, they might tend to rate concerns more severe at the outset and/or overestimate improvements over time. While the data were collected by the same two people and are thus likely to be homogeneous, they may also be biased.

The dataset from this single higher music education institution is valuable since there are no comparable data from musicians. They are likely to reveal only a small part of the picture, however. Research using other types of measurement, such as standardized effectiveness outcomes and feedback from clients, is needed to paint a bigger and more accurate picture.

4.3 Strengths of the study

Despite these limitations, the advantages of being able to conduct a secondary analysis of existing data outweighed any disadvantages. The constraints of the study described above forced the researcher to be creative. The data were freely available since they had been collected for purposes other than those of the present study: rigorous, contemporaneous record-keeping, unlikely to have been affected by memory biases, given that the counsellors took in-the-moment notes, in the form of diaries, rather than recalling events or selecting cases for their atypicality. A longitudinal approach could be taken to the exploration of trends in a large sample, saving money, time and effort. To the researcher's knowledge, the present study is the first of its kind. Finally, the use of the AUCC Categorisation of Concerns and severity ratings recommended by the BACP permits future comparisons with similar data from other sources.

4.4 Are students increasingly distressed?

Interviews with five counsellors from a UK university revealed that counsellors have increasing workloads as they try to respond to growing demands and maintain high standards, while resources remain the same. They feel pressured to provide evidence for the effectiveness of their services and constantly to adapt the number and frequency of their sessions to clients' various needs (Randall & Bewick, 2015). If this trend continues, counsellors might need to limit counselling to a few sessions only per client while waiting times could increase. This is problematic, as students in the UK do not usually receive more than five or six sessions anyway (Connell et al., 2006). Such brief models might already be

incompatible with client needs, but more extensive ones might not be viable (Benton et al., 2003). More time for counselling sessions might further limit the counsellor's likelihood to engage in research, thorough assessments or record keeping. Increases in the severity of presenting concerns could also raise the issue of further training for counsellors, as more of the students approaching NHS services could instead seek counselling within college (Broglia et al., 2018; Connell et al., 2006).

It is difficult to gauge accurately whether or not students are becoming increasingly distressed. The prevalence of anxiety, for example, in a nationally representative sample of thousands of adults in the Netherlands, did not change between 1996 and 2009 (de Graaf, ten Have, van Gool, & van Dorsselaer, 2012). This finding was confirmed by the results of a systematic review of prevalence studies with regards to anxiety and depression which found no increases between 1990 and 2010. However, an increase was found in psychological distress (Baxter et al., 2014). The AUCC (1999) raised awareness, in a report entitled *Degrees of Disturbance: The New Agenda*, that only weak evidence supported the perception that students were experiencing psychological problems that were both more prevalent and more severe (Connell et al., 2006). Researchers use a variety of approaches to such phenomena: they might consult the client or the therapist, use *ad hoc* tools, recall or more reliable measures such as Clinical Outcomes in Routine Evaluation (CORE) instruments; and they address non-homogeneous trends in the time courses of different concerns (Benton et al., 2003; Pérez-Rojas et al., 2017).

The impression of increased prevalence and/or severity might, of course, be accurate, at least to some extent, although increased willingness to disclose and seek help could easily be mistaken for increased prevalence. After all, the prevalence of mental illness in young people between 1992 and 2002 did not change much (Hunt & Eisenberg, 2010). Increased prevalence and/or severity could be due to other factors. Mental health is now defined more widely; the threshold for accessing mental health services is lower, and there is a heightened perception that mental ill-health has a serious impact not only on individuals and their families but society at large; these may all lead to an increase in help-seeking behaviours (Kosidou et al., 2017). Thus young people may be more willing to seek help

for emotional issues, there may be less stigma associated with doing so, and public attitudes to mental (ill-)health may have improved. Counsellors in higher education institutions could be more stressed as there is more demand for their services but no funding for employing more counsellors. Slight increases in numbers of students who have severe difficulties requiring more time with counsellors could be mistaken for an overall increase in student demand (Connell et al., 2006; Hinderaker, 2013; Kettmann et al., 2007; RCP, 2011). Other reasons for heightened demand could include the increasing use of digital technologies with its associated risks such as cyber-bullying and excessive screen-time; and constantly-rising academic pressure (e.g. to achieve a first-class degree), as well as social and financial pressures (Thorley, 2017). Another explanation is that distress in students is perceived to have increased over time because of the phenomenon recently described as 'prevalence-induced concept change'. This means that even though distress in students may in fact be lessening over time, as more services are available to help students, people think it is increasing because the criteria by which they define distress have shifted, and they are seeing more of it (Levari et al., 2018).

4.5 Does counselling have undesirable side effects?

Recent evidence suggests that psychotherapy (including counselling) may not be harmless. Schermuly-Haupt, Linden and Rush (2018) asked 100 CBT-trained psychotherapists to administer the Unwanted Events-Adverse Treatment Reactions checklist to their clients. The researchers reported that 43% of clients experienced at least one side effect, defined as negative reactions to the treatment, or unwanted event, defined as the consequences of inadequate treatment. The most common were distress, and strains and deterioration in family relations. The researchers also interviewed the psychotherapists, who were asked to recall whether they thought their clients experienced unwanted effects prior to using the checklist: 74% thought they had not.

The Dodo bird verdict (Rosenzweig, 1936) states that all forms of psychotherapy are equally efficacious not because of the particular approaches they use but because of variables specific to the therapist such

as their genuineness and empathy, client, for example their psychological-mindedness, and the relationship between them (Luborsky, Singer, & Luborsky, 1975). However, more recent evidence suggests that some forms of psychological intervention can be harmful and clinicians have an ethical responsibility to be aware of the available evidence. For example, according to a meta-analysis of 23 published RCTs, grief counselling for normal bereavement could lead to a deterioration in the individual's ability to function (Lilienfeld, 2007; Neimeyer, 2000). As such, perhaps the issue of potentially undesirable side effects of counselling could be investigated through interviews with both counsellors and students who have attended counselling.

4.6 Future research

4.6.1 Barriers to, facilitators and perceived benefits of help-seeking

It would be worth investigating the barriers to, and facilitators and perceived benefits of, help-seeking attitudes and behaviours. University students fail to seek help because of social and self-stigma. Social stigma derives from negative societal attitudes towards individuals suffering from mental health problems and seeking professional help; self-stigma derives from the diminished sense of self-worth experienced by the individual who feels socially rejected (Corrigan, Watson, Byrne, & Davis, 2005; Vogel, Wade, & Haake, 2006; Vogel, Wade, & Hackler, 2007). The distinction between the two is important, as it suggests that support should be offered at both community and the individual levels (Vogel & Wade, 2009). Other reasons for not seeking help include sex (women are more open to accessing help for mental ill-health), cultural factors such as race, ethnicity, family, social norms and faith, and being disabled (Morgan, Ness, & Robinson, 2003; Raunic & Xenos, 2008).

According to a systematic review of 22 qualitative and quantitative studies of young people aged 12-25 years, barriers to help-seeking comprised confidentiality and trust, negative previous experience, poor health literacy and knowledge about relevant services or difficulty identifying relevant symptoms, lack of accessibility, preference for self-reliance, fear and stress (Flansburg, 2012; Gulliver, Griffiths, & Christensen, 2010; Vogel et al.,

2007). Reasons related to self-reliance, such as the belief that one's problems will get better over time, or that discussing them with friends and family might suffice, could indicate resilience, a desirable use of social support and a healthy normalisation of such issues (assuming they are not disabling and the individual is thus in denial). However other reasons, such as fear, stress and discomfort, may be less desirable and therefore worth addressing or challenging (Hinderaker, 2013).

By contrast, the most important facilitator was positive past experience with help-seeking. A study of 682 students at a US university found the perceived benefits of help-seeking for a mental health problem to be improved mental health, reduced stress, resolving one's problems, self-awareness or personal growth, happiness, better life satisfaction, increases in relationships, optimism, self-confidence, communication, comfort sharing one's feelings with others, and social support, better sleep and more energy (Vidourek, King, Nabors, & Merianos, 2014).

4.6.2 Other potential directions for research

In light of all that has been presented above, several steps could be taken. The study reported in this chapter investigated only the use of an in-house counselling service. The extent to which students needed high-intensity support and had to be referred on from the in-house counselling service remains unclear. Analysis of data on referrals to external health providers and professionals such as psychologists, psychotherapists and/or psychiatrists accessed via BAPAM and other routes, and the use of counselling services outside the college, could reveal further insights.

The results of the present study have implications for policy. Resources for support, including counselling services at RNCM and elsewhere, should be maintained, if not increased, to prevent more students experiencing (worse) distress. It would be helpful for counsellors to engage with students outside the context of counselling on topics such as relationships, anxiety and academic stress that are particularly prevalent (Hinderaker, 2013). This might make it easier for students whose main reason for not seeking help is feeling uncomfortable to do so. Given that negative attitudes towards

counselling constitute barriers to help-seeking, educational policies and campaigns could encourage more positive attitudes (Hinderaker, 2013).

Better ways of conducting research in this area include conducting efficacy trials for internal validity and to determine causality, and effectiveness studies for external validity and to obtain evidence on existing practice. These approaches are resource-intensive and are thus rarely used (Connell et al., 2006). The recruitment of a (preferably) active control group could also help to clarify the ingredients of effective counselling. It would be worth investigating students' attitudes to and awareness of in-house counselling and their reasons for and for not seeking counselling. Surveys could be used to investigate students' perceptions of the support available to them (ECU, 2014).

More valid and reliable measures, such as CORE tools could be used to assess the extent to which services address clients' needs, and thereby lead to improvements (MWBHE, 2015). They could also be used to diagnose clients' concerns relative to clinical cut-off scores. Other CORE tools also enable the monitoring and evaluation of impact, based on the client's pre- and post-therapy answers, using the following dimensions: subjective well-being, problems/symptoms, life functioning and risk/harm (CORE, 2018). Other measures that could be included are estimations of academic coping; therapeutic alliance; treatment satisfaction; waiting times; short-term and long-term effects; drop out/completion rates; whether the ending was planned or unplanned; and potential adverse effects (Broglia, Millings, & Barkham, 2017). For example, although counselling is effective for some individuals, others may feel worse and/or drop out (Østergård, Fenger, & Housgaard, 2017). In general, self-report measures should be validated on appropriate samples, sensitive to change, acceptable to counsellors and clients, and not be resource-intensive (Benton et al., 2003). The most meaningful effects of counselling can be difficult to quantify, however, so interviews with therapists and clients should also be carried out.

Alternative methods of delivering counselling could be explored, such as online counselling via synchronous methods such as Skype and asynchronous methods such as email or text message. These would reach students who fail to seek treatment because they prefer to remain

anonymous and at a physical distance from the therapist (Wong, Bonn, Tam, & Wong, 2018). However, the evidence for the effectiveness of computer- and web-based interventions aiming to promote psychological wellbeing and reduce depression and anxiety is mixed (Davies, Morriss, & Glazebrook, 2014). Interventions based on cognitive and behavioural approaches, and psycho-education, are more promising in terms of long-term effects (Winzer, Lindberg, Guldbrandsson, & Sidorchuk, 2018). While it could be useful for clients to have a choice of delivery options, it would be difficult to assess the effectiveness of each one so as to improve services, given the probable diversity of non-comparable outcomes (Broglia et al., 2018).

The most effective approaches are likely to be holistic, based on whole-setting health promotion, as recommended by the Healthy Universities Network (WHO, 1998). A strategy aiming to embed help at all levels of an institution might lighten the load on counsellors and help prevent a potential increase in the severity of students' distress. For example, it might be that a course or at least a series of sessions on issues of particular concern to students could be particularly useful. Topics could include stress management; distinguishing between reliable and unreliable sources on the internet; interpersonal communication and healthy relationships; financial literacy; and educational, career and/or vocational success. As these topics are so relevant to students, these sessions could be used to engage them, train them as independent thinkers and, if conducted in a sufficiently informal and intimate atmosphere, bring students together, thus increasing their perceived social support, and helping to lower stress levels and destigmatise psychological distress. Although findings from a recent systematic review (Burrus et al., 2018) suggest that many interventions aiming to prepare young people for adulthood are not methodologically strong, a course or series of sessions on topics of relevance to students would target some of the more malleable social determinants of health and wellbeing, such as employment opportunities, communication and social relationships. After all, teaching students how to build healthy relationships could help them improve their negotiation skills and make them more resilient when experiencing negative peer pressure (Wolfe, Crooks, Chiodo, Hughes, & Ellis, 2012).

The Equality Challenge Unit (2014) investigated mental health difficulties in 1442 students in higher education. The students made recommendations including the following: the institution should offer information about the benefits and harms of disclosure and confidentiality; and information on what happens after disclosure, with specific examples and case studies. Such information would demonstrate understanding of equality legislation; offer reassurance regarding discrimination; clarify how information will be handled and suggest how to contact support systems. Recommendations for course delivery and assessment included considering the timing of examinations; better communication between support staff and academics for more awareness of individuals' distress; offering alternative methods of course assessment; providing notes and slides before lectures; making lectures available through recordings; creating chatrooms on particular topics; and offering advice on managing deadlines and study strategies. Recommendations related to the built environment included the availability of quiet areas with comfortable seating where people can relax. Insofar as these recommendations have not already been implemented, they could be trialled in conservatoires.

Finally, there are many other ways in which the existing promotion of psychological health in conservatoires could be (and indeed, at RNCM, is already being) further enhanced: through materials such as the prospectus, welcome packs, leaflets, magazines, newsletters and bulletins, videos, websites and emails as to what is available; during induction week and at events such as open days, lectures, guest lectures and lunchtime seminars; awareness-raising campaigns; psychological health training offered to academic staff and instrumental and vocal teachers; mental health first aid training offered to staff and training on responding to mental health crises for security and accommodation staff; peer mentoring schemes; and collaborations with external health professionals and strong relationships with local NHS mental health services (Thorley, 2017).

Chapter 5

Health and Wellbeing for Musicians: Design and quantitative evaluation

1 Introduction

The questions asked by the Better Practice strand of the AHRC-funded CUK-wide research project *Musical Impact* (2014-2017) were

1) What can be learned from existing educational and professional approaches to promoting musicians' health?

2) How can such approaches be adapted, applied and evaluated across educational and professional contexts in the UK and internationally, from the earliest years of study into the profession?

Accordingly, this chapter gives a detailed account of how the course entitled Health and Wellbeing for Musicians, delivered at the Royal Northern College of Music (RNCM) between September 2016 and February 2017, was designed. Its content and delivery methods were based on evidence from what has been learned from existing educational and professional approaches, that is, from the reviews of literature on other health education courses (Chapter 2) and interventions to prevent and mitigate music performance anxiety (MPA), playing-related musculoskeletal disorders (PRMDs) and music-related hearing loss (Chapter 3).[2] The design of the course was also informed by the analysis of students' reasons for attending counselling sessions (Chapter 4). The course, which was compulsory for all first year undergraduate students, was an attempt to adapt and apply the evidence in the context of one educational context, namely the RNCM, and to evaluate its effectiveness. This chapter therefore reports the methods by which it was evaluated and presents the findings of the evaluation of quantitative data; the findings of the evaluation of qualitative data are presented in Chapter 6.

[2] Note that the reviews of the literature provided in Chapters 2 and 3 continued to be updated until the end of October 2018. Given that the course described in this chapter was designed between January and September 2016, articles published more recently could not be taken into consideration.

The evaluation of quantitative data focused on primary and secondary outcomes. Primary outcomes consisted of perceived knowledge of course content and knowledge and awareness of potential risks to health, while secondary outcomes were sought via measures representing general health; health-related quality of life [HRQoL]; health-promoting behaviours; self-efficacy; emotional state; perceived stress; frequency and severity of PRMDs; and perceived exertion. In addition, the opportunity was taken to explore students' hearing and use of hearing protection, and to identify the topics covered in the course that can be inferred as being most salient to students, on the basis of the essays they wrote as part of their course assessment.

Much of this chapter, particularly from Section 2.6 onwards, has been published elsewhere (Matei, Broad, Goldbart, & Ginsborg, 2018) (see Supplementary Material).

2 Materials and Methods

2.1 Health and Wellbeing for Musicians: Course design

The design of the course reflected all but one of the recommendations of the Health Promotion in Schools of Music (HPSM) project. It was not possible to adopt a single health promotion framework for two reasons. One was limited time to plan: my supervisory team and myself had been told that the course would not begin until the spring term of the 2016-2017 academic year (i.e. January 2017) but found out at the beginning of September 2016 that the first lecture was to be given before the end of that month. The other was insufficient control over the planning process: the Health and Wellbeing course was introduced as part of a newly-validated undergraduate programme, in which it was incorporated into a larger module entitled Artist Development 1. Nevertheless the other HPSM recommendations were followed. Health and Wellbeing for Musicians represents the undergraduate "occupational health" course delivered to all music majors (in this case, to first-year students, but the course has continued to be delivered); it educates students about hearing loss as part of ensemble-based instruction; and it assists students through active engagement with health care resources (Chesky et al., 2006).

In addition to the evidence outlined in Section 1, the content and delivery of the course was informed by theories and models deriving from health psychology (Taylor, 2012); discussions with the Acting Head of Undergraduate Studies at RNCM; and members of Healthy Conservatoires. As a result of these discussions it was agreed that the Health and Wellbeing course, as part of the larger Artist Development module, should be embedded in students' training for the music profession. For this reason, the content included sessions on effective strategies for practising and rehearsing.

2.1.1 Health education courses for music students

To summarise briefly the results of the systematic review reported in Chapter 2, health education courses addressed topics such as anxiety, stress, musculoskeletal injury prevention, hearing health, and preventative lifestyle. Evaluations of the effectiveness of the courses measured a range of outcomes for health including health-related behaviours, awareness and perceived knowledge. Few, however, took into account the distinction between health promotion and health education (according to WHO definitions) or considered that the aim of health education should be primarily to improve health literacy rather than health outcomes. The authors of all studies reviewed reported positive associations between health education courses as interventions and outcomes. However, the reliability of these findings was compromised by several limitations, detailed in Chapter 2.

Only one course, designed, evaluated and reported by Laursen and Chesky (2014) explicitly addressed the health education of music students, according to the HPSM recommendations, via the incorporation of health-related elements into a brass methods course. These elements included information on national trends in musicians' health, musculoskeletal injuries and risk factors, and hearing health. Students' awareness, perceived knowledge, perceived competency, perceived responsibility were measured and found to have increased from pre- to post-intervention. Some of Laursen and Chesky's outcome measures were used in the evaluation of the RNCM Health and Wellbeing course.

2.1.2 Interventions to prevent or mitigate MPA

The review of literature presented in Chapter 3 indicated that a 'toolbox approach' aiming to provide a range of evidence-based strategies for coping with MPA would be most effective. In particular, the systematic reviews by Burin and Osorio (2016), Kenny (2005) and the meta-analysis by Goren (2014) showed that CBT approaches were most reliably associated with reductions in MPA and trait anxiety, better self-efficacy and improved performance quality. It was therefore decided that the Health and Wellbeing for Musicians curriculum would teach students that there is a range of evidence-based strategies available to them for dealing with stress and anxiety, while focusing on CBT approaches.

2.1.3 Interventions to prevent or mitigate PRMDs

The review of literature presented in Chapter 3 showed that the studies reported to date comprise both very specific interventions attempting to isolate key ingredients and more complex interventions in the form of health education programmes so, once again, it was hard to draw firm conclusions as to the most effective interventions that should be recommended. While there was no evidence to support yoga, specific exercises guided by a physiotherapist for the neck, shoulder, spine, abdomen and hip were found to be useful in reducing the frequency and severity of PRMDs both immediately after the intervention and at six months follow-up. Endurance training increased muscle strength and reduced muscle fatigue, and reduced the intensity and frequency of pain; similarly, strength training was also associated with reduced pain. It was therefore decided that the Health and Wellbeing course would emphasize the importance for preventing injuries of physical activity in general, and endurance and muscle strengthening training in particular.

2.1.4 Interventions to conserve musicians' hearing

The review of literature presented in Chapter 3 showed that evidence on interventions aimed at conserving musicians' hearing is scarce. Not surprisingly, the authors of the articles reviewed indicate that hearing conservation education is needed to encourage music students to use

preventative strategies to protect their hearing. Information on music-related hearing loss is covered in a lecture delivered to all first-year students during Induction Week, before teaching begins at the start of the academic year. Nevertheless, it was decided to reinforce this in the Health and Wellbeing course, especially as training in hearing conservation is recommended by the HPSM project.

2.1.5 Students' use of counselling at RNCM: Reasons and trends

According to the findings of the study presented in Chapter 4, the issues that were most prevalent over the 16 years for which data were analysed – several of which were also most prevalent in undergraduates' presenting concerns – related to self and identity including self-esteem, self-confidence, ego strength and coping ability; relationships; performance anxiety; lack of academic motivation, lack of concentration, tendency to procrastinate, study skills and time management; loss; abuse; and anxiety. Of course it was not possible to address all of these topics in the Health and Wellbeing course, both for reasons of time and the limited expertise of lecturers. It was possible, however, to include a lecture on music performance anxiety, and to cover the topics of coping ability, concentration, strategies to avoid procrastination, study skills and time management in the course of two further lectures.

2.2 Course structure

The course was designed as the major component of the Artist Development module and was compulsory for all first-year students. The other components were recording and self-promotion. The module took place over the first and second terms of the academic year (September 2016 – February 2017) and consisted of ten weekly 1-hour lectures delivered to the whole cohort (104 students) and eight weekly 1-hour seminars delivered to ten small groups of 10–15 students. Lecturers included Heads of Schools, my primary supervisor (a music psychologist), a specialist in performing arts medicine and myself. All are either practising professional or formerly professional musicians.

Seven of the lectures and five of the seminars related, broadly, to health and wellbeing. Lecture content is outlined below. All lectures were

uploaded to the RNCM's learning management system, Moodle, so that, although students were expected to attend all lectures in person, they could watch them again in their own time.

The ten groups of students (three groups of singers, three groups of string players, two groups of keyboard players and two groups of wind, brass and percussion players) each took part in five seminars that were intended to reflect the content of the seven lectures. I facilitated all ten seminars entitled *Life skills for musicians*; the performing arts medicine specialist facilitated all those entitled *General ergonomics: How do I improve my posture?* The remaining seminars were entitled *Injury prevention and management, including hearing protection; Preparation for performance;* and *Successful careers: Time management, finances, life on tour* and were facilitated by a range of tutors including the researcher's primary supervisor.

2.3 Course content

I attended two of the lectures and one seminar and obtained notes and Powerpoint slides for most of the sessions. In addition, after the final Health and Wellbeing lecture had been given in February 2017, I contacted the lecturers whose lectures and seminars she had not attended via email and asked them about the content of their sessions. The following reflects the information she was able to obtain from them.

2.3.1 Lectures

Lecture 1, How to practise more effectively, was delivered by the Head of the School of Strings. This session focused on the importance of deliberate practice; making and listening to one's own recordings; appraising one's ideal performance and being creative when attempting to overcome specific identified weaknesses by designing one's own strategy perhaps via a series of exercises. The lecturer pointed out that this would require the student to think critically, so as to evaluate their chosen strategy, decide whether it was successful and determine the next steps to be taken (e.g. repeating or adjusting the exercises). He also emphasized the importance of mental practice as a way for students to imagine their ideal performance.

Lecture 2, How to rehearse more effectively, was delivered by the Head of Chamber Music with live illustrations from a first-year piano trio. Topics included warming up and rehearsing as a group; overcoming technical difficulties and problems with rhythm, articulation, bowing and breathing; intonation in groups with and without piano; learning how to identify errors, and to give and receive constructive criticism; the use of recordings when developing interpretations; responding and listening to the music while playing; interacting with the audience.

Lecture 3, Introduction to health and wellbeing, was delivered by the myself. Topics included the findings of recent research on the prevalence and symptoms of, and risk factors for MPA, PRMDs and hearing loss; healthy lifestyles (e.g., nutrition and sleep) and health-promoting behaviors (e.g., physical activity and reducing sedentary behavior); behaviour-change strategies focusing on the concept of life skills as defined by WHO (1998).

Lecture 4, Life skills for musicians including behaviour change techniques, was also delivered by myself and focused on both health and music-making. Life skill topics included time management, exposure (e.g., to healthy options or public performance) and restriction (i.e., intentionally reducing exposure). Behaviour change techniques included goal setting and self-monitoring (Michie et al., 2009; Dombrowski et al., 2012; see also Samdal, Eide, Barth, Williams, & Meland, 2017); planning; self-talk; grading tasks; cognitive reframing (Brooks, 2014); and disputation as a solution for reducing the impact of negative thoughts (in McLeod, 2015).

Lecture 5, Anatomy and physiology for musicians, was delivered by a specialist in performing arts medicine. Topics included sensorimotor integration, particularly in relation to MPA.

Lecture 6, Managing music performance anxiety, was delivered by a music psychologist. Topics included prevalence; symptoms; causes; and the relationship between arousal and performance quality. Potential solutions were suggested in the form of a toolbox of evidence-based strategies including peak performance approaches.

Lecture 7, Presentation skills, was delivered by a senior member of the School of Vocal Studies. The session focused on public speaking and included information on physical (e.g., voice warm-ups) and mental preparation.

2.3.2 Seminars

Other than the seminars on life skills for musicians and general ergonomics all of which were given by myself and the performing arts medicine specialist respectively, the other seminars were delivered by a range of lecturers according to their own expertise and the needs of the students in each of the groups they taught. Most lecturers provided students with lists of resources including references to the literature cited in their sessions.

Life skills for musicians focused on the use of behavioural and cognitive tools for improving health and practice. Although students were keen to discuss MPA and stress management, they also discussed lifestyle more broadly and ways of increasing their engagement in physical activity. The session also introduced Socratic questioning in the context of disputing irrational thoughts.

General ergonomics introduced warm-up and cool-down routines, and – because the lecturer is also a teacher of Alexander Technique – advice on posture based on its principles.

Injury prevention and management, including hearing protection: Content varied according to lecturer and group, but generally covered injuries of the hand and upper body for instrumentalists, and tension in the vocal tract, and head and neck more generally, for singers. Strategies for prevention included warm-up and cool-down, taking regular breaks and keeping fit; the analogy was often drawn between musicians and athletes. Recommended treatments for injury were those published on the NHS website.

Preparation for performance: Content varied according to lecturer and group, but most lecturers interpreted this as practising, learning and memorising. Students shared and discussed the strategies they found most effective, and lecturers provided further advice based on resources provided by musicians and research evidence.

Successful careers: Time management, finances, life on tour: Again, content varied according to lecturer and group – from students' dreams, aspirations and goals to dilemmas such as being offered two engagements on the same day, how to keep comprehensive records for tax purposes and how to promote oneself most effectively using social media.

2.4 Course assessment

Students were required to submit a portfolio of assessments including a 1,000-word essay in response to both the following questions: (1) Looking back on the Health and Wellbeing component of Artist Development 1, what new information, useful for your own music-making, have you learned from one lecture or one workshop/seminar? (2) How have you been able to put this information into practice when making music (e.g., practising, rehearsing, performing or studying more generally)?

2.5 Course evaluation

A mixed-methods approach to evaluation was adopted: quantitative analyses of within-subject data gathered at baseline and post-intervention, and between-group data (intervention vs. controls); and qualitative, semi-structured interviews, reported in Chapter 6. The research was approved by the RNCM Research Ethics Committee (see Appendix K). While the course was compulsory for all first-year students, they gave their informed consent to take part in the study by completing questionnaires; completion took c. 30 minutes. These were administered, at the beginning of the first lecture of the course in September 2016 and at the end of the last lecture in February 2017, via Bristol Online Surveys and as hard copy. The control group consisted of students who had been in the first year of their undergraduate studies in 2015-2016 (i.e. the year before the course was introduced) and responded to the same questionnaire, slightly modified, in March and April 2018, when they were third-year students.

2.6 Measures

The full questionnaire can be seen in Appendix L. It includes items reflecting relevant demographic data; hearing; primary and secondary outcomes.

Hearing and use of hearing protection were measured using 12 items adapted from Laitinen and Poulsen (2008).

Primary outcomes were measured using 15 items adapted from Laursen and Chesky (2014): perceived knowledge of seven topics covered in the course; awareness of potential risks to health associated with music performance; knowledge of potential risks to hearing, health and safety;

responsibility for self-education and prevention of ill-health; and competency to implement recommendations for healthy performance. In order to assess the value they attached to the topics covered in the course, respondents were asked to rate their perceived importance, since health-related perceived importance has been associated with a higher likelihood of engaging in health promoting behaviours (Näslund & Fredrikson, 1993; Orji, Vassileva, & Mandryk, 2012; Wardle & Steptoe, 1991). All ratings were made using 11-point scales from 0 (none) to 10 (greatest possible) or equivalent.

Secondary outcomes were measured as follows:

General health, a single item of self-rated health status of the RAND Short Form 36 Health Survey (SF-36; Ware & Sherbourne, 1992; McDowell, 2006), measured on a scale from 1 (excellent) to 5 (poor). Responses are recoded as scores of 100, 75, 50, 20, and 0, with higher values suggesting better perceived health.

Health-related quality of life (HRQoL): four items from the 15D scale (Sintonen, 1994): (problems with) sleeping, depression, distress, and (lack of) vitality, measured on a scale from 1 (normal) to 5 (severe).

Health-promoting behaviours: the Health Promoting Lifestyle Profile II questionnaire (HPLP II: Walker & Hill-Polerecky, 1996), consisting of 52 items representing six sub-scales: health responsibility (HR), physical activity (PA), nutrition (NU), spiritual growth (SG), interpersonal relations (IR) and stress management (SM), measured on a scale from 1 (never) to 4 (routinely).

Self-efficacy (i.e. self-appraisal of one's capability to deal with a situation or solve a problem), which might facilitate both engagement in health-promoting behaviours and maintenance of healthy habits (Kreutz, Ginsborg, & Williamon, 2009): ten items from the Self-Efficacy Scale (SES: Schwarzer & Jerusalem, 1995), measured on a scale from 1 (not at all) to 4 (exactly true).

Emotional states during the previous week: the Positive and Negative Affect Schedule (PANAS: Watson, Clark, & Tellegen, 1988), a set of 20 adjectives describing positive (10) and negative (10) affective states,

measured on scales from 1 (very slightly) to 5 (extremely). Kreutz et al. (2008) argue that positive emotions may stimulate engagement in health-promoting behaviours and thereby reinforce them.

Perceived stress: the Perceived Stress Scale (PSS-10: Cohen, Kamarck, and Memslstein, 1983; Cohen and Williamson, 1988) was found to be a reliable and valid tool in a study of college students (Roberti, Harrington, & Storch, 2006): ten items relating to stress levels in the previous month, measured on a scale from 0 (never) to 4 (very often). Ratings are added to produce a total, rather than a mean score. The total score can range from 0 to 40.

Frequency and severity of PRMDs: two items adapted from Ackermann and Driscoll (2010), measured on 11-point Likert scales, from 0 (never) to 10 (constantly), and from 0 (none) to 10 (most severe) respectively.

Perceived exertion, to evaluate the amount of physical effort respondents needed to complete their daily practice routines: the Borg Rating Scale (Borg, 1998), which ranges from 6 (no exertion at all) to 20 (maximal exertion).

The respondents' 1000-word essays, written for the purposes of course assessment, also served as a source of data.

2.7 Analyses

Quantitative data were analysed using IBM SPSS 22. Descriptive and inferential statistics are presented. Statistical significance was considered at p=0.05. Confidence intervals of 95% were used throughout. Missing data were handled using listwise deletion for the exploration of changes across time and between groups.

For within-subject analyses, Wilcoxon Signed-Rank tests for paired samples were run, because the assumptions for normality were not met. Effect sizes were calculated using the following formula: $r=Z/\sqrt{N}$ (where N is the total number of cases, not participants). The paired-samples sign test was run when the assumption of symmetrical distribution was not met.

For between-group analyses, Mann-Whitney U tests for independent samples were used, while effect sizes were calculated using the following

formula: $\eta^2 = Z^2/(N-1)$ (where N is the total number of participants). For normally distributed data, independent *t*-tests were conducted.

Respondents' essays were anonymised and their titles (or content, in the absence of titles) categorised according to course topics covered.

3 Results

3.1 Sample characteristics: attrition rate and demographics

Intervention group. Of a total of 104 first-year undergraduate students enrolled on the course, only 13 did not complete the baseline questionnaire (12.5%). Of the 91 students who did, 81 (90%) completed the same questionnaire post-intervention: an attrition rate of only 10%. The mean age of these 81 respondents (37 males, 41 females, 3 undisclosed sex) was 19 years (range 18-26, *SD*=1.34). Twenty-nine (36.3%) were singers, 19 (23.8%) were string players, 17 (21.3%) were wind and brass players, 11 were pianists (13.8%), three were composers (3.8%), and one was a percussionist (1.3%). The mean number of years they had sung, or played their main instrument, was 9.4 (range 2-18, *SD*=3.09). They reported carrying out a mean of 14.3 hours of personal practice per week (range 0-84 hours, *SD*=11.08).

Control group. Thirty-three third-year undergraduate students (18 male, 14 female, and one who preferred not to disclose their sex) with a mean age of 22 (range 20-27, *SD*=1.71) completed the questionnaire either online or as hard copy in March-April 2018. Fifteen were string players (46.9%), six were keyboard players (18.8%), six were wind and brass players (18.8%), three were singers (9.4%) and two were composers (6.3%). Information on main instrument was missing for one respondent. They had played their main instruments for a mean of 12 years (range 7-18, *SD*=3.16).

3.2 Hearing and use of hearing protection

For the purposes of comparing the intervention group with controls, data from all the students who completed the questionnaire at baseline, including those who did not complete it post-intervention, are shown in Table 17 as numbers and percentages of respondents to each question.

Table 17. Hearing and use of hearing protection

	Intervention (T1 only) *n* (%)	Control *n* (%)
Use of hearing protection		
Do you use ear protection aids (ear plugs/noise-reducing headphones)…		
…while practising alone (89 Intervention, 33 Control)		
Never/Seldom	80 (89.9%)	30 (90.9%)
Sometimes/Often/Always	9 (10.1%)	3 (9.1%)
...at rehearsals with other players (89 I, 33 C)		
Never/Seldom	71 (79.8%)	23 (69.7%)
Sometimes/Often/Always	18 (20.2%)	10 (30.3%)
...at performances (my own) (89 I, 33 C)		
Never/Seldom	82 (92.1%)	29 (87.9%)
Sometimes/Often/Always	7 (7.9%)	4 (12.1%)
...at other people's performances (90 I, 33 C)		
Never/Seldom	73 (81.1%)	21 (63.6%)
Sometimes/Often/Always	17 (18.9%)	11 (36.4%)
Use of hearing protectors (39 I users, 21 C users)		
I got used to wearing them right away	22 (56.4%)	7 (33.3%)
It took me weeks/months/years to get used to them	6 (15.4%)	7 (33.3%)
I didn't get used to them, but I use them anyway	7 (17.9%)	4 (19.0%)
I didn't get used to them, so I stopped using them	4 (10.25%)	3 (14.3%)
I have never used them	51	11
Type of ear protection (37 I users, 20 C users)		
Single use soft ear-plugs	10 (27%)	4 (20%)
Reusable (more expensive) soft ear plugs	26 (70.3%)	14 (70%)
Personally tailored, custom-made ear plugs	1 (2.7%)	2 (10%)
While using your ear plugs, did you encounter any of the following difficulties?[1] (56 I, 38 C)		
The ear plugs hindered my own performance	9 (16.1%)	11 (33.3%)
The ear plugs decreased my ability to hear the other player	15 (26.8%)	15 (45.5%)
Ear plugs were uncomfortable	10 (17.9%)	4 (12.1%)
Ear plugs were difficult to put into ears	12 (21.4%)	4 (12.1%)
Ear plugs made me feel dizzy	2 (7.1%)	0
Ear plugs caused a pressure sensation in my ear	8 (14.3%)	4 (12.1%)
If your instrument is suitable for playing with mute (muffler), how often do you use it on your instrument? (40 I, 18 C)		
Never/Seldom	29 (72.5%)	14 (77.8%)
Often/Always	11 (17.5%)	4 (22.2%)
Hearing issues		
Do you have tinnitus? (88 I, 33 C) YES	7 (7.95%)	7 (21.2%)
Do you experience hyperacusis? (86 I, 33 C) YES	5 (5.8%)	5 (15.15%)
Do you experience distortion? (80 I, 33 C) YES	1 (1.25%)	0
Do you experience diplacusis? (80 I, 33 C) YES	0	0
When was your hearing last checked? (66 I, 32 C)		
I don't know	19 (28.8%)	4 (12.5%)
I have never had a hearing test	18 (27.3%)	10 (31.3%)
Over 10 years ago	5 (7.6%)	3 (9.4%)
6-10 years ago	9 (13.6%)	2 (6.3%)
4-5 years ago	3 (4.5%)	3 (9.4%)
1-3 years ago	6 (9.1%)	3 (9.4%)
In the last 12 months	6 (9.1%)	7 (21.9%)
When your hearing was checked, were you told that you have hearing loss? (40 I, 26 C)		
Yes	4 (10%)	0
No	29 (72.5%)	19 (73.1%)
Cannot say	7 (17.5%)	7 (26.9%)

Use of hearing protection. In both groups, minorities of respondents reported using hearing protection 'sometimes', 'often' or 'always' while practising alone (10% of the intervention group and 9% of controls) and during their own performances (8% of the intervention group and 12% of controls). By contrast, 20% of the intervention group and 30% of controls reported using hearing protection while rehearsing with other people, and 19% of the intervention group and 36% of controls used it while listening to other people's performances. Seventy percent of those who did use hearing protection used reusable soft ear plugs. Of those whose instruments can be muted, 17.5% of the intervention group and 22.2% of controls reported using the mute 'often' or 'always'.

Experiences of using hearing protection. Fifty-six percent of the respondents in the intervention group who used hearing protection, but only 33% of controls, reported having got used to wearing them right away; another 33% of controls said it had taken them 'weeks/months/years' to get used to them.

Difficulties using hearing protection. The most frequently-reported problems experienced by respondents in the intervention and control groups were a decrease in their ability to hear other players (26.8% and 45.5% respectively). The next most frequently-reported problems were difficulty inserting ear plugs (21.4% of intervention group responses) and hindrance to the player's own performance (33.3% of control group responses). The questionnaire included an invitation to report other problems: responses included "not being able to hear details in the sound"; "made listening to my sound more difficult"; "can't sing with them in"; "I felt isolated and anxious over the sounds I was making and tuning"; "I can hear my mouth moving – very distracting"; and "hear myself from within my mouth when playing".

Hearing issues: Tinnitus was reported by 8% of the intervention group and 21% of controls, and hyperacusis by 6% and 22% respectively. Only one member of the intervention group experienced distortion and no-one reported diplacusis.

Hearing loss. While only 36% of the intervention group and 47% of controls had had a hearing test in the previous ten years, only 10% of the former and none of the latter had been diagnosed with hearing loss.

3.3 Primary outcomes

Descriptive and inferential statistics are shown in Table 18 for perceived knowledge and importance of topics covered in the course, and awareness and knowledge of potential risks to health.

Perceived knowledge: There were statistically significant increases from baseline to post-intervention in mean ratings for perceived knowledge of all topics covered in the course: effective practising strategies (Z=-4.32, p<.001); effective rehearsing strategies (Z=-3.84, p<.001); learning and memorising strategies (Z=-2.37, p=.01); ergonomics and posture (Z=-2.45, p<.01); managing MPA (Z=-4.97, p<.001); life skills and behaviour change techniques (Z=-3.12, p=.002); presentation skills (Z=-2.31, p=.02). Small to medium effect sizes associated with these changes varied between r=.18 and r=.42 (Cohen, 1988). There was a trend such that respondents rated their perceived knowledge, post-intervention, higher than controls on managing MPA (Z=-1.69, p=0.09) but the difference between means did not reach significance.

Perceived importance: Respondents rated their knowledge of effective learning and memorising strategies, post-intervention, higher than controls (Z=-2.07, p=0.03, η^2=0.04), and there was a trend such that they also gave higher ratings for the perceived importance of ergonomics and posture (Z=-1.80, p=0.07) but the difference between means did not reach significance. Otherwise, there were no differences between the ratings of the intervention and control groups, nor changes from baseline to post-intervention.

Awareness of potential risks: There was a significant increase from baseline to post-intervention in ratings for one of the three items: awareness of performance factors related to musculoskeletal injuries associated with learning and playing an instrument/singing (Z=-3.09, p=.002, r=.26). There were no significant differences between the ratings of respondents, post-intervention, and controls.

Knowledge of potential risks: There were significant increases from baseline to post-intervention in ratings for both items: knowledge of sound intensity levels associated with hearing loss (Z=-2.09, p=.03, r=.17) and how to deal with the health and safety issues associated with learning and playing a musical instrument (Z=-5.03, p<.001, r=.39). There were no

significant differences between the ratings of respondents, post-intervention, and controls. There was, however, a trend such that the former rated their knowledge of sound intensity levels higher than the latter (Z=-1.83, p=0.06), although the difference between means did not reach significance.

Other primary outcomes: There were no significant increases from baseline to post-intervention in ratings for responsibility for self-education and prevention of ill-health, or competence to implement recommendations for healthy performance. Nor, for these outcomes, were there any significant differences between the ratings of respondents, post-intervention, and controls.

Table 18. Perceived knowledge and importance of topics, awareness and knowledge of potential risks

	N	*T1 (mean, SD)*	*N*	*T2 (mean, SD)*	*Z value*	*p*	*Effect size (r)*	*N*	*Control (mean, SD)*	*Z value (comparison with intervention group at T2)*	*p*	*Effect size (η^2)*
Perceived knowledge of:												
1.Effective practising strategies	80	5.62 (2.02)	81	6.92 (1.60)	-4.32	**<0.001**	**-0.37**	33	7.18 (1.77)	-1.32	0.18	
2.Effective rehearsing strategies	80	5.21 (2.26)	79	6.40 (1.72)	-3.84	**<0.001**	**-0.32**	33	6.57 (2.00)	-1.04	0.29	
3.Learning and memorising strategies+	80	5.76 (2.24)	81	6.39 (2.07)	-2.37	**0.01**	**-0.18**	33	6.51 (2.37)	-0.56	0.57	
4.Ergonomics/posture	80	5.56 (2.34)	81	6.19 (2.15)	-2.45	**0.01**	**-0.21**	33	6.42 (2.07)	-0.86	0.38	
5.Managing music performance anxiety	80	4.47 (2.58)	81	6.86 (1.85)	-4.97	**<0.001**	**-0.42**	32	5.93 (2.44)	-1.69	0.09	
6.Life skills and behaviour change techniques+	80	4.87 (2.67)	81	6.39 (2.05)	-3.12	**0.002**	**-0.24**	33	5.42 (2.54)	-1.54	0.12	
7.Presentation skills+	79	5.64 (2.35)	81	6.28 (2.29)	-2.31	**0.02**	**-0.19**	33	6.45 (2.29)	-0.24	0.80	
Perceived importance of:												
1.Effective practising strategies+	77	8.74 (1.49)	80	8.76 (1.72)	-0.15	0.87		32	8.62 (2.05)	-0.48	0.62	
2.Effective rehearsing strategies	77	8.63 (1.47)	80	8.48 (1.85)	-1.11	0.26		32	8.28 (2.06)	-0.62	0.52	
3.Learning and memorising strategies	77	7.97 (1.85)	80	8.21 (1.79)	-1.30	0.19		32	7.68 (1.59)	-2.07	**0.03**	0.04
4.Ergonomics/posture+	77	8.36 (1.60)	80	8.33 (1.87)	0	1.00		32	7.78 (1.87)	-1.80	0.07	
5.Managing music performance anxiety+	76	8.42 (2.06)	80	8.17 (1.68)	-1.71	0.08		32	8.18 (2.62)	-0.86	0.38	
6.Life skills and behaviour change techniques	77	7.64 (2.28)	80	7.61 (2.25)	-0.34	0.73		32	7.21 (2.63)	-0.99	0.31	
7.Presentation skills+	75	8.06 (1.83)	80	7.48 (2.27)	-0.91	0.35		32	7.31 (2.62)	-0.32	0.74	

	N	*T1 (mean, SD)*	*N*	*T2 (mean, SD)*	*Z value*	*p*	*Effect size (r)*	*N*	*Control (mean, SD)*	*Z value (comparison with intervention group at T2)*	*p*	*Effect size (η^2)*
Awareness of potential risks												
As a future professional musician, are you aware of any performance factors that are related to musculoskeletal injuries associated with learning and playing an instrument/singing?	80	5.36 (2.86)	80	6.62 (2.34)	-3.09	**0.002**	**-0.26**	33	6.87 (2.67)	-1.19	0.23	
Learning and performing music may involve hazards that have a negative impact on health.	81	5.77 (3.22)	81	6.03 (3.12)	-0.90	0.36		33	6.63 (3.21)	-1.20	0.22	
The way an individual plays a musical instrument/sings influences his/her level of risk of injury or health problems.	81	7.20 (2.57)	79	7.31 (2.60)	-0.32	0.74		33	8.06 (2.27)	-1.75	0.07	
Knowledge of potential risks												
Do you know what sound intensity levels are associated with hearing loss?	80	5.50 (2.98)	79	6.22 (2.78)	-2.09	**0.03**	**-0.17**	33	5.03 (3.82)	-1.83	0.06	
As a future professional musician, do you feel you have the resources, understanding, and knowledge to deal with the health and safety issues associated with learning and performing music?+	81	5.50 (2.30)	80	7.15 (1.92)	-5.03	**<0.001**	**-0.39**	33	6.51 (1.97)	-1.60	0.10	

+Results based on the Sign Test analysis (within-subjects)

3.4 Secondary outcomes

Descriptive and inferential statistics are shown in Table 19.

General health. Means at both baseline and post-intervention were comparable to those obtained previously among musicians, but much lower than values among university students in the UK (Araujo et al., 2017). There were no significant mean differences from baseline to post-intervention, nor between intervention group and controls.

HRQoL. While means at baseline and post-intervention were low, there were nevertheless significant increases in ratings representing sleep problems (Z=-2.77, p=.005, r=.21), distress (Z=-2.63, p=.009, r=.20), and lack of vitality (Z=-2.02, p=.04, r=.15). In comparison with respondents post-intervention, controls experienced more severe depression (Z=-3.58, p<.001, η^2=.11), distress (Z=-2.18, p=.02, η^2=.04), and lack of vitality (Z=-3.49, p<.001, η^2=.10).

Health-promoting behaviours. The HPLPII showed acceptable to good internal reliability for the whole scale (Cronbach's alpha=.77) and subscales at T1 with the following alphas: HR=.83; PA=.81; NU=.73; SG =.84; IR =.78; SM =.67) and at T2 for the entire scale (alpha=.79) and subscales: HR=.81; PA=.80; NU=.75; SG=.87; IR=.82; SM=.72). The grand mean of all scores on HPLPII was 2.53 (SD=0.36), indicating that respondents reported engaging in health-promoting behaviours 'sometimes' or 'often' (Araujo et al., 2017; Kreutz et al., 2008; Panebianco-Warrens et al., 2015). Means for the subscales representing health responsibility, physical activity and stress management were lower, and means for the subscales representing nutrition, spiritual growth and interpersonal relations were higher than the grand mean. There were no significant differences in ratings at baseline and post-intervention, nor between those of respondents, post-intervention, and controls

Self-efficacy. The SES scale showed good internal reliabilities at T1 and T2 (Cronbach's alphas=.86 and .89 respectively). Ratings increased significantly from baseline to post-intervention (Z=-2.52, p<.01, r=.20), although the grand mean at baseline was only 3.0 (SD=0.41), lower than found in previous research in the UK (M=3.57; SD=0.63: Kreutz et al., 2008) and South Africa (M=3.89; SD=0.59: Panebianco-Warrens et al.,

2015). There were no significant differences between the ratings of respondents, post-intervention, and controls.

Emotional states. The PANAS scale showed good internal reliabilities at T1 (PA Cronbach's alpha=.87; NA=.83) and T2 (PA=.90; NA=.88). Ratings for positive affect decreased significantly from baseline to post-intervention (Z=-4.02, p<.001, r=.32), although the mean at baseline was 3.89 (SD=0.65), higher than those reported by Kreutz et al. (2008) and Panebianco et al. (2015): 3.43 (SD=0.75) and 3.51 (SD=0.74) respectively. There was a trend such that ratings for negative affect increased (Z=-1.64, p=.09), although significance was not reached; once again, the mean at baseline was 1.77 (SD=0.59), lower than the means reported in the UK and South African research: 2.09 (SD=0.73) and 2.40 (SD=0.81) respectively. In comparison with respondents post-intervention, controls experienced lower positive affect (Z=-2.30, p=.02, η^2=.04) and higher negative affect (Z=-2.68, p<01, η^2=.06).

Perceived stress. The PSS scale showed good internal reliability at T1 and T2 (Cronbach's alphas=.86 and .87 respectively). There was no significant difference between mean ratings at baseline and post-intervention, but in comparison with respondents, post-intervention, controls reported higher levels of stress (Z=-2.28, p<.02, η^2=.04).

PRMDs. There were no significant differences between mean ratings representing the frequency and severity of PRMDs at baseline and post-intervention, nor between the ratings of respondents, post-intervention, and controls. Both frequency and severity were comparatively low.

Perceived exertion. There was a significant decrease from baseline to post-intervention (Z=-3.05, p=.002, r=.24), namely from '12' to '11 fairly light' on the RPE scale, although controls reported their daily practice routine to require more effort ('13 somewhat hard' on the RPE scale) (Z=-3.22, p<.001).

Table 19. Secondary outcomes

	N	*T1 (mean, SD)*	*N*	*T2 (mean, SD)*	*Z value*	*p*	*Effect size (r)*	*N*	*Control (mean, SD)*	*Z value (comparison with T2)*	*p*	*Effect size (η^2)*
General health	80	67.81 (18.73)	81	66.04 (19.48)	-0.81	0.41		33	59.84 (22.48)	-1.53	0.12	
HRQoL												
Sleeping	81	1.69 (0.70)	81	1.91 (0.77)	-2.77	0.005	-0.21	33	2.09 (0.91)	-0.96	0.33	
Depression	81	1.53 (0.76)	81	1.60 (0.83)	-1.13	0.25		33	2.36 (1.08)	-3.58	<0.001	0.11
Distress	81	1.95 (0.86)	81	2.20 (0.95)	-2.63	0.009	-0.2	33	2.70 (1.18)	-2.18	0.02	0.04
Vitality	81	1.49 (0.63)	81	1.65 (0.79)	-2.02	0.04	-0.15	33	2.30 (0.95)	-3.49	<0.001	0.1
HPLPII												
Health Responsibility (HR)+	79	1.91 (0.53)	81	1.94 (0.56)	-0.12	0.9		32	2.01 (0.46)	-1.13	0.25	
Physical Activity (PA)	74	2.28 (0.62)	79	2.38 (0.64)	-1.12	0.25		32	2.28 (0.62)	-0.77	0.44	
Nutrition (NU)	80	2.57 (0.52)	78	2.63 (0.56)	-0.96	0.33		32	2.67 (0.50)	-0.22	0.82	
Spiritual Growth (SG)++	77	2.90 (0.54)	79	2.87 (0.60)	-0.07	0.93		33	2.70 (0.54)	1.37	0.17	

	N	*T1 (mean, SD)*	*N*	*T2 (mean, SD)*	*Z value*	*P*	*Effect size (r)*	*N*	*Control (mean, SD)*	*Z value (comparison with T2)*	*p*	*Effect size (η^2)*
Interpersonal Relations (IR)	78	3.06 (0.48)	79	3.04 (0.50)	-0.32	0.74		30	2.92 (0.54)	-1.37	0.17	
Stress Management (SM)++	80	2.33 (0.43)	80	2.42 (0.51)	-1.25	0.21		33	2.33 (0.41)	0.91	0.36	
Self-efficacy	79	3.00 (0.41)	80	3.09 (0.48)	-2.52	0.01	-0.2	33	3.13 (0.45)	-0.71	0.47	
PANAS												
Positive Affect (PA)	76	3.89 (0.65)	80	3.56 (0.70)	-4.02	<0.001	-0.32	32	3.21 (0.83)	-2.3	0.02	0.04
Negative Affect (NA)	76	1.77 (0.59)	81	1.94 (0.72)	-1.64	0.09		32	2.33 (0.72)	-2.68	<0.01	0.06
Perceived stress	81	17.19 (6.49)	77	17.85 (7.20)	-0.5	0.57		29	21.10 (5.32)	-2.28	<0.02	0.04
PRMDs												
How often do you suffer from a PRMD?	80	1.42 (2.09)	81	1.66 (2.43)	-0.64	0.51		32	2.56 (2.68)	-1.76	0.77	
Average severity of PRMD	80	1.30 (1.97)	80	1.55 (2.03)	-1.12	0.26		32	2.43 (2.44)	-1.78	0.75	
Perceived exertion	78	7.32[1] (2.37)	80	6.401 (-2.51)	-3.05	0.002	-0.24	32	8.16[1] (2.71)	-3.22	0.001	0.09

+Results based on the Sign Test analysis (within-group)
++Results based on independent t-tests (between group)
[1]M=7.32 is the equivalent of '12' on the RPE scale (from 6 to 20); M=6.40 is the equivalent of '11 fairly light'; M=8.16 is the equivalent of '13 somewhat hard'

3.5 Student assignments

A total of 103 essays was submitted. Just over half the students chose to write about managing MPA or life skills and behaviour change techniques (see Table 20). Less popular topics included injury prevention (including hearing loss), vocal health, practice and memorisation strategies and the psychophysical mechanisms of performance and Alexander Technique. Three students wrote about public speaking, and a small minority chose to discuss the health and wellbeing component of the module as a whole.

Table 20. Course topics covered in student assignments

	n (%)
Managing MPA	36 (34.9%)
Life skills and behaviour change techniques	21 (20.3%)
Injury prevention (including hearing loss)	10 (9.7%)
Vocal health	9 (8.7%)
Practice and memorisation strategies	9 (8.7%)
The psychophysical mechanisms of performance and Alexander Technique	6 (5.8%)
Public speaking	3 (2.9%)
Variety of topics or about the module as a whole	9 (8.7%)
Total	103 (100%)

4 Discussion

This study investigated the effects of a compulsory health education course, framed as an intervention, on a range of health-related outcomes for undergraduate music students. The course covered not only physical and mental health, but also effective strategies for practising, memorising and rehearsing, and life skills and behaviour change tools inspired by health psychology. It is the first such course to be designed and evaluated at a British conservatoire. Within-subject data were gathered at the beginning and end of the intervention in September 2016 and February 2017, and control data were gathered for the purposes of the between-group analysis in March-April 2018.

4.1 Hearing and use of hearing protection

Tinnitus and hyperacusis were reported by both groups of respondents, with a higher incidence in the (third-year) control group than in the (first-year) intervention group. Ten percent of the intervention group had been diagnosed with hearing loss, although minorities of respondents in both groups reported having had hearing tests in the previous ten years.

Although respondents were more likely to use hearing protection when rehearsing with others and attending concerts, comparatively few members of either group used hearing protection or the mute on their instrument, if appropriate, while practising alone. This could affect hearing, since private practice can cause over-exposure to risky levels of sound; O'Brien et al. (2013), for example, estimate that recommended limits may be reached after less than half the practice time reported by participants in their study.

The majority of users preferred reusable soft ear plugs to single-use soft plugs and the much more expensive custom-made versions; over half the intervention group users and a third of control group users reported getting used to them immediately while the remainder needed more time, persisted despite discomfort, or gave up using them. Typical problems with ear plugs included decreased ability to hear others, hindrance to own performance, difficulties with insertion and the sensation of pressure in the ear.

These findings complement the results of recent research investigating the perceived advantages and disadvantages of using ear plugs, how they are used and musicians' strategies for wearing them. In a series of in-depth interviews with 23 musicians in Australia, Beach and O'Brien (2017) asked participants to identify the advantages and disadvantages of wearing earplugs, and describe their strategies for, and patterns of using them. Perceived advantages included protecting their hearing; the fact that their ability to communicate with others was not affected; their experience of sound levels being reduced and enhanced clarity; feeling comfortable using them; and the discreet nature of the earplugs they used. Perceived disadvantages included worse sound quality; their impaired ability to judge sound balance, intonation, tone and timbre; the occlusion effect (which might have been the cause of the previous issue); and worry that other people might have a negative perception of them.

4.2 Primary outcomes

Not surprisingly, respondents reported increased knowledge of the topics covered in the course, including the sound intensity levels associated with hearing loss and how to deal with the health and safety issues associated with learning and playing a musical instrument. They also reported increased awareness of performance factors related to potential musculoskeletal injuries. The ratings of students who had taken the course and those who had not did not differ significantly, perhaps because the control group had had informal exposure to the other topics covered in the course, with the exception of life skills and behaviour change techniques. These were introduced in the context of an innovative lecture on preventative health, tools for the initiation and maintenance of healthy habits, and cognitive strategies for addressing thinking errors. Students who had taken the course also rated their ability to deal with relevant health and safety issues significantly higher than controls, but these issues are likely to have been reinforced throughout the period of the intervention by instrumental and vocal tutors and through health and safety briefings provided by the conservatoire.

The results support those of Laursen and Chesky (2014) in relation to their health education programme: their respondents also reported significantly increased knowledge post-intervention, and Laursen and Chesky argue that even minimal intervention can produce positive effects. While the researcher asked respondents to rate the importance (i.e., the value) they attached to each of the topics covered in the course, only one significant difference was found between intervention and control groups: the latter attached less importance to effective learning and memorising strategies than the former, perhaps because, as current third-year students, they were more confident in their ability to meet the demands being made on them to learn and memorise. There were no changes in perceived importance between baseline and post-intervention. This can be attributed to a ceiling effect: means ranged from 7.64 to 8.74 at baseline and from 7.48 to 8.76 at post-intervention, suggesting that students find these topics highly relevant to their studies.

4.3 Secondary outcomes

The only desired secondary outcomes to improve significantly from baseline to post-intervention were self-efficacy and perceived exertion, which may or may not have been the result of the course. Other significant increases were in the wrong direction: sleep problems, distress and lack of vitality all increased significantly from baseline to post-intervention, and controls experienced more severe depression, distress and lack of vitality. Positive affect decreased significantly and there was a trend towards an increase in negative affect, while controls experienced lower positive and higher negative affect. Controls also reported higher levels of perceived stress and perceived exertion.

These negative findings could be attributed to the cumulative pressure on students over time. The first time the intervention group completed the questionnaire, they were in their second week at the conservatoire; post-intervention, they were facing deadlines for assignments to be submitted and recitals to be given. They may, however, have fared better than the control group simply by virtue of being a year younger. The extent to which the health education course may have mitigated the demands perceived by the students in the intervention group remains unknown. After all, behavioural changes might take longer than cognitive changes to be made (Barton & Feinberg, 2008).

The mean ratings for perceived exertion decreased significantly from baseline to post-intervention, and were higher for controls, reaching '13 somewhat hard'. Means were low, representing '12' to '11 fairly light', although not surprisingly low, given that perceived exertion measures the level of physical effort and that scores for both frequency and severity of PRMDs were also low. For example, some exercise-based interventions have been associated with a positive impact on both PRMDs and RPE in the past (Ackermann et al., 2002; Chan et al., 2014a; Kava et al., 2010). However, the result is hard to interpret, given that perceived exertion may be influenced by both physiological and psychological factors (McCrary, Halaki, Sorkin, & Ackermann, 2016).

Finally, the categorisation of student assignments to the topics covered in the course illustrated (arguably) those that respondents found of most interest or direct relevance to them, at this point in their studies:

predominantly managing MPA and life skills and behaviour change techniques.

The strengths of the study include the design and evaluation of the course, which was more rigorous than the majority of those reviewed in Chapter 2. First, the content of the course was based on a critical appraisal of the available literature on interventions to improve the health of musicians, theories from health psychology and a clear conceptualisation of health education, according to the WHO definition, as opposed to health promotion. Second, the course was compulsory. This partially explains the low attrition rate and reduces the likelihood of selection bias. The findings are therefore likely to be both more realistic and generalisable than evaluations of optional courses. Indeed Spahn et al. (2001) suggest that compulsory courses may be more effective. Third, lectures were delivered and seminars facilitated by tutors who were all performing musicians, which may have helped to promote more intimate and informed interaction with students; in addition, three of the tutors specialised also in health psychology, performing arts medicine and psychology respectively. Fourth, seminars were conducted in an informal, relaxed manner, enabling students to ask questions freely and tutors to tailor content to the needs of particular groups of students. Fifth, assignments were set in such a way as to bridge the gap between theory and practice: students were asked to reflect on what they had learned and how they implemented it in their music-making. Sixth, it was helpful to compare the experiences of the students who took the course with those of a control group (albeit a year older, with a year's more experience of conservatoire training), so as to contextualise learning within the broader context of undergraduate studies in music performance.

The limitations of the study must also be acknowledged. First, the rigour of the approach could have been increased by consulting a wider variety of health professionals when designing the course, given its high level of interdisciplinarity. Second, I did not have the final say on the content of all the lectures and sessions delivered, other than those I delivered myself, and could not therefore fully monitor the extent to which the course was evidence-based. My impression, from reading the materials with which I was was provided by tutors, and the students' essays, suggests that, on the whole, the evidence base was satisfactory. As a general point, it can be

argued that justification is needed for including popular practices in health education courses for musicians that have little support from research evidence, such as Alexander Technique (Aetna, 2016; Baggoley, 2015; Klein et al., 2014). Music students and their tutors have such full schedules (Clark & Williamon, 2011) that they should not be exposed to interventions unless there is evidence that they are likely to be effective. Third, the set of questionnaires used was lengthy, and response fatigue might have affected students' responses. Fourth, measures of perceived rather than actual knowledge were used. Fifth, it was not possible, for ethical reasons, to recruit a control group of first-year students at the conservatoire who would thus have been deprived of taking the course, and because the course was deliberately designed to take over two terms it was not possible to deliver it twice, once in each term, so as to use a wait-list design. A control group of second-year students could have been recruited in 2016 but, due to changes of personnel at the institution, permission could not be obtained. It was not possible until 2017, by which time the researcher had begun to report findings to colleagues, that the course could be run again (it is now part of the curriculum) and questionnaires could be administered to the control group. This solution does not, however, allow the researcher to ascertain the extent to which differences between groups were pre-existing or the result of the control group's additional experience. Sixth, using assignments as a way of evaluating the course is potentially problematic. Students' choices of sessions to write about may have been guided less by interest in the topic or its relevance to them and more by the lecturer's clarity, communication and/or charisma, how informative the slides were and whether an easily-accessible list of references had been provided; such factors could have made certain topics more memorable or attractive for the purposes of fulfilling an assignment. Essay content may not have been entirely reliable, as students are likely to have been motivated by the wish to pass the course. Some students did not refer explicitly to the title of the relevant lecture or seminar/workshop, or the name of the tutor, so their essays had to be categorised on the basis of our knowledge of the content delivered; others referred to the course as a whole.

In the absence of a national curriculum for health, all institutions of higher education must develop their own approaches to health education, as do many university music departments and music conservatoires, the

questions posed by Ralph Manchester in 2006 are still pertinent: “Who will develop this course? What topics will be included in the syllabus? Who will teach it? Will it be offered to freshmen or seniors, or can it be taken during any year? Can one course meet the needs of performance majors, music education majors, and others? Should we develop some minimal national requirements?” (Manchester, 2006, pp. 95-96). Further questions could be asked, such as: When can a course be considered successful? What are its desired outcomes? How should they be measured? Once the content and delivery of a course have been evaluated, how should they be adjusted, if necessary? To what extent should students’ requirements and feedback be taken into consideration, given the available evidence and the need, on occasion, to challenge their beliefs? Very few health courses have been formally evaluated to date, and reports of those that have been evaluated do not say how the course was improved as a result.

Although it has been argued for the last 25 years that health education for musicians should be evidence-based (Zaza, 1993) and one of the four HPSM recommendations endorses the use of a health promotion framework, the declarations and recommendations fail to mention the importance of evidence-based teaching. Indeed the first HPSM declaration includes the unsubstantiated claim that performance injuries are preventable (Manchester, 2006). There is now a wealth of research on musicians’ playing-related health problems, and their management, but unless this is disseminated effectively to senior managers and educators, instrumental and vocal tutors, and students, we fear that conservatoires will remain resistant to change, maintaining traditional practices rather than responding systematically to the best evidence available.

Researchers carrying out similar studies in future should consult the best available literature when designing courses and make more use of iterative processes. They should employ rigorous approaches to investigate the effectiveness of complex programmes, including exploring the acceptability of a course; piloting it; recruiting active control groups; and using a range of measures such as validated questionnaires, objective measures and qualitative data. They should conduct follow-up studies after longer periods, given that health-promoting behaviours may take time (Barton & Feinberg, 2008). Finally, they should disseminate the findings of their evaluations to relevant stakeholders, examine and discuss, and ultimately implement the

course as part of the curriculum, in the interests of providing high-quality evidence-based health education for music students.

To conclude: although the course described in the present study did not have the hoped-for impact on secondary outcomes including reported health-related behaviours, reduced PRMDs and stress, it was associated with improvements in primary outcomes relevant to health education, namely the perceived knowledge of topics covered in the course and awareness of health risks. Furthermore, the study itself is the first evaluation of a health education course for musicians that documents the process of designing the course on the basis of a rigorous assessment of the available evidence, and its incorporation in the ‚real world' context of a music conservatoire.

Chapter 6

Health and welbeing course: Qualitative evaluation

1 Introduction

This chapter describes the qualitative evaluation of the Health and Wellbeing for Musicians course, delivered between September 2016 and February 2017. The analysis investigated students' general feedback, changes to relevant attitudes and reported behaviours, perceived benefits and limitations, and suggestions for further improvements.

2 Method

2.1 Participants

As shown in Table 21, 20 first-year undergraduate students at RNCM (12 females and 8 males) from the Schools of Wind, Brass and Percussion, Strings, Keyboard Studies, Vocal Studies and Composition took part in the research.

Table 21. Participant characteristics

Participant no.	Sex (F/M)	Instrument	Age	Interview length	Interview location
P1	F	Flute	20	36 mins	Skype
P2	F	Oboe	19	85 mins	RNCM
P3	F	Saxophone	19	80 mins	RNCM
P4	M	Saxophone	19	60 mins	RNCM
P5	F	Voice	19	31 mins	RNCM
P6	F	Voice	20	39 mins	RNCM
P7	F	Voice	21	31 mins	Skype
P8	F	Voice	23	27 mins	Skype
P9	F	Voice	21	32 mins	Skype
P10	M	Voice	20	20 mins	Skype
P11	M	Piano	19	30 mins	RNCM
P12	F	Piano	27	39 mins	Skype
P13	F	Piano	21	28 mins	Skype
P14	F	Violin	19	28 mins	RNCM
P15	M	Violin	19	60 mins	Skype
P16	M	Violin	20	33 mins	Skype
P17	F	Violin	20	23 mins	Skype
P18	M	Viola	21	37 mins	Skype
P19	M	Guitar	22	14 mins	Skype
P20	M	Composition	22	27 mins	Skype

2.2 Procedure

Ethical approval was granted by the RNCM Ethics Committee, in accordance with the British Psychological Society (BPS) Code of Human Research Ethics (see Appendix K).

After the students had submitted their assignments for formal assessment, in March 2017, an email was sent to all of them offering a reward of £10 each to the first 20 who agreed to be interviewed. A total of 20 participants were interviewed one-to-one. Those who agreed were sent a participant information sheet and consent form via email (see Appendix M). The interviews were conducted face-to-face in private rooms at RNCM and via Skype in April 2017, and lasted between 14 and 85 minutes. Participants were told about the purpose of the interviews and their approval to record them was sought. They were assured the content of the discussions would not be accessible to anyone other than myself, the recordings would be destroyed once the interviews had been transcribed and participants' names would not be revealed when the interviews were reported and the research disseminated. Participants were encouraged to see the interviews as informal conversations and to talk about anything they thought might be relevant to the questions. To diminish the influence of social desirability it was made explicit that they should be as honest as possible since improvements to the course had to be based on how they actually perceived the course and their real needs. Before the interview began they (re-)read the participant information sheet, had the opportunity to ask questions, and signed a consent form and receipt for payment.

The interviews sought to explore how well the objectives of the course had been met and its impact on students' life as a whole. The schedule was based on that used by Clark and Williamon (2011) and was tailored to each participant's responses. It included items requesting feedback on the course generally; if and/or the extent to which it changed their existing views; tools they learned about; to what extent and how they attempted to implement them in their routines; the extent to which they thought such a course was appropriate in the conservatoire setting; the most and the least useful topics, and those they wished had been approached differently; suggestions for improvement (see Appendix N). Each interview was recorded using a portable recorder and transcribed verbatim by being

played back and occasionally slowed down. Transcripts were analysed thematically according to the guide provided by Braun and Clarke (2006).

2.3 Analysis

I used a predominantly semantic, theoretical, contextualist approach when analysing the data. Although I mostly identified themes at the surface level, I sometimes went beyond describing utterances to interpreting them, when I referred to their potential significance and attempted to look for underlying assumptions or beliefs, thereby moving more towards a constructionist paradigm. The contextualist approach, between esssentialism and constructionism, is based on the assumption that the various meanings that individuals attach to their experience are influenced by broader social contexts (Braun & Clarke, 2006). The analysis was aimed at providing a broad description of the rich data, in an attempt to capture the entire data set, instead of providing an in-depth account of a single aspect. According to Braun and Clarke (2006), this type of analysis is appropriate when the researcher wants to focus on participants whose views are unknown. The analysis was mostly theoretical (analyst-driven) in that my epistemological interests were reflected in the set of (albeit broad) interview questions, focusing on how the course was perceived, instances of behaviour change and/or changes of view, and suggestions for improvement. The lenses of my approach were inevitably tinted by my preoccupation with health education and preference for certain definitions, as well as the ways in which I envisage or perhaps even idealise the successful implementation of health education courses. My analysis was therefore influenced by my wanting the course to engage students, respond to their needs and minimise and/or remove some of the barriers to engagement. However, it was also to some extent data-driven, as the process of coding shifted my attention to the potential barriers to, and facilitators of, behavioural changes so that I decided to modify my initial research questions. Otherwise, I did not make a conscious effort to fit findings into a specific coding frame. Utterances that were unrelated to the research questions/interview schedule were not considered. Transcripts were checked for potential omissions against recordings. Next, transcripts were analysed and codes were labelled. Codes were clustered under sub-themes which were further clustered under themes. Themes were then refined iteratively. Themes and sub-themes are presented in the form of a map in Figure 3. For ease of

reading, in two instances I include multiple quotations relating to a single sub-theme, attributed to participants by their identification number, in a table.

3 Results and discussion

Five themes relevant to the research questions emerged from the data and are presented below: 1) the course as a catalyst for engagement with health; 2) behavioural changes and other gains; 3) barriers to engaging with the material and to initiating changes; 4) suggestions for improvement; and 5) miscellaneous. All participants responded affirmatively when asked whether a conservatoire is an appropriate setting for a health education programme.

Figure 3. Thematic map

Theme 1. The course as a catalyst for engagement with health

Seminars. This was the sub-theme that emerged most frequently. Most participants perceived seminars as particularly effective for several reasons. They were more enjoyable than the lectures: "I quite looked forward to the seminars" (P4) and engaging: "we discussed it and then you actually learn and for us it was more like fun… like a game…" (P2), which might have made them more memorable: "it didn't feel like being forced to study something… I don't know… it just made the whole thing a lot more interesting and easy to remember" (P4); "and you come out of the groups still carrying on talking about it…" (P4).

Furthermore, seminars stimulated more focused discussions: "The seminars forced you to engage and forced you to talk with others and sometimes you're asked questions which can be like 'Ah, that means you're actually thinking about it' and like form your own opinion (. . .)" (P3) and provided a better context for asking questions: "I feel like it's a bit more personal and get to ask the questions you need to ask" (P6).

Also, these sessions tended to be more personal and intimate than lectures, allowing for more honesty. They allowed students to hear from their peers, which often increased awareness of their struggles, relief that they shared worries, and more connection between them through discussions around sensitive topics: "it was kind of reassuring to know that I wasn't the only one that had had struggled previously" (P7).

> I found it really important and sometimes they became… you could see in… certainly my group, you could see in certain people, it was a time to be a little bit more honest, like, I don't know what the correct word would be… the best one I can come up with is… like counselling… and people would get quite… would become quite quiet and reserved and quite deep and talk about their general feelings… in a couple of seminars where we were talking about like especially giving yourself breaks and what you do in your free time and going to the gym and how certain people would be 'oh, in my general life, I feel quite lonely' and… it was interesting cause suddenly become aware that some of your peers are actually suffering from certain things and it meant that once we came out, we'd be like 'Oh, mate, if you need someone to talk to, come see me', and that was quite interesting actually…. one of my mates said… 'I get quite lonely sometimes and just if I've had a bad lesson or if (. . .) just generally, then my day becomes

> unproductive and I get quite upset sometimes', and I was like 'Wow, I didn't expect that to come from you…' (P4)

> I actually found that to be one of the most beneficial seminars because it got a little bit more personal, like more people were involved and I find that really helpful when you can hear what other people are going through …maybe I'd be sad like if that element was taken away because someone was uncomfortable with it, [...] because it was a really helpful seminar for me, and to lose that would be a shame. (P1)

Relevance. Many participants perceived the course content as relevant to their own personal needs as individuals; as first year undergraduate students; as young musicians; and in response to what they identified as being their peers' needs or lack of engagement in desirable behaviours. Additionally, the relevance of the course was linked to its being the unique source of health-related information in the curriculum and thought to have been of benefit "before getting to uni as well as at uni" (P1).

Participant	Illustrative examples
P15	So, the Pomodoro technique was quite intriguing (. . .) because often for me, there's a... when coming back to something I've not done in a while, there's often that anxiety ,Oh, am I starting this the right way? Have I planned it well? Is it really the best way to go?' (. . .). I'm not the most spontaneous in that respect, I generally like to have some sort of plan, or preconception of how to begin something... now the Pomodoro technique was something that I've never come across before... (. . .) I found it... it was really quite enlightening because often the most difficult thing for me is actually starting the practice sometimes.
P8	I think learning about your anatomy and how sitting effectively is good for you, how to warm up your body in an effective way so that you're ready to practice, you're ready to perform… I think that's a positive thing and learning it in a way that's effective for musicians
P17	and some of my friends would continue practising even though they were maybe feeling a bit of pain or tension, so I think it was really good for us to actually learn about how we can prevent injury and that if we start feeling pain that we actually have to stop now, so it's good to like learn about this at the stage we're at now so that we can kind of prevent things developing, getting worse…
P3	I think it's really needed… especially in the first year… cause a lot of us haven't come from practising every day and from music being our main thing… and now we have been brought into this… this is what we do now… I think it was really good to like go to these things and learn… and discuss with other people… cause you're never taught how to practise… or how to rehearse… it's a thing you do and then you go to your teacher every week and you hope it gets better… but I think being told… now we spend so much time individually practising… we only get one lesson a week at the end of the day, so it's all very individual… so I think it is just really useful to have that… and not just that, but how to do it in a healthy way in a way that is sustainable for four years and then a career after that…

P7	It's an important course to have... particularly in the first year, when we first… a lot of us have just come from leaving home and so a lot of these things are things we haven't previously thought about because it's always our parents deciding what we eat, and what time we get to sleep, stuff like that
P5	I did enjoy the music performance anxiety lecture... I think it was really useful because we're the first-years and lots of us are 18-19 year old, so we have to explore ourselves, so we get to new stages of emotional… like emotional stages at the university and it's changing, so people are not supposed to have breakdowns at this age, but it's really easy if they are not able to cope and they are not having much experience, because... like I'm an international student here and I have already experienced being far away from my family
P19	Well… there was this lecture about how to practise more efficiently… that was useful as well… a lot of people are just trying to do a lot of work (. . .) without… just to get a lot of hours done… but it's more important that they do… 25 minutes of concentrated practice and then take a break… a small one and then go like 25 minutes again… efficiently, not just like… play without thinking what you are doing…
P17	I think it is definitely relevant for us, because otherwise I don't how how we would get this information… useful for practice and performance in general, wellbeing, so… if it was held outside college, I don't think that people would bother to go…

Raising awareness. The course presented novel information „that I hadn't even thought about before" (P14) or „I wouldn't have thought of that myself" (P9). For example, one participant „wasn't really aware of like hearing problems before" (P6). Others said:

> I think it was your lecture on… health and wellbeing… but also different kind of… tools… you talked a lot about kind of preparing mentally and about things like imagery and how we can change behavioural patterns which I thought was quite interesting because I didn't even know that you could change certain behavioural patterns such as negative thought patterns, so that was interesting to learn that you could replace negative thought patterns with more like positive thinking… (P17)

and that it had also „given me more tools in order to implement that into my own life... (. . .) it's literally just deepened my understanding" (P10). Moreover, it raised awareness of musicianship as a broader concept, going beyond music making and incorporating health and wellbeing and their implications into students' lives more widely.

Participant	Illustrative examples
P6	it did make me sort of realise more… like... compared to before college, like I view being a musician or a singer more like a… kind of comparing it to an athlete, so we have to be well and versed in all things… like... the whole package… really like nutrition, everything… whereas before I was just like 'Oh, just sing', but it's a lot more complicated than that… (. . .) Umm…it's quite daunting…cause you realise that you're like… you have to really

	commit yourself to something… and it's not just going to university and studying and then suddenly you're a singer… but it's a lot more than that… it's a lifestyle… so I think daunting would be a good word for it.
P7	when I imagined what it would be like to study singing, what it would be like to study a musical skill, I didn't really think about it in terms of the way that it changes your whole lifestyle, whereas having not just the music lectures, but also having the AD1 course alongside our other studies, kind of brought to mind that it's more like a complete lifestyle change… cause you're practising every day, you have to look after yourself more that you would before, cause your body is your musical instrument, stuff like that, so it kind of... highlights the fact that it's a major lifestyle change.
P17	it made me think a lot about how important it is to be in a good physical form and how much that can affect performance and quality of practice and also how much our psychology can affect like physical symptoms when we're performing as well, so that's been quite interesting how everything is kind of connected and how we can get to the optimum performance level.
P10	Definitely appropriate because I feel like if you look back… like when you talk to people that have been in conservatoires in the past, they almost feel like 'yeah we were taught how to play our instruments', but actually, this side of things wasn't really covered, so I think it's important for us to know how to look after ourselves, because if you can't look after yourself, then you're gonna struggle.

Other changes of attitude referred to causes of injuries; physical activity; and mental practice:

> Yes, yes… so, before, I was thinking that people who quit music because of injuries have done something wrong in their playing… their technique is wrong or something like that, but it's not entirely true… like yes, maybe they over-practised or something, but I don't know… people at home tend to think that if you have the correct technique, you can practise ten hours without stopping… this is not true. (. . .) I knew, but I wasn't that convinced. I still thought that the technique is the problem and not others… (P18)

> They said that, obviously, one of the key things is exercise… (. . .) and I've always thought that that meant I had to go (. . .) in the gym, do stuff, sweating, and actually like going for a walk, like walking into town…I know it's not very far, but there and back… it's a decent walk if you walk briskly, that's exercise, and being told it's ok not to just sit in the gym and push yourself into it until you can't do more (. . .) there's other ways of doing it (. . .) and that for me is really comforting to know, cause I hate exercise….but if you go up the stairs quickly (. . .), that's good for you… and just little things like that… that… you know you're looking after yourself… (P2)

> And also, it was really cool to learn that practice isn't just a practical thing… that when you're sat, listening, if you're listening actively, looking at your score, that is still practice… I think the general word 'practice' is 'right, that's me playing for every single minute of a whole hour

> (. . .)', when it really isn't… you could go in and warm up, you're stretching, just looking at the notes on the page, that's all practice as a thing… that was something that actually was a real quality when I got told that… I was like 'wow!'… (P4)

Motivation. The course motivated some participants to read further on the topic: „I've read some good papers on this after the seminar… it motivated me to read about it" (P12); one participant felt encouraged to challenge herself: „but it was ever evident from the AD course that they did encourage us to take up more opportunities, to sort of put ourselves out of our comfort zone in order to make progress. And I think that's been effective" (P7). Another was inspired to spread the information further: „I thought the idea of the course was something very nice that I could bring back home, to Romania, to teach more people about it" (P18). The course inspired specific changes of attitude, but also the idea of exploring non-musical activities that might potentially be of interest.

> It was more informative than… oh yeah, about the instrument… we talked in one of the classes that it's also important to choose the right instrument for you… like the right size. And I'm actually thinking about getting back my old viola which is smaller, just because it was way more comfortable playing on that. This is how it influenced me the most (P18)

> early second term and I remember them saying like 'ok, you're only doing music now, but wait until you're 4th year and if you're only doing music and nothing else, you really won't be coping… and you'll hate it and that's when people stop or don't want to do it as a career any more cause they grow sick of it, so just find something else to do… that's when I started thinking 'Oh, what else aside [from] music is there? (P3)

Impact in the wider context. The course "has been fully transferable into my wider college experience" (P4) and information was being incorporated as part of their broader contexts ("a lot of what was talked about in the lectures or the seminars I've taken in to my lessons" (P4)) and led to further discussions as part of their individual lessons: "overall it was looked at many things which sort of in lessons with my own teacher we started speaking about them because it's all part of our development as a musician, I guess" (P16). Another one said:

> and I'm thinking about releasing and being free... it's not exactly relevant to the seminars, but my teacher asked me after I told him about my pain after seminars, he asked me to release for example… release for one minute on piano and play without any tension on your body and… I mean your seminar helped me pay attention to the pains that I had before and understanding these pains helped me to ask, for example, from my teacher, and reading about it… (P12)

Furthermore, some of the information was in line with one teacher's attempt to address their student's performance anxiety: „it worked quite well, actually… at the same time my teacher was also purposefully putting me into stressful situations in my lessons so I could recreate a real performance (. . .)" (P1). Also, it fitted well with recommendations received from a health professional:

> just before we went into these lectures, my doctor actually recommended that I started exercising a lot cause I had trouble with posture and things like that and ... So, it's quite interesting to look at the results... cause I remember in some of the lectures there were discussions about cardiovascular fitness and basic strength training and... so, that's something I've taken on board in the last couple of months and I've seen some really positive results (. . .) (P15)

Empowerment. The course gave some participants a better sense of control over their own health and wellbeing: „I feel I can have a lot more control" (P17)

> and it's now up to us to make the right decisions for our own health and wellbeing… it's in our own hands…(. . .) and it's possible to really increase our rate of development and learning if we make the right choices and I think it did highlight the impact that these choices can make on our musical development, which is encouraging (P7)

Other effective characteristics of the course. The course presented tools that could be implemented easily and immediately: "I like the Pomodoro technique in the sense that it's just... it's immediately applicable" (P15); it was comprehensive and diverse: "you gave techniques that were quite specific, but you gave a variety that could be worked in different situations whether it's short term and immediate or long-term, progressive

techniques... " (P15); "'cause you basically covered everything from nutrition to general mindset towards things, so I think it was well covered topic-wise" (P19). Given that most students aspire to be professional musicians and invest their instrumental teachers with a lot of authority, several participants appreciated the fact that the lecturers were musicians themselves and/or had had first-hand experience of the issues they were talking about: "she is a singer herself which obviously connected to me" (P8); "I'm hoping that one day I'll become a concert pianist, so getting the direct information from them is really, really good " (P11); "really useful having access to someone who has all those years of experience and could sort of impart insight into what is really to actually be in the career that we're all aspiring to follow…" (P7); "we had a guitar teacher who (. . .) has experienced and got through these problems…(. . .) it was a really nice thing to have" (P18). One participant reported reassurance and relief after having received advice from an authority-invested figure:

> we had a lecturer… he was like a person who was clear about (. . .) you need to have breaks… you need to do it in short amounts and like quality over quantity is like the main thing and was also like told us you need to have a day off a week and all that and for me being told that was recommended was such a big help (. . .) I do need to be told by someone to take time off and just being told how to structure practising…(. . .) it was really useful and the (. . .) it kind of put our minds at rest…like we were all thinking 'how much do I need to do a day?' and like 'I'm never gonna get a day off ever again… it's awful' and just put our minds at rest (P3)

Theme 2. Behavioural changes and further gains in mood, wellbeing, and practice effectiveness

Participants reported a variety of behavioural changes to their lifestyle, time management and/or practice planning and strategies. These changes included initiating certain actions and/or increasing the frequency and intensity of already existing actions. Participants also referred to the perceived benefits of having implemented such changes.

Health-related behavioural changes. Several participants mentioned having increased their physical (in most cases aerobic) activity levels after the relevant seminars and lectures: "I started after our seminars… I started

aerobic" (P12); "so I found the run very good for myself and I do quite a lot of running these days and I started doing after the lecture... it's kind of giving you the inspiration to do that" (P5). Some managed to integrate brisk walking as part of their routines: "when I walk to college, for example, one way I'm going brisk walking, and for example coming back to home, no..." (P12) or increased their levels of physical activity: "I've always been good at exercising, but maybe not… so like frequently, so I started sort of integrating that in my lifestyle, making sure that I exercise maybe three or four times a week " (P17). One participant mentioned improvements to her diet: "more veggies, more fruits and vegetables" (P11).

The benefits of having initiated these changes that were mentioned included higher levels of energy: "I think it helped me not to be so much sleepy… I was always tired (. . .) but when I run, I think that I would be tired now, but I am much more fresh after running [...]" (P12), less tension and better playing: "I think it has helped with my playing as well… I feel a lot more relaxed and it's good for kind of tension release as well" (P17).

Additionally, one participant made time for relaxation: "for me that sort of helped to, you know, put in my diary a couple of hours here and there which I say to other people it's busy… it's actually just my own time where I can relax by myself… and I found that's been very useful…" (P16); while another changed the environment in order to concentrate better: "now, like every day I ensure I go somewhere other than college or halls… whether that be … I go work in a coffee shop up on Oxford Road, where it's quiet…but it's just a different environment… and I find personally completely refocuses me… cause I get to a point where I'm being completely unproductive and I'm… let's take half an hour and walk somewhere or do something else… " (P4).

Practice-related behavioural changes. These included starting a daily warming-up strategy: "in order to minimize tension… cause I did have quite a lot there, so… they've really helped" (P10); a daily vocal warming-up in the morning: "I can really tell the difference if I haven't warmed myself up properly before speaking and like I find it so useful if I haven't done it I can really tell the difference…" (P6). Participants referred to the use of imagery in visualising one's self perform, which "made me think that when I'm performing I used to have like physical symptoms like performance anxiety

that I feel a lot more calm inside because I've kind of pictured what's going to be like…" (P17). They reported planning practice: "before going to practise now, I often make notes of what I'm going to do and stuff just because it's so much more concise and like how… it was really useful" (P3); undertaking mental practice: "as I got used to it, then I found that I could adapt quicker and then when I actually got to holding and playing the violin then I could put the skills I've been thinking about into practice a lot easier… because I had actually thought about it before …" (P16); and breaking down practice time that had been associated with increased productivity: "it's much better to do two intervals in that hour instead of just one long one… so I started using that in my daily routine (. . .) I'm making more progress more rapidly" (P19). Focus and enjoyment increased: "it's just less mindless, I think I'm getting more done and that makes it more enjoyable, so making more progress…" (P14) as did taking breaks which was associated with more effectiveness when practising: "taking time out so that I feel more relaxed with myself that I can have more effective practice sessions" (P16). Setting specific goals and having a plan "made my practice like much more efficient and much more effective, so I'm able to feel like I'm making more progress than I was before, I think" (P7). Adopting a better way of rehearsing chamber music led to increased productivity: "we're now doing so much repertoire compared to one piece that we did for the whole of… until we had that lecture one piece… now we're doing 6, 7, 8" (P2):

> The one on rehearsing effectively… that changed the way that we see a rehearsal… like it changed much of our rehearsals quite a lot. They're just more productive… before we'd spend a while faffing around, now we can go and be like this is what we're going to do, where before we would at the start run the piece through, then go this was wrong, that was wrong, whereas now before what we're going to do. It's good. (P2)

Two participants reported having adjusted their approach towards hearing protection: "so now if there's like really loud music, I put my ear plugs in (laughs) which I would have never done before, but now I think I'm more aware of keeping myself healthy cause I know that can then become a problem later in life and in my career" (P6). Similarly, "I cannot go clubbing without wearing ear plugs so I get really worried and paranoid" (P2).

Other behaviours included a more proactive approach to public performance in an attempt to reduce performance anxiety: "taking opportunities like even small ones like small informal concerts, performing to lunchtimes and stuff, to my friends, just to keep the habit of performing and to sort of get to grips with any performance anxiety that I might have so that it's not such a big deal when there are important performances or assessment or something, so that it's not something that's a real shock to the system " (P7).

Theme 3. Barriers to engaging with the course material and to initiating changes

Several barriers might have reduced students' engagement with the course material and the likelihood of their initiating changes.

Lack of specificity. Some students perceived certain sessions as being too broad and vague: " [name of session removed] was helpful, but it was quite like broad… it was quite general" (P7); "some of the methods, if I can remember them, like for instance posture and things like that... it was a bit too generic" (P15). Another session was perceived as having no clear purpose: "it just felt like we never really got anywhere in that seminar…" (P14). A few students felt left out when the material was not being directly specific to their own instrument or instrumental group: "it was very aimed at singers and I felt like the lecturer was talking directly to the singers and like the instrumentalists were like a side thought" (P1); "the lecture on the practising... I felt that… the strategies were good, but it was mainly aimed at instrumentalists" (P9); "the seminars were always focused more on the pianists than on me as a composer. (. . .) It made me feel like I'm in the wrong place..." (P20).

Not enough focus on solutions. A few students thought that the course was too descriptive and not prescriptive enough. They felt that too much time was spent on defining issues which they were already familiar with and not enough on practical coping strategies: "I didn't have this much anxiety but then after all those lecturers, after you perform, you sort of think about it, so there was not like… there hasn't been a proper way of dealing about it…" (P11); "it wasn't really giving us like the solutions to it… it was more like telling us when something goes wrong, this is what happens, or like this is

the negative aspect. And it wasn't really saying like 'this is what you should be doing', whereas I am more interested in what I can do to get over those problems, rather than these are the problems, cause I'm kind of aware of the problems anyway" (P6); "it was more presenting the findings rather than looking at the approaches" (P15). One participant expressed the view that she would have prefererd a more practical than theoretical approach: "it's presented sometimes in a bit of a scientific way that is difficult to apply in a real life situation, but that was quite a general observation on quite a lot of the lectures…" (P9). Some students expressed a need for sessions in which they could apply various strategies they were informed about, on their instruments: "it would have been really useful to actually have had a practical session, I should say… like actually with the instrument and actually seeing what then changes from holding an instrument to not holding it, you know…" (P16); "because you can feel exactly what the teacher is trying to tell you about those things…" (P18).

Redundant/repetitive material. Some participants found that there was sometimes too much overlap between lectures and seminars and perceived this as a waste of their time: "but when you're in a lecture for an hour learning about a topic that again could be condensed down and then later on in the same day you go to a seminar that then covers the exact same thing, you feel like you're losing two hours" (P1). Other students thought that the material presented in some sessions was too basic, as they were already familiar with the information presented: "basically we already knew and we could've recapped it in about 5 minutes…" (P8); "I thought what was being discussed was quite obvious… I remember coming out of it sort of feeling like I sort of knew what had been said" (P9).

Discussing mental health in groups. Some singers mentioned that discussing "the mental side of health" (P7) or performance anxiety made some students "feel less comfortable discussing (. . .) no one wants to volunteer the stuff that they struggle with and have the whole group sort of analyse it…" (P7); "I think people really struggle expressing their issues in a group" (P9). As a result, someone suggested that this topic "should be optional for them …" (P8).

Lecturers' attitudes. One lecturer was perceived as having created "quite a tense atmosphere" (P17) and had a "patronizing" attitude (P1).

Lack of perceived access to health services provided in college. A few students mentioned they were not aware of where to go when they needed health-related help: "'who on earth do I go and speak to?' (. . .) sometimes there's just an unawareness of who's who because in our first year there's so many people to get to know and we're seeing different people weekly …new faces all the time…" (P4). Although they were aware that support was available, they found it problematic to access it: "we've been told that support is there…but that's no use if we've got no idea how to access it…" (P2).

Environmental and social barriers. In terms of social barriers, one participant mentioned feeling isolated as a foreign student and not being able to go for a walk with friends, as well as financial barriers "the problem is that in Manchester it's really hard to do this because I don't really know people in here…so I just have to stay on my laptop and talk to my friends from home, (. . .) going to a bar or something with my friends… I can't do this here, because of the prices" (P18). Other barriers included lack of time and energy: "I like to do football, or basketball, or something like that and the problem with the music college schedule is you had to find a team to join it fits your timetable, but I mean if I tried harder I probably could have been more sporty, but I'm always so tired by the end of the day that I don't wanna look into it" (P1); "we're so busy here and we have so many rehearsals and then they're telling us 'get out, listen, exercise, go do stuff, non-musical related' and you got all this information, but *when* on earth am I gonna do this and get the recommended sleep that you're telling me to get, and do this kind of stuff" (P3).

Environmental barriers included living too close to college, which might prompt even more work and practice: "because the halls are basically on the college, you can maybe walk from college to halls and then you're gonna carry on doing practice or work" (P4).

Sensitisation. Some participants felt that merely talking about anxiety and pain might have caused or intensified their own experiences of them:

> I was scared not to be influenced by those things… like to feel pain or to feel that something is wrong without it to be wrong in the first place. I don't know how to explain this… kind of like a… let me just think a bit about this… for example, if I learned about things that can happen to you

> during playing or from too much playing, I might get symptoms of that even if I don't actually have it. (. . .) And the injuries… there are some psychological things that we talked in class… about fingers literally stopping moving… like not being able to control your fingers any more… and that thing actually scared me… for my brain not to do that now that it knows it is possible. I don't know how to explain this better (. . .) There are some things that scared me… because I think the one with the fingers that were not moving… is something that comes from the brain, not from the body… , because it's a psychological thing… just knowing about it may make you likely to have it… I'm not sure if what I'm saying is true, but this is what was in my mind right then and I was like 'no, I want to forget this' (laughs) (P18)

Some participants also perceived that the course placed too much emphasis on the negative side of physical injuries and anxiety: "instead of focusing on 'oh, this might happen to you, this might happen to you', sort of maybe it would be better to remind us of the joy of performing and going about it in a different way" (P11). Another said:

> I think we discussed so much that it might make someone a bit paranoid…(. . .) I think it's really important that we know about it and obviously some people suffer from it more than others, but I think generally, there could have been other things that could have been talked about more, that were sort of more positive, I think… (. . .) (P9)

One participant would have liked a more normalised approach to pain:

> I think we were taught to be really aware and careful with playing in case we inflict injury upon ourselves, but then also I think we should be warned that you can't avoid everything cause that's what I was trying to do… like prevent all possible situations which obviously isn't possible… it was like a little bit of putting fear into me about how injuries could happen, but in reality it's probably inevitable that we're going to be injured at one point …it's how you treat it afterwards and go forward… I think maybe that was important… oh, we didn't really cover much about when you were actually injured from what I remember…(P1)

Theme 4. Suggestions for improvement

More information on certain topics. Participants expressed their interest in being offered more information on a variety of relevant topics, including effective practising strategies: "that session on how to practise and what

makes effective practice and valuable practice…something like that would have been quite useful… maybe for the second term to sort of top up" (P16). Mental health and how to spot potential problems in other people was another topic: "there could be a deeper focus on mental health… and generally looking after yourself mentally…(. . .) not necessarily to do with music but generally…" (P4); "I think key for me is just knowing how to spot it…(. . .) being aware of what's going on, being aware that they're around us and understand it…(. . .) what's that mean, how is that affecting them, how can we help" (P2). General health and nutrition were identified: "like health and stuff outside music…(. . .) you're not going to be a good musician if you're not like a healthy person" (P3); healthy affordable eating: "maybe getting even like a sports and nutrition person to come in…(. . .) and going 'OK guys, you're students here, this is what you can eat that's really cheap…" (P2), "a little bit more talk of diet as well…" (P9). Learning more about applied physiology could be useful: "I would add some more explanation because as anatomy is quite hard subject but students need to learn more" (P5); "what does it happen when you practise and you're not warming up? Like, something to explain it physiologically better like what happens to your fingers inside, the tendons and everything…" (P18); practical physical exercises: "maybe exercises (. . .) on ways of how to release their tension in their muscles" (P5); injury management: "but I know what me and all my peers are like… we'll just keep powering through even no matter what everyone's told us, so if we can get educated on how to care for our injuries afterwards, that would help… maybe" (P1). Other topics included relaxation methods: "maybe how to relax at some point, cause many people work hard but maybe don't know how to relax" (P20); sleep: "there could be a section on techniques maybe for sleeping " (P9); and exam preparation: "maybe ways to think about an exam… to make it easier…" (P18).

More intimate sessions. Some participants expressed their need for sessions allowing for more intimate and honest discussions, for example about struggling, which might not be usually admitted and/or an artificial positive outlook might instead be endorsed. Rather, struggling could be normalized:

> being told that it's actually ok to struggle, because I think we all kind of have this impression that 'Oh, you know, everyone else seems ok, like I have to keep going, it must have been so useful in knowing when someone goes 'Oh, I'm really struggling to practise (. . .) and everyone is like 'But you're so good' and I'm really struggling (. . .) it would be a chance for us to understand and know that we're not alone and that we're not… like if you're struggling with an excerpt, it's not just you… all of them are struggling as well…(P2).

One participant suggested seminars within students' own School of Study (department) might help improve relationships with people with whom they might eventually be working professionally: "maybe having… a larger seminar across wind, brass and percussion and a larger seminar taking people from each year group and they would have a seminar (. . .) to feel comfortable around the people… if we go in the industry, we're going to be working with people all the time… it's important to be able to get on with them… understand how people work, what annoys them, what make them happy… I think a seminar is a key way of doing that[3]" (P2). Support from peers within students' own departments was endorsed by the same participant as a compensation for lack of support from students' main teachers:

> You wouldn't necessarily have to have a teacher… I think a lot of them obviously, you've got postgrads who are very experienced… fourth years are very experienced… they can come and lead it (. . .) maybe something like a seminar to help them help us cause it's all very well like your teacher would tell you something, but if coming from experience, if your own teacher kind of goes wrong at times (. . .) and you don't agree on everything, I've come out of my lessons (. . .) I had worked so hard on (. . .) and ripped apart in my lesson and I got really down and actually from what I've been talking to him at the Opera (her friend) and he's been going 'It's fine' and helped me cope and gave me advice and that for me has been so key (P2).

More applied sessions. One participant suggested incorporating some of the information presented in sessions as part of coaching or applied sessions in which the student is performing and then supported via

[3] Seminars were intended for groups from each instrumental or vocal School of Study.

discussions and questions with regards to not only her technique and musical interpretation, but also her emotions and thoughts, as well as coping strategies one could make use if needed: "maybe a coach of some kind, one of you maybe, one of the Artist Development team lecturers to sort of guide them through these processes and sort of put these things into practice but in a very comfortable environment (. . .) not motivate them, but to give them the tools to guide them the way through the mental process... cause (. . .) I think sometimes you need to have a mental foundation yourself and find as much comfort as you can as a performer in yourself to be as confident as you can... (. . .) I personally think that would be a very beneficial thing for me " (P15).

A few students suggested more guidance on how to structure one's day: "because if you have a free day you just think 'Oh, I'm just going to do three hours of practice' and the rest of the time you don't know" (P11); "maybe like how to (. . .) go about your day as a professional singer slash musician…" (P6), and also on pre-performance routines: "I think it would be useful if we did stuff related to more like the pre-performance period…" (P6); "what you should do on the day of the concert … I think that's not talked about a lot…before competitions or concerts…" (P11).

More emphasis on specific exercises for students playing different instruments was also suggested: "for example violinists, they will explore the shoulders more and neck and how they would need to cope with the balance there and for singers, it's a different one... and everyone have a specific concentration of the subject" (P5); "maybe a seminar looking more at stretches or warm ups that we could do… like targeted at the different instrument groups because we kind of use different muscles and different actions" (P17).

Additionally, two participants suggested a performance class for people suffering from performance anxiety and an applied session which would allow for the exploration of various strategies on the instruments: "maybe like having like performance classes for people who sign up, or for people who think they really struggle with performance anxiety and so that can be set up to maybe inform people how to go about these things…" (P11); "if you ask people to bring the instruments and play (. . .) Because you can

feel exactly what the teacher is trying to tell you about those things…" (P18).

Sources of information. Some students said they would have liked a web link with relevant sources of information, references and practical tips, provided via Moodle, the internal learning management system: "maybe like a page on there…which has tips… could be just like health and wellbeing tips, something like that, to look at (. . .) and the references…" (P2); "just five links to student websites, or the NHS page (. . .) or an AD1 page…" (P4). Other students suggested handouts: "like a proper physical sheet of paper to tell you where to go about [...] but maybe a guideline or where to look at…it's good" (P11); "I think giving some brochures or useful things (. . .) important notes on, for example, eating habits, about musculoskeletal disorders, like newspapers, I think it would be really helpful" (P12); "maybe links to more websites to help or like pamphlets or something, something that we can take away and read in our own time" (P6).

Sessions from role models. A few students suggested sessions from authority-invested figures who went through the experience of the issues they discuss: "probably the idea of getting more professors who are performers themselves… having them to do more like lectures" (P11); "so for me it would've been quite useful to have someone explain what was going on but also it might have been nice to have someone who suffers (. . .) someone who has been through… in conservatoire…(. . .) someone who damaged something because they had bad posture, that we can see people... why it happened and how it happened… and that might have been really useful to have" (P4); "have someone maybe with depression or someone who suffered from mental health problems to come in and be like 'It's OK, you can get through it'" (P2).

Theme 5. Miscellaneous

Three instances of potentially misinformed claims were found. Two of them referred to weight lifting or other exercises not being appropriate for singers: "I remember how they told us about the weight lifting and how it can affect our larynx and that it can just tighten it, so, weight lifts are really not good " (P5) and "so singers can't do specific exercises, but we're kind

of… I think we generally know and they have been brought up the ones that we shouldn't do in our physical awareness classes" (P9). Additionally, a student seemed to use an oversimplified meaning of posture, referring to it as right or wrong: "I just sometimes forget about it just from day to day… I don't think about… you know… is this posture good for me, is this posture bad for me, whereas if we do have like a reminder, then it keeps it in the forefront of our consciousness so that if I'm just sitting down and work at my computer, if I'm practising, I just like remember… oh, I should be sitting like this, I should be standing like this, you know… positioning myself so that it's good for my spine…" (P7).

4 General discussion

This chapter presented findings from the qualitative evaluation of the Health and Wellbeing course, in the form of 20 semi-structured interviews. Based on the thematic analysis of verbatim transcripts, five themes were identified: 1) the course as a catalyst for engagement with health; 2) behavioural changes and other gains; 3) barriers to engaging with the material and to initiating changes; 4) suggestions for improvement; and 5) miscellaneous (i.e. misinformation). Outside the five themes, and based on a simple frequency calculation, all participants agreed that the conservatoire is an appropriate setting for health education.

Under the broad heading of Theme 1), students found seminars particularly enjoyable, engaging and personal, as this particular setting enabled more awareness of their peers' struggles, and more open dialogues on potentially sensitive topics. The content of the course was perceived as relevant, needed, and novel. Some students were led to change their views on topics such as injury and mental practice. They reported feeling empowered to integrate the knowledge they had gained into their learning more widely, for example by relating it to advice from their instrumental or vocal teachers, or indeed health professionals. This constitutes an illustrative example of how health promotion may happen in a setting, as defined by WHO (i.e. 'healthy settings': see Chapter 1, Section 3), understood here as a range of people with defined roles representing the multiple levels of the same setting (WHO, 2018a). Other effective

components of the course, according to the data included in Theme 1), included finding out about strategies that were easily and immediately usable and hearing about them from musicians and/or music teachers who also spoke about their personal experience.

Students' enjoyment of the seminars is important if engagement with the topic and behavioural changes is to be targeted. Positive affect can act as a facilitator for adherence to desirable health behaviours (Van Cappellen, Rice, Catalino, & Fredrickson, 2018). In fact, several theoretical frameworks incorporate positive emotion as a predictor of behaviour. The theory of planned behaviour, for example, posits that individuals will engage in a behaviour if they evaluate it positively, they feel supported by others in doing so, and they believe they are in control (Ajzen, 1991). According to self-determination theory, unsurprisingly, individuals who engage in physical activity out of enjoyment are more likely to continue with it (Deci & Ryan, 2008). According to the Capability-Opportunity-Motivation-Behaviour (COM-B) model, reflective motivation is an important factor in behaviour change and can be achieved by enhancing knowledge and associating the target behaviour with positive feelings (Michie et al., 2011).

Additionally, increasing students' opportunitities to improve their social relationships and become closer to each other in, and through the seminars can increase students' levels of wellbeing not only by eliciting more positive emotions, but also by enabling relationships to become meaningful for their own sake, and thereby nourish the individuals concerned (Ascenso et al., 2017).

Enjoyment associated with particular behaviours is, of course, also important. For example, enjoyment of physical activity is a better predictor of behaviour involving physical activity than self-efficacy (Lewis, Williams, Frayeh, & Marcus, 2016). Similar positive behavioural changes can be observed under the heading of Theme 2), where students reported initiating behavioural changes related both to their health and their daily instrumental or vocal practice. Health-related examples included initiating physical activity or integrating into existing routines. For example, "when I walk to college, for example, one way I'm going brisk walking, and for example coming back to home, no... " (P12) is an instance of environmental restructuring, a technique or intervention function in the COM-B model that

is linked to physical opportunity. Environmental restructuring is also linked to automatic motivation especially if it is or becomes an instance of associative learning which elicits positive emotions and/or leads to habit formation (Michie et al., 2011). Participants in the present study reported gains associated with increases in physical activity which included more energy and less tension. Similarly, participants experienced gains subsequent to behavioural changes related to instrumental or vocal practice. Experimenting with imagery led to a calmer state, while engaging in mental practice and taking more breaks during practice were associated with increases in productivity. If the course motivated students to implement these changes, their perceived benefits could have encouraged them to continue making or maintain changes over time. This could only be determined by a follow-up study, however.

Under the heading of Theme 3), perceived barriers included lack of specificity in whole-cohort lectures; lack of applied sessions; and content that was too repetitive at times. Three or four singers felt uncomfortable talking about personal issues such as performance anxiety and/or mental health and two students said they were not aware of how to seek help from health services in college. Some students also mentioned that there was at times too much focus on negative aspects and that pain, for example, might need to be normalised. Other barriers labelled as social and environmental included being a foreigner far away from friends, thereby not having someone to go for a walk with; financial issues linked to going out, which were mentioned by one of the students who came from country poorer than the UK; lack of time and being too tired; and living in such close proximity to the college that walking was unlikely to be incorporated into students' daily routines. Environmental and social barriers relate back to the social determinants of health (mentioned in Chapter 1, Section 3) and the COM-B model, which states that behaviour is determined not only by individual capability, but also by one's motivation and opportunity to engage in that behaviour. Thus all factors must be taken into account if the issue of lifestyle behaviour is to be addressed successfully, and not just one of them.

While seminars were run for small groups of students who played the same instrument or were singers, lecture topics were kept broad so that basic information applicable across instruments and the voice could be given.

Where participants complained of lack of specificity, this applied more to lectures than seminars. Certain topics might have received more attention in sessions because of the lecturer's background or interests, regardless of their audience. Alternatively, the strong sense of identity with their own instruments that was apparent in some participants might narrow their focus. Perhaps some music students disregard anything that is slightly outside their field of study because the conservatoire represents a context in which high levels of perfectionistic strivings develop alongside increasing levels of expertise, a strong competitive environment and high self-expectations (Araujo et al., 2017; Stoeber & Eismann, 2007).

Where participants complained that the course material was too repetitive at times, this may be because they perceived it as irrelevant to them. If students have decided an issue does not apply to them, they tend to ‚switch off' unless given the opportunity to link it to material that is of interest and perhaps develop a different kind of understanding. Practical sessions could allow students to experiment with some of the tools discussed in lectures and seminars and engage with their topics from multiple perspectives, potentially facilitating meaningful insights. On this occasion, factors such as time, planning and the lecturers' expertise did not allow for practical sessions beyond focused small-group discussions and debates. Too much theory might also be perceived as unhelpful because students already have a rich experiential perspective on issues such as pain and performance anxiety and, unless they also have the opportunity to take part in personal (and therefore more interesting?) discussions, dry and academic overviews can be off-putting. Finally, students often prefer 'quick fixes' that they think will guarantee success to the invitation to explore a range of solutions for themselves.

There are two plausible explanations for the instances of sensitisation reported by participants, whereby mere mention of an issue causes it to be experienced or exacerbated. The first relates to the way anxiety, for example, was discussed theoretically in lectures rather than being explored practically; an alternative approach would have been to have conducted guided imagery, relaxation and performance exposure exercises as a way of reducing anxiety levels (assuming these were already high). The second is that sensitisation was experienced because of a cognitive bias known as the Baader-Meinhof phenomenon, according to which becoming more

aware of something can subsequently increase one's perception of the frequency with which it occurs.

Theme 4) encompassed suggestions for improvement. Students asked for more information on most of the relevant topics, such as how to spot mental health problems in their peers; healthy affordable eating; practical physical exercises and relaxation techniques; and advice on sleep. They wanted more sessions in small groups so they could have more intimate conversations and share their experiences of struggling; more input from role models; and more access to sources of information. One participant justified the need for injury management by saying that "I know what me and all my peers are like… we'll just keep powering through even no matter what everyone's told us, so if we can get educated on how to care for our injuries afterwards, that would help… maybe" (P1). This could reflect a 'no pain, no gain' belief, especially as other participants seemed to be proposing that pain be normalised. Or perhaps that participant meant that they and their fellow students focus so much on the music that they have beome used to ignoring physical symptoms. There is some evidence from qualitative research on experiences of pain in musicians suggesting a perceived strong connection between health and performance such that, on the one hand, pain indicates that the performer must be doing something wrong (Schoeb & Zosso, 2012) and, on the other hand, that performers ignore pain experienced as they strive for perfection (Nygaard Andersen, Roessler, & Eichberg, 2013).

Finally, Theme 5) included instances of potential misinformation. It is unclear if the lecturer actually misinformed students or if participants had misunderstood. Instances included two participants saying they had been told that weightlifting was not recommended for singers. It is unclear on what basis any lecturers would recommend singers to refrain from certain types of physical activity. A third participant said she wanted to be reminded if the posture in which she happened to be sitting at her computer was right or wrong. This comment might have arisen from the lecture or seminar on ergonomics, but not much is known about the relevance of ergonomics to musicians. As for research with office workers, there are only weak associations between ergonomic interventions and neck pain (Aas et al., 2011), and complaints of the arm, neck and shoulder (Verhagen

et al., 2013), and adjustments to workstations have little effect on upper body musculoskeletal disorders (Van Eerd et al., 2016).

Some of the themes echo the findings of Clark and Williamon's (2011) evaluation of their mental skills programme. Like the participants in that programme, RNCM students reported increased awareness of effective practising strategies, but also of topics related to health; improvements in practice efficiency and health-related behavioural changes; and changes in how they view musicianship in the broader context of health and lifestyle. Additionally, they suggested similar improvements, including a greater focus on applying skills and more practical sessions, as well as more opportunities for performance situations; and reports direct from professionals and student musicians, rather than research findings. Furthermore, music students and/or recent graduates interviewed by Perkins et al. (2017) reported barriers to accessing support services, most notably a lack of awareness of their existence, or where/how to seek help. Perkins et al. argue that when students rely on external solutions rather than taking the initiative themselves they are demonstrating low levels of health responsibility. This was illustrated in the present study by students' insistence on receiving clear solutions, and expectations of straightforward answers to their problems. Its findings demonstrate the importance of ensuring that students are made aware of the support services that are available to them. Although the questions focused on participants' experience of the course, as well as individual tools and strategies for engaging with health both cognitively and behaviourally, the findings shed light on the importance of the environment, the larger social, cultural and organisational issues around health, going beyond health education, into the complexities of health promotion. As observed by Perkins et al., all these issues need further research.

The limitations of the study need to be acknowledged. Selection bias, social desirability, interviewer bias and the financial incentives offered might have increased the likelihood of positive feedback. Given that the course finished in February and the interviews took place in April, instances of source amnesia may have affected the accuracy of participants' reports. Were it not for the danger of overloading students, this could have been addressed by asking students to complete open-response evaluation forms after each session (Clark & Williamon, 2011). Some interviews were relatively short;

longer discussions might have allowed participants to access more depth and offer richer insights. The results cannot be generalised, as they represent the views of a self-selected group from a single institution. Cultural and personal factors inevitably influenced participants' views regarding the course, and thus their responses. The sample was slightly biased towards women; however, it included representatives from each instrumental group.

I included students' suggestions for improvements even when they were not directly relevant to health (e.g. more information on exam preparation). This was firstly because the health course had a special place as part of a larger module on artist development and, secondly, because the close link between performance/practice and health/wellbeing might not only be inevitable among musicians, but also lie at the core of how music students view health and wellbeing. It could well be that separating these issues when considering their responses might lessen both their meaning and relevance.

5 Reflexivity

Clarke and Braun (2013) say that being a good qualitative researcher requires several attitudes and skills such as being interested in process and meaning in order to engage with the topic beyond simple cause-effect relationships; being critical and questioning things around oneself, but also one's own assumptions and managing to put them aside to some extent while engaging with the research question; having good interactional skills to enable trust; and being reflexive. The authors refer to reflexivity as a critical engagement with the research process, but also with one's role as a researcher, regardless of whether one is an insider or an outsider (understood here in relation to whether – and the extent to which this is the case – the researcher identifies with her participants). In fact, the insider-outsider issue can best be seen not in terms of either/or, but rather as a continuum with potential benefits and pitfalls (Le Gallais, 2008). The process of reflexivity is about the researcher acknowledging that they are actively participating in the building up of knowledge, and not merely taking the role of an observer (Patnaik, 2013). Notably, prospective reflexivity is

about the effect of the researcher as a whole person on the research. This allows one to attend to one's knowledge, feelings and values in an attempt to understand them better, rather than to see them as interfering with the data (Attia & Edge, 2017). This immediately recognizes the importance of the researcher's subjectivity, but only in light of her ability to analyse and understand herself in order to enhance the value of the research process.

In light of suggestions made by Le Gallais (2008), I will now focus on the disclosure and analysis of my dual role as both an insider and the researcher trying not to interfere too much with the research, which requires a hightened sensitivity from my part to my own biases. During the time when I conducted and analysed the interviews, I had multiple roles: I was a PhD student and at the same institution as the students I interviewed; I acted as one of the lecturers on the Health and Wellbeing course I was evaluating; I was the main researcher investigating the effects of the course; and a former musician. As a musician myself, I had been a student violinist at two conservatoires, and I myself struggled with music performance anxiety.

Being an insider has both advantages and disadvantages. Perhaps most importantly, qualitative research requires empathy to relate to other people's psychological experiences (Attia & Edge, 2017) and empathy is easier when one has walked the same pathway, or a sufficiently similar one. So one advantage of being an insider is that experiences shared with participants help to maintain researchers' interest and engagement with their topic. My being a 'practitioner researcher' is likely to have made me more credible in participants' eyes (Robson, 2002), thereby enabling me to build rapport with them in less time than if I had been more of an outsider. I made sure that I was perceived as a musician as well as a researcher by introducing myself as such at the beginning of my first lecture and each seminar, and also at the beginning of each interview. Because I had gained considerable experience of both teaching and interviewing at RNCM by the time I conducted this study I was able to focus on the participants in a relatively relaxed manner.

Of course, my experience of having been a student some years ago at conservatoires other than RNCM meant that I was not so familiar with life at RNCM from the perspective of the current students I was interviewing.

Being an insider can be disadvantageous, especially if one is not aware of, or fails, to address potential disadvantages. I discuss these here in relation to a number of factors that could have compromised this part of the study. First, there were power differences between the students and myself, reflected in their knowledge that I taught some of the seminars and/or that I might mark some of their assignments, which may have increased the likelihood of social desirability in their responses. Second, because I was both the interviewer and the researcher-lecturer, my eagerness that participants should report perceiving the course positively might have made me ask questions in such a way that participants would be more likely to give responses I was hoping for. I tried to reduce the possibility of this happening in several ways. At the begining of each interview I reiterated that the aim of the interview was to improve the course for both current and future students. I told each participant it was important for him or her to be honest, and that I was not looking to be pleased. My own personal tendency is to ask questions in a way that I know can be perceived as intrusive. I countered this by deliberately allowing enough time for the participant to ponder before answering each question. Most of the questions were open-ended and I did my utmost not to show when responses were more or less desirable by trying not to nod or make any other overly enthusiastic or confirmatory facial expressions.

Although my own curiosity and active encouragement of intimate discussions during seminars might have increased the risk of 'over-rapport' in my interviews, I do not think this occurred. In any case, I only gave one seminar, besides the two, more formal, cohort lectures. It is possible that the information I shared during my sessions could have influenced participants' responses, as they would have been able to guess what I might like to hear. However, that too is unlikely, as I specifically focused on delivering evidence-based information in the lectures and on encouraging students to question their own assumptions, look for answers and interact with each other as part of the seminars. One of the participants was from the same country as myself and although for the sake of consistency we conducted the interview in English, this might have limited the richness and depth of his answers, given that his English was not very good. His poor English might have biased my interpretations, however, so it might have been better to conduct the interview in our own first language.

During the interviews, participants would sometimes stop half-way through a statement and then abruptly finish with 'you know...', assuming that, as a musician, I must know what they were talking about. Although I sometimes did understand what they meant, I always prompted them to be explicit, as I knew that my experience as a musician would not always save me from making incorrect assumptions.

Occasionally, participants would tell me spontaneously about their current health-related behaviours and practice. In trying to distinguish between changes in attitudes or behaviours that were associated with the course and unrelated changes, so as to detect the potential effects of the course, I might have increased the likelihood of biased responses by asking potentially leading questions. However, in general, I did my best to keep to the interview schedule.

Finally, my thematic analysis might have been biased by issues I happen to focus on as part of doing my PhD and by the things I happen to spend more time reflecting on, such as behaviour change and critical thinking. Such biases might have made me more likely to find themes and/or sub-themes related to these topics. However, behaviour change was indeed one of the main foci of the present research, given its central role in the course content.

To conclude, this chapter presented findings from the qualitative evaluation of the Health and Wellbeing for Musicians course, by giving an overview of the main themes and placing them in a broader context, in relation to the existing literature.

Chapter 7

Physical activity, sedentary behaviour, anxiety, and PRMDs: Knowledge, reported behaviour, training and relationships between variables

1 Introduction

The present study was aimed at investigating both individually and in relation to each other, a set of variables that have been associated with and/or might be associated with risk factors for PRMDs.

1.1 Background

1.1.1 Physical activity, PRMDs and anxiety

The World Health Organisation recommends that adults aged 18 to 64 years should engage in at least 150 minutes of moderate-intensity aerobic physical activity (PA) per week, or 75 minutes of vigorous-intensity PA. Muscle strengthening activities are also recommended on two or more days per week (WHO, 2018d). The same guidelines are endorsed by the British Department of Health and Social Care (DHSC, 2011). Activities that count as moderate aerobic activity include brisk walking, riding a bicycle, hiking, volleyball, and pushing a lawn mower. Vigorous-intensity PA includes jogging, fast swimming, football, aerobics, gymnastics and martial arts. Finally, lifting weights, working with resistance bands, push-ups and sit-ups, yoga and pilates count as activities that help strengthen muscles (National Health Service [NHS], 2018).

For musicians, the importance of physical activity for PRMDs has already been discussed in Chapter 3, Section 3, as part of the systematic review of interventions aimed at preventing and mitigating PRMDs. An overview of literature on music performance anxiety (MPA) is included in Chapter 1, Section 1.4, and summaries of findings from two systematic reviews of interventions for preventing or mitigating MPA is included in Chapter 3, Section 2. However, the present study looked at general anxiety, rather than anxiety specifically in the context of music performance, in an attempt

to capture clinically meaningful results that might be applicable not solely to music performance but more widely.

Physical activity has been associated with lower anxiety levels in the general population (Conn, 2010; Rebar et al., 2015) and reductions in anxiety through complex physiological mechanisms in non-clinical adult populations, according to meta-meta-analytic findings (Anderson & Shivakumar, 2013; Rebar et al., 2014). Musicians who report being physically active have lower levels of MPA than those who are "inactive" (Rocha, Marocolo, Correa, Morato & da Mota, 2014). They also show less anxiety after giving a musical performance (Wasley, Taylor, Backx, & Williamon, 2012). Regular physical activity has also been associated with lower perceived exertion during rehearsals (Wilke, Priebus, Biallas, & Frobose, 2011). However, there is currently no data on the relationship between PA and general anxiety in musicians. Performance anxiety could be linked with PRMDs because muscular tension resulting from anxiety increases the risk of physical injury (Kava et al., 2010). While PRMDs could be caused by the somatisation of psychological distress, findings to date are based on correlational data and firm conclusions cannot be drawn (Ackermann, Kenny, O'Brien, & Driscoll, 2014).

1.1.2 Knowledge of physical activity

Although the evidence for the association between awareness of guidelines for PA and actual behaviour is mixed (Abula, Gropel, Chen, & Beckmann, 2016), knowledge of official (e.g. national) recommendations for PA could make it easier for individuals to assess the extent to which they engage in PA (Knox, Musson, & Adams, 2015) and might be a prerequisite for behaviour change. In a study exploring PA for preventative health in dancers (Hanna, Hanley, Huddy, McDonald, & Willer, 2017), respondents scored low on a questionnaire assessing their knowledge of public health messages, in which they were asked to rate the extent to which they agreed with items such as "Taking the stairs at work or generally being more active for at least 30 minutes each day is enough to improve your health" and "Exercise doesn't have to be done all at one time – blocks of 10 minutes are okay".

1.1.3 Barriers to engagement in PA and theoretical framework

Many interventions involving PA produce results with moderate effect sizes. Few reports of such interventions include the theoretical framework underpinning the intervention, and even fewer discuss the stages through which the formulation of a theory-based intervention developed (Taylor, Lawton, & Conner, 2013). Existing theories of behaviour, such as the Health Belief Model (HBM), the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) and the Social Cognitive Theory (SCT) are often used to understand behaviour, rather than behaviour change.

Barriers to and enablers of any behavioural change must be determined if an intervention is to be tailored to the needs of a specific group at multiple levels (e.g. the individual's physical and psychological capability for change, the environment in which they live and work and how motivated they are to change) and, therefore, more likely to be effective (NICE, 2014). For example, findings from focus group interviews suggest that university students' levels of PA are affected by a complex interaction of individual factors such as enjoyment and time, with the physical environment in terms of accessibility, travel time and prices, and the macro environment represented by the media and advertising (Deliens et al., 2015).

The study reported in this chapter used the Theoretical Domains Framework (TDF) to explore the determinants of engagement in PA (Michie et al., 2008). The TDF is an integrative model that brings together other existing theoretical approaches and, on the basis of expert consensus, distills overlapping concepts into a set of 11 determinants of behaviour change, including concepts such as environment, emotion, motivation, beliefs about capabilities and social influences, which function as a guide to exploring what might affect any behaviour. These determinants are assessed to indicate potential areas of strengths and weaknesses. Based on this evaluation, specific behaviour change techniques (BCTs) can then be matched to various determinants, enabling interventions to be tailored to groups or individuals as required.

1.1.4 Sedentary behaviour

Sedentary behaviour has been defined as any waking activity requiring an energy expenditure lower than or equal to 1.5 metabolic equivalents (METs) while sitting or lying down (Sedentary Behaviour Research Network, 2012). Sitting for too long is not just a symptom of insufficient PA, but has also been associated with multiple health issues. Whether musicians are sitting or standing while practising and performing could affect physiological stress and health risks (Spahn, Wasmer, Eickhoff, & Nusseck, 2014). Although prolonged sitting has been associated with musculoskeletal pain in office workers (Gupta et al., 2015; Hallman, Gupta, Mathiassen, & Holtermann, 2015), the evidence remains limited and inconclusive, as PA is not always taken into consideration as a confounder (de Rezende et al., 2014; van der Ploeg, & Hillsdon, 2017). Playing a musical instrument such as the violin while sitting is characterized by approximately 2.0 METs (Manchester, 2011), so although this does not adhere to the definition of sedentary behaviour given above, little is known about musicians' sitting and PA when they are at leisure. Recent research conducted among elite athletes including footballers and rowers suggests that, while they exceed the recommended levels of PA generally, they are often sedentary during their leisure time (Judice, Silva, Magalhaes, Matias, & Sardinha, 2014; Sperlich et al., 2017; Weiler, Aggio, Hamer, Taylor, & Kumar, 2015). The implications of this pattern of behaviour remain unknown.

1.1.5 Rationale

The methodological quality of studies investigating risk factors for musculoskeletal problems among musicians is low, not permitting causal relationships to be identified (Baadjou, Roussel, Verbunt, Smeets, & de Bie, 2016; Wu, 2007), particularly as musculoskeletal problems are likely to have multiple causes that may interact with each other. However, the process of identifying potential causal interactions must begin by finding associations between them (Woldendorp, Boonstra, Arendzen, & Reneman, 2018). While the study reported in this chapter, like most studies of the same topic, was also cross-sectional and correlational only, it aimed

to investigate, independently and in relation to each other, a set of potential risk factors for PRMDs identified in the literature to date. These include practice time and practice-related preventative behaviours such as warming up on, and away, from the instrument and taking breaks; engaging in PA; and anxiety. Additionally, it aimed to explore, for the first time, the relationship between sedentary behaviour and PRMDs. Determinants of and barriers to engagement in PA were investigated independently to understand better what might prevent music students from engaging in PA. Self-reported pain and perceived exertion were investigated because, like physical strain and muscle fatigue, they are associated with PRMDs (Ackermann, Driscoll, & Kenny, 2012). Additionally, the study explored students' attitudes to preventative strategies for PRMDs, as well as what information about risk factors for PRMDs they received as part of their training and from what sources. It is intended that the findings should be capable of serving as the basis for designing a future intervention study. The method chosen – a cross-sectional survey using a series of standardized questionnaires – was the most efficient way of gathering data from a representative sample of music students.

1.1.6 Research questions

No hypotheses were generated as the study was exploratory. The following research questions were asked:

- What is the students' knowledge of official guidelines for PA?
- What are students' self-reported levels of PA including muscle-strengthening exercise?
- What are the barriers to and determinants of engaging in PA?
- How much sedentary behaviour do they report, both occupational (when playing their instrument) and non-occupational?
- To what extent have they learned about risk factors for PRMDs and the importance of PA during their training?
- From what sources have they found out about risk factors for PRMDs?
- How do they believe PRMDs can be prevented and what strategies have they found effective themselves?

- What is their experience of anxiety, in terms of its intensity?
- What relationships are there between students' experience of pain, PRMDs, anxiety, practice behaviours, physical activity and sedentary behaviour?

2 Method

2.1 Design

The design of the study was a cross-sectional questionnaire survey.

2.2 Respondents

Respondents were undergraduate and postgraduate students at UK conservatoires. They were recruited using opportunity sampling, via various routes: at orchestral rehearsals, and at sessions organised particularly for the purpose of recruiting and administering the questionnaire, via social media and emails sent to conservatoire administrators, and via the researcher's own personal contacts.

2.3 Questionnaires

A questionnaire survey was administered comprising basic demographic data, standardized questionnaires, items excerpted or adapted from standardized questionnaires, and items created by myself (see Appendix O).

The standardized questionnaires were the International Physical Activity Questionnaire – Short Form (IPAQ-SF); Barriers to Being Physically Active quiz (CDC, 1999); Determinants of Physical Activity Questionnaire (DPAQ: Taylor et al., 2013); Sedentary Behaviour Questionnaire (SBQ: Rosenberg et al., 2010); Rating of Perceived Exertion Scale (Borg, 1998); and the anxiety scale of the Hospital Anxiety and Depression Scale (HADS: Zigmond & Snaith, 1983).

Two items on pain were excerpted from the RAND 36-Item Short Form Survey Instrument (SF-36: Ware and Sherbourne, 1992; McDowell, 2006).

Two items on PRMDs were adapted from Ackermann and Driscoll (2010), as were two items on warming up, two on taking breaks, and five on training advice. Sixteen items on preventative strategies (believed and

perceived effectiveness) were adapted from Davies and Mangion (2002) and four items on knowledge of PA guidelines were adapted from Knox et al. (2015).

Finally, two items on health-related training in relation to PA were created by the researcher for the purpose of this study.

- Demographic data consisted of sex, age, nationality, degree, name of conservatoire, nature of genre studied (classical or popular music) and academic level (undergraduate or postgraduate).
- Practice and warming up: Items included the name of main instrument; the number of years playing main instrument; number of hours spent in a typical week in individual practice; the frequency and length of taking breaks during practice sessions; the duration of a practice session before taking a break; and the frequency of warming up on the instrument (via slow scales, long tones and finger exercises) and away from it (via movement, stretching, cardiovascular or core muscle movement) before practising or playing, adapted from Davies and Mangion (2002).
- Health-related training: A yes/no item was included on whether participants had received any information on how to prevent health-related pain and were asked to mention sources. Then they were asked about whether they found it easy to access such information (yes/no response) and if they had received advice during their training on nine items related to the prevention of PRMDs, of which five were adapted from Davies and Mangion (2002). These included warming up on and away from the instrument, and taking breaks during playing. I added two items on engaging in aerobic PA and muscle-strengthening exercises.
- Knowledge of PA guidelines: Recognition is easier than recall from memory so rather than providing multiple-choice options, open-ended questions adapted from Knox et al. (2015) about officially recommended amounts of aerobic PA and muscle strengthening were included. Respondents who answered ‚Yes' to “Do you know what the national recommendations are for taking part in physical activity, in terms of minutes per week of moderate intensity physical activity?” were prompted to state the national recommendations in terms of minutes per week. The correct answer is 150 minutes per

week; respondents who estimated fewer and more than 150 minutes were labelled over- and under-estimators respectively. A similar format was used to evaluate knowledge of guidelines regarding muscle-strengthening exercises in days per week: the correct answer is „Two”.

- Reported physical activity: The International Physical Activity Questionnaire – Short form (IPAQ-SF) was used since it has reasonable measurement characteristics for PA (Craig et al., 2003). Respondents were asked how much time they had spent walking, and doing moderate and vigorous PA over the previous seven days. Response options were number of hours and/or minutes, subsequently computed in minutes only. All cases in which variables representing walking, moderate and vigorous PA exceeded 180 minutes (3 hours) were recoded as 180 minutes, while variables representing walking, moderate and vigorous PA exceeding 1260 minutes (21 hours) were recoded as 1260 minutes so that a realistic maximum of 21 hours (3 hours * 7 days) of physical activity was allowed for each respondent (IPAQ, 2005). Metabolic equivalent of energy expenditure (MET)-minutes/week values were computed for each type of activity according to the following pattern: 3.3 for walking, 4.0 for moderate and 8.0 for vigorous physical activity. Next, MET-minutes/week scores were calculated (e.g. Walking MET-minutes/week = 3.3 * walking minutes * walking days). The total sum of MET-minutes/week was thus computed by adding the values of MET-minutes/week for walking, moderate and vigorous activity. Cut-off scores were also used, so respondents could be categorised as engaging in low, moderate and high PA defined as follows:

  - Low – Individuals not meeting the criteria for 'moderate' or 'high'.
  - Moderate – Individuals who satisfied one of the following conditions: a) three or more days of vigorous-intensity activity of at least 20 minutes per day OR b) five or more days of moderate-intensity activity and/or walking of at least 30 minutes per day OR c) five or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a

minimum total physical activity of at least 600 MET-minutes/week.

- High – Individuals who satisfied one of the following conditions: a) vigorous-intensity activity on at least three days achieving a minimum total physical activity of at least 1500 MET-minutes/week OR b) seven or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum total physical activity of at least 3000 MET-minutes/week.

I added one further item to find out how many respondents had engaged in specific exercises for muscle strengthening exercises using their own body (e.g. yoga, sit-ups or push-ups), weights or resistance bands during the previous month.

- Barriers to engaging in physical activity: The Barriers to Being Physically Active quiz (CDC, 1999) is a 21-item survey encompassing 1) lack of time, 2) social influence, 3) lack of energy, 4) lack of willpower, 5) fear of injury, 6) lack of skill and 7) lack of resources. Response options range from '0 – very unlikely' to '3 – very likely'. According to the instructions, a score of 5 or more for any of these categories indicates a considerable barrier. The Determinants of Physical Activity Questionnaire (DPAQ) derives from the TDF (Taylor et al., 2013) and contains 34 items matched to 11 factors: 1) knowledge, 2) environmental context and resources, 3) motivation and goals, 4) beliefs about capabilities, 5) skills, 6) emotion, 7) social influences, 8) beliefs about consequences, 9) action planning, 10) coping planning, and 11) goal conflict. The questionnaire has good discriminant validity and test-retest reliability, and reasonable internal consistency for most factors. Eight of these determinants differentiate reliably between high and low exercisers.
- Sedentary behaviour: The Sedentary Behaviour Questionnaire (SBQ) asks participants how much time they spent "from when you wake up until you go to bed" engaging in each of nine sedentary behaviours during a typical weekday and a typical weekend day:

watching TV, playing computer or video games, sitting listening to music, sitting and talking on the phone, doing paperwork or computer work, sitting reading a book or magazine, playing a musical instrument, doing artwork or crafts and sitting and driving in a car, bus or train. Response options encompassed 'None', '15 minutes or less', '30 minutes', '1 hour', '2 hours', '3 hours', '4 hours', '5 hours' and '6 hours or more'. Each response was converted into hours (e.g. '30 minutes' was recoded as '0.5 hours'). Total numbers of hours of sedentary behaviour were summed separately for weekday and weekend days for each item. Next, weekly scores were computed by multiplying weekday hours by 5 and weekend hours by 2 and summing the two results. Responses representing more than 24 hours/day were recoded as 24 hours/day for variables of total hours/day (weekday and weekend) and total hours/week. Also, variables were created to sum the number of hours spent every day in all listed behaviours for weekday and weekend days separately. Next, weekly estimates were calculated by multiplying weekday hours by five and weekend day hours by two. Finally, another variable was created for the total number of hours spent in sitting behaviours per week. Answers representing more than 24 hours/day were coded as 24 hours/day (Rosenberg et al., 2010).

The SBQ has acceptable measurement properties for adults (Rosenberg et al., 2010). Both weekday and weekend day TV viewing showed excellent reliability (ICC = 0.86, 95% CI [0.76–0.92]) and ICC = 0.83, 95% CI [0.72–0.90] respectively: Prince, LeBlanc, Colley, & Saunders, 2017). Mean, median and standard deviation values are reported for the following: hours/week for each activity; total sedentary hours/week; total weekday (hours/day); total weekend (hours/day) (Rosenberg et al., 2010). In order to look at non-occupational scores, 'playing a musical instrument' was removed.

- Pain was measured via two SF-36 items on intensity (from 1 – 'none' to 6 – 'very severe') and the extent to which it interfered with one's practice and performance 'during the last 4 weeks' (from 1 – 'not at all' to 5 – 'extremely'). The latter item was adapted from the original 'During the past 4 weeks, how much did pain interfere with

your normal work (including both work outside the home and housework)?'.

- PRMDs were investigated in terms of frequency and severity through two items adapted from Ackermann and Driscoll (2010), measured on 11-point Likert scales, from 0 (never) to 10 (constantly), and from 0 (none) to 10 (most severe) respectively.
- One item asked about perceived exertion, defined as the amount of physical effort respondents reported needing to complete their daily practice routines over the preceding seven days, provided these represented a typical week: the Rating of Perceived Exertion Scale (Borg, 1998), which ranges from 6 (no exertion at all) to 20 (maximal exertion).
- Beliefs and attitudes regarding the prevention and treatment of PRMDs were assessed via a list of 14 activities based on Davies (personal communication, January 6, 2017). Items on the list were rated in terms of believed effectiveness on one hand, and perceived effectiveness subsequent to personal experience on the other hand. Responses ranged from 1 (not effective) to 4 (extremely effective) and also included 0 (not sure).
- Anxiety: The 7-item anxiety scale from the Hospital Anxiety and Depression Scale (HADS) was used. An anxiety score was computed. Total scores were labelled as normal (0-7), borderline abnormal (8-10) or abnormal (11-21).

2.4 Procedure

The entire set of questionnaires was administered both online and via hard copies between June 2017 and April 2018 to music students at all UK conservatoires, although no responses were received from Birmingham Conservatoire and Leeds College of Music. Ethical approval was granted by the Conservatoires UK Research Ethics Committee (see Appendix P).

2.5 Analyses

Descriptive statistics are reported, as well as findings from non-parametric group comparisons, correlations and Cronbach's alpha scores measuring the internal reliability of some of the scales.

3 Results

3.1 Descriptive and inferential statistics

- Demographic information was obtained from 111 students, aged 18-31, median (MD) = 22, of whom 64 (58%) were female. Ninety-three respondents (84%) were undergraduate students. Eighty-two respondents (74%) were from RNCM, 18 (16%) were music students from Trinity Laban Conservatoire of Music and Dance and the remainder were from the Guildhall School of Music and Drama, Royal Welsh College of Music and Drama, the Royal College of Music, Royal Academy of Music and Royal Conservatoire of Scotland. Seventy-three (68%) students were from the UK, 22 (20%) from Europe, seven (6.5%) were from Asia, four (4%) were from Australia or New Zealand and two (2%) were American. In terms of instrument/school of study, 51 (47%) were string players, 31 (28%) were wind and brass players, 13 (12%) were singers, 10 (9%) were keyboard players, two (2%) were percussionists and two (2%) were composers.
- A total of 59 respondents completed the section on practice and warming up. They reported playing their instruments for a mean of 11.74 hours in a typical week (*SD*=4.04; range: 3-24). The total number of hours spent in individual practice was a mean of 19.50 (*SD*=8.26; range: 3-42). Breaks lasted a mean of 12 mins (*SD*=11.47; range: 2-60) and respondents reported practising for a mean of 44 minutes before taking a break (*SD*=20; range: 10-90). The questionnaire asked about frequency of warming up before practising and playing, on the instrument (through slow scales, long tones and finger exercises) and away from it (through movement, stretching exercises, cardiovascular or core muscle movement). As shown in Table 22, out of 111 respondents, 96 (86.5%) reported warming up on the instrument 'quite frequently' and 'very frequently' while only 44 (39.6%) did so away from the instrument.

Table 22. Frequency of warming up on and away from the instrument

N=111	Never	Occasionally	Quite frequently	Very frequently
Warming up ON your instrument	4 (3.6%)	11 (9.9%)	30 (27%)	66 (59.5%)
Warming up AWAY from your instrument	25 (22.5%)	42 (37.8%)	25 (22.5%)	19 (17.1%)

- A total of 110 respondents completed the section of the questionnaire asking if they had received specific health-related advice during their training. Table 23 shows the number and percentage who responded YES to each item.

Table 23. Health-related advice received during training

N=110	*n* who said yes (%)
How to warm up (on your instrument)	103 (94%)
How to play with flexibility and free movement	95 (86%)
How to sit comfortably when playing (including correct chair height, type of chair, position of stand)	84 (77%)
When to take breaks during playing and practice sessions	87 (79%)
How to look after your muscles and prevent strain	79 (72%)
How to pace yourself during periods of intensive practice and playing	77 (70%)
How to warm up (away from your instrument)	73 (66%)
Why you should engage in aerobic/cardio physical activity	66 (62%)
Why you should do muscle strengthening exercises	60 (57%)

As shown in Table 24, 88 (80% of 110) respondents had been given information on how to prevent playing-related pain. More than two-thirds (76 or 68%) had received information from their teacher or college lecture but only 26 (23%) had received it from a health professional. Very few (10 or 9%) mentioned books, magazines and websites or the British Association of Performing Arts Medicine (BAPAM). Out of 108 respondents, 64 (60%) said they found it easy to access information about preventing/treating PRMDs, while 44 (40%) did not.

Table 24. Sources of information on pain prevention

Source *(N*=110*)*	*n* of participants who mentioned it (%)
Teacher	48 (43%)
Lecture/College	28 (25%)
Health professional (physiotherapist, doctor, GP, osteopath, chiropractor, Alexander Technique instructor, Pilates instructor)	26 (23%)
Books, magazines, websites	7 (6%)
BAPAM	3 (3%)

- More than three-quarters of respondents (83 or 76.1% of 109 respondents) said they did not know the national recommendations for taking part in physical activity. Of the 26 (23.9%) respondents who said they did know them, eight (31%) gave correct responses, ten were over-estimators (38.5%) and eight were under-estimators (31%). The vast majority (103 or 94.5%) did not know the national recommendations for muscle strengthening exercises. Of the six who did, three gave the correct answer while the other three were over-estimators.
- A total of 57 respondents, two of whom preferred not to disclose their sex, completed the IPAQ-SF measuring engagement in physical activity. Cronbach's alpha of 0.75 was found for all three scales and can be regarded as acceptable. As shown in Table 25, 40 (70%) respondents reported 'moderate' PA, while 15 (26%) reported 'high' PA. When divided by sex, no male and 2 (5.6%) females reported 'low' PA; 14 (74%) males and 25 (69%) females reported 'moderate'; and 5 (26%) males and 9 (25%) females reported 'high' PA. As for programme, 2 (5%) undergraduate students (UGs) and no postgraduate students (PGs) reported 'low'; 26 (65%) UGs and 14 (82%) reported 'moderate'; and 12 (30%) UGs and 3 (18%) PGs reported 'high' PA.

Table 25. Physical activity

	N=57 (%)	Males (*n*=19)	Females (*n*=36)	UG (*n*=40)	PG (*n*=17)
Low	2 (3.5%)	0	2 (5.6%)	2 (5.0%)	0
Moderate	40 (70.2%)	14 (73.7%)	25 (69.4%)	26 (65.0%)	14 (82.4%)
High	15 (26.3%)	5 (26.3%)	9 (25%)	12 (30.0%)	3 (17.6%)

As shown in Table 26, mean total physical activity per week was 2326 MET-mins (*SD*=1846), of which 606 MET-mins (*SD*=1107), were contributed by vigorous activity, 345 MET-mins (*SD*=570), by moderate activity and 1375 (*SD*=1012) MET-mins by walking. Median mins/week and MET-mins/week, and inter-quartile ranges, were calculated given that the data was not normally distributed and outliers were present. Mann-Whitney U tests were conducted to compare the walking, moderate, vigorous and total PA of men vs women and undergraduate vs postgraduate students, but there were no significant differences between groups.

Table 26. Types of physical activity

		Mean (*SD*) (*N*=57)	MD (IQR)* (*N*=57)
Vigorous	Mins/week	75 (138)	5 (0-90)
	MET-min/week	606 (1107)	40 (0-720)
Moderate	Mins/week	86 (142)	30 (0-120)
	MET-min/week	345 (570)	120 (0-480)
Walking	Mins/week	416 (306)	420 (180-450)
	MET-min/week	1375 (1012)	1386 (594-1485)
Total PA	Mins/week	578 (398)	440 (330-840)
	MET-min/week	2326 (1846)	1674 (1386-2874)

*Median (Interquartile Range)

Twenty-nine respondents completed the item on muscle strengthening exercises, reporting a median and mean of 3 times per week (range: 0-6.50; *SD*=1.78).

- A total of 106 respondents completed the items representing barriers to being active. As shown in Table 27, the following barriers received mean scores of more than 5: lack of time, energy, willpower and resources; and social influence.

Table 27. Barriers to being active

Barriers (*N*=106)	Mean score (*SD*)
Lack of time*	8.44 (2.50)
Lack of energy*	8.06 (2.55)
Lack of willpower*	7.61 (2.91)
Social influence*	6.23 (2.31)
Lack of resources *	5.96 (2.36)
Lack of skill	4.77 (2.25)
Fear of injury	4.10 (1.82)

*Barriers that received a score higher than 5

- A total of 52 respondents completed the items representing determinants of physical activity. As shown in Table 28, the majority received mean scores around the mid-point of 3.5 (range: 3.34 – 6.11) but those receiving mean scores above 5 (Emotion, Action Planning, Environmental Resources and Beliefs about Consequences) were less likely to be barriers.

Table 28. Determinants of physical activity

Determinants (*N*=52)	Mean score (*SD*)
Beliefs about consequences	6.11 (0.93)
Environmental resources	5.67 (1.20)
Action planning	5.07 (1.57)
Emotion	5.05 (1.66)
Skills	5.00 (1.53)
Social influences	4.83 (1.36)
Motivation goals	4.81 (1.39)
Beliefs about capabilities	4.11 (0.85)
Knowledge	3.81 (1.50)
Coping planning	3.44 (1.65)
Goal conflict	3.34 (1.48)

- Data on sedentary behaviour were provided by 105 respondents. As shown in Table 29, respondents reported being sedentary, other than when they were playing their instruments, for a mean of 5.51 (*SD*=3.25) hours per day during the week and 6.52 (*SD*=2.95) hours per day at the weekend. Medians and inter-quartile ranges were calculated, given that the data were not normally distributed and outliers were present.

Table 29. Sedentary behaviour

N=105	M (*SD*)	MD (IQR)	'Play musical instrument' removed – M (SD)	'Play musical instrument' removed – MD (IQR)
TV	9.56 (7.64)	9.00 (4-14)		
Computer games	1.88 (4.59)	0 (0-1.75)		
Listen to music	7.81 (8.02)	4.50 (2.25-11)		
Talk on phone	3.13 (3.00)	2.25 (1.75-3.50)		
Paper work	8.27 (7.43)	6.00 (3-12)		
Reading	4.13 (4.49)	3.00 (1-6)		
Play musical instrument	23.48 (9.81)	24.00 (19-30)		
Arts and crafts	1.45 (3.24)	0 (0-1.75)		
Driving in a car/bus/train	4.34 (5.44)	2.25 (0-7)		
Total SB h/w*	64.10 (24.79)	62.25 (48-74.25)	40.61 (20.98)	37.75 (26.50-47.75
Total SB weekday h/day	9.00 (3.83)	8.50 (7-10)	5.51 (3.25)	5.00 (3.50-6.50)
Total SB weekend h/day	9.55 (3.50)	9.25 (7-11.50)	6.52 (2.95)	6.00 (4.50-8.50)

*SB h/w = sedentary behaviour hours/week

Postgraduate students spent significantly more time (*M*=7.5 [*SD*=7.08] hours per week) than undergraduate students sitting while driving (*M*=3.73, *SD*=4.89; *U*=574.500, *p*=.04), while undergraduate students spent significantly more time (*M*=3.46, *SD*=3.12) talking on the phone than postgraduate students (*M*=1.44, *SD*=1.42; *U*=521.500, *p*=.01).

- A total of 59 respondents completed the section of the questionnaire on reported pain, which used scales of 1-6 for intensity of pain experienced in the previous month and 1-5 for the extent to which it interfered with their practice and performance. Mean scores were 2.81 (*SD*=1.15) and 1.97 (*SD*=0.94) respectively.
- A total of 108 respondents reported a mean frequency of PRMDs of 3.98 (*SD*=2.72) while 109 respondents reported a mean severity of 3.72 (*SD*=2.35), both measured on scales of 0-10. Both variables were also transformed into dichotomous variables such that frequency and severity were labelled ‚low' if they were rated 5 or less, and ‚high' if they were rated 6 or more. A total of 85 respondents (79%) reported low frequency and 96 (88%) reported low severity of PRMDs.
- A total of 110 respondents completed the Borg Reported Perceived Exertion scale. The mean score was 7.60 (*SD*=2.57) corresponding to between 12 and 13 ('somewhat hard' on the RPE scale).
- Respondents were asked about the strategies they „think" (i.e. believe) would be effective for preventing and treating PRMDs: 59 respondents completed this part of the questionnaire, although they did not respond to all the items. Table 30 shows the percentages of respondents rating each strategy as 'very' or 'extremely effective'. The five most highly rated strategies were physiotherapy, posture correction (e.g. Alexander Technique), rest, body awareness (Feldenkrais method, Alexander Technique) and slight adjustment of playing technique.

Table 30. Believed effectiveness of preventative/treatment strategies for PRMDs

	n	No of those who answered 'very effective' and 'extremely effective' (%)
Physiotherapy	48	39 (81%)
Posture correction (e.g. Alexander Technique)	56	44 (78%)
Rest	59	45 (76%)
Body awareness (Feldenkrais Method, Alexander Technique)	55	42 (76%)
Slight adjustment of playing technique	55	39 (71%)
Stretching, Yoga	57	38 (67%)
Regular massage	53	35 (66%)
Exercise such as swimming	55	36 (65%)
Easing off playing	58	29 (50%)
Developing upper-body strength at gym	53	24 (45%)
Meditation, Visualisation	48	19 (40%)
Martial arts (e.g. Aikido, Tai Chi)	37	12 (32%)
Anti-inflammatory drugs	53	10 (19%)
Painkillers (e.g. aspirin)	56	6 (11%)

Respondents were then asked which strategies they had found effective themselves: 59 completed this section of the questionnaire. As shown in Table 31, the five most effective strategies, based on respondents' experience, were slight adjustment of playing technique, rest, body awareness, posture correction and stretching/yoga.

Table 31. Experienced effectiveness of preventative/treatment strategies for PRMDs

	n	No of those who answered 'very effective' and 'extremely effective' (%)
Slight adjustment of playing technique	55	43 (78%)
Rest	59	43 (73%)
Body awareness (Feldenkrais method, Alexander Technique)	39	26 (67%)
Posture correction (e.g. Alexander Technique)	40	26 (65%)
Stretching, Yoga	49	31 (63%)
Regular massage	32	20 (63%)
Easing off playing	58	33 (57%)
Exercise such as swimming	47	26 (55%)
Developing upper-body strength at gym	34	16 (47%)
Physiotherapy	31	14 (45%)
Meditation, Visualisation	41	15 (37%)
Anti-inflammatory drugs	39	11 (28%)
Martial arts (e.g. Aikido, Tai Chi)	25	7 (28%)
Painkillers (e.g. aspirin)	42	8 (19%)

- A total of 56 respondents completed the Anxiety component of the Hospital Anxiety and Depression Scale. The scale showed good internal reliability (Cronbach's alpha = 0.82). The mean score was 9.57 (*SD*=4.90), classed as borderline abnormal. When using categories according to the suggested cut-off scores, 34% of respondents were normal (mean 0-7), 23% were borderline abnormal (mean 8-10) and 43% were abnormal (mean 11-21).

3.2 Relationships between variables of interest

Relationships were explored between seven sets of variables:

- Pain: general and interfering with practice and performance
- PRMDs: frequency and severity
- Perceived exertion (RPE)
- Anxiety: general (measured on the HADS scale)
- Practice behaviours: time (hours per week), frequency of breaks, length of session before taking a break, warming up on and away from the instrument
- Physical activity: reported physical exertion, total physical activity (minutes per week), muscle-strengthening exercises
- (Non-occupational) sedentary behaviour: weekday, weekend, total.

Correlations between all variables using Spearman's *rho* were calculated and are shown in Table 32. Cases were excluded pairwise to deal with missing values.

First, significant associations between variables within each set, with bootstrapped (bias-corrected and accelerated BCa) 95% confidence intervals (Field, 2013) are reported.

There were associations between bodily pain and bodily pain interfering with practice and performance (r_s=.686, CI=.494-.823, p<.001) and the frequency and severity of PRMDs (r_s=.885, CI=.803-.938, p<.001).

Hours of practice per week were positively associated with length of practice session before taking a break (r_s=.399, CI=.161-.607, p<.001), and

there were positive associations between total, weekday (r_s=.970, CI=.947-.982, p<.001), weekend (r_s=.768, CI=.657-.850, p<.001), and weekday and weekend hours of non-occupational sedentary behaviour (r_s=.876, CI=.812-.918, p<.001).

Second, significant associations between sets of variables were as follows:

Bodily pain interfering with practice and performance was associated with frequency (r_s=.733, CI=.579-.849, p<.001) and severity of PRMDs (r_s=.707, CI=.538-.826, p<.001), anxiety (HADS: r_s=.438, CI=.089-.562, p<.001) and reported physical exertion (r_s=.345, CI=.092-.464, p<.001).

Frequency of PRMDs was associated with anxiety (HADS: r_s=.438, CI=.168-.661, p<.001), reported physical exertion (r_s=.279, CI=.091-.464, p<.001) and sedentary behaviour at the weekend (r_s=.213, CI=.007-.405, p<.05). Severity of PRMDs was also associated with anxiety (HADS: r_s=.340, CI=.078-.572, p<.001) and sedentary behaviour at the weekend (r_s=.217, CI=.033-.379, p<.05) but not reported physical exertion. This in turn was associated with anxiety (HADS: r_s=.335, CI=.107-.543, p<.05).

Hours of practice per week were negatively associated with weekday (r_s= -.387, CI= -.647- -.094, p<.001) and total non-occupational sedentary behaviour (r_s= -.348, CI= -.602- -.055, p<.001).

Frequency of taking breaks was negatively associated with length of practice session before taking a break (r_s=-.294, CI=-.505- -.052, p<.05) and positively associated with warming up away from the instrument (r_s=.278, CI=.044-.503, p<.05). Length of practice session before taking a break was also negatively associated with weekday (r_s= -.305, CI=-.534- -.042, p<.05) and total non-occupational sedentary behaviour (r_s=.-280, CI= -.536- -.019, p<.05).

Warming up away from the instrument was associated with total physical activity (minutes per week: (r_s=.294, CI=.066-.491, p<.05).

Engaging in muscle-strengthening exercise was negatively associated with total non-occupational sedentary behaviour (r_s= -.581, CI=-.783- -.289,

$p<.001$), on weekdays only (r_s= -.539, CI=-.746- -.253, $p<.001$) and at weekends only (r_s= -.489, CI=-.741- -.162, $p<.001$).

Table 32. Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.Bodily pain (*n*=59)	-														
2.Bodily pain interfering (*n*=59)	.686**	-													
3.PRMDs frequency (*n*=108)	.603**	.733**	-												
4.PRMDs severity (*n*=109)	.562**	.707**	.885**	-											
5.RPE (*n*=110)	.205	.345**	.279**	.186	-										
6.Practice time (hours/week) (*n*=58)	.176	.236	.128	.097	.113	-									
7.Taking breaks frequency (*n*=59)	.082	.090	-.030	-.071	.127	-.030	-								
8.Length of practice session before breaking (*n*=59)	-.067	.084	.038	-.110	.142	.399**	-.294*	-							
9.Warming up ON instrument frequency (*n*=111)	.169	-.083	-.143	-.185	-.028	.050	-.167	.155	-						
10.Warming up AWAY from instrument frequency (*n*=111)	.170	.084	-.134	-.047	-.071	.084	.278*	-.083	.110	-					
11.Total PA mins/week (*n*=57)	-.034	-.136	-.127	-.015	-.082	-.259	.114	-.201	.018	.294*	-				
12.Muscle strengthening (times/week) (*n*=29)	.088	.135	-.131	.099	.072	.355	-.033	.159	.149	.304	.241	-			
13.Anxiety (HADS) (*n*=56)	.343**	.341*	.438**	.340*	.335*	-.018	.005	.008	-.078	.198	-.020	.106	-		
14.Weekday non-occupational SB (*n*=107)	-.116	-.138	.135	.176	-.054	-.387**	-.170	-.305*	-.166	.024	-.092	-.539**	.150	-	
15.Weekend non-occupational SB (*n*=107)	.035	.056	.213*	.217*	.036	-.174	-.162	-.162	-.177	-.044	-.123	-.489**	.199	.768**	-
16.Total non-occupational SB (*n*=109)	-.073	-.099	.162	.188	-.047	-.348**	-.159	-.280*	-.176	-.024	-.102	-.581**	.161	.970**	.876**

4 Discussion

The study reported in this chapter investigated variables that have been associated with risk factors for PRMDs, including practice-related strategies such as taking breaks and warming up, self reported levels of PA and anxiety, as well as the interaction between them and with PRMDs, pain and perceived exertion. Additionally, it explored respondents' knowledge of PA guidelines, barriers to PA engagement and whether respondents might be receiving relevant health-related information and from what sources. Finally, the study looked at levels of various forms of sedentary behaviour and its interaction with other variables. Furthermore, it explored relationships between most of these variables.

4.1 Descriptive data

Respondents tend to practise for about 45 minutes before taking a break that lasts a few minutes on average. This is in line with current recommendations, although some authors recommend a five-minute rest break every 25 minutes of playing (Chan & Ackermann, 2014). While most music students report engaging in warming up on the instrument frequently, considerably fewer do so away from the instrument. This is supported by other research findings. While up to 72% musicians report engaging in musical warm-ups, only 18% carry out physical warm-ups (Zaza & Farewell, 1997). The evidence on the benefits of doing so remains inconclusive (McCrary, Ackermann, & Halaki, 2015). Only one study conducted on 55 violinists compared the effects of various forms of warming up both on the instrument and away from it (cardiovascular and core muscle warming-up) and found they were equally effective in lowering perceived exertion when compared to an inactive control group (McCrary et al., 2016). However, no particular warm-up activity had any objectively measurable effect on muscle activity levels. It is thus unclear whether there are important distinctions between different types of warm-up activities. Of course, while all the practice-related strategies discussed above might describe the respondents' typical week, these patterns can fluctuate during stressful times such as audition preparation, considerable playing demands and various other types of performance (Chan & Ackermann, 2014).

Respondents who had received health-related advice during training were most likely to have received information on warming up on the instrument (94%) but considerably less likely to have received information about warming up away from the instrument (66%). Even fewer had been told why they should engage in aerobic/cardiovascular PA (62%) and muscle-strengthening exercises (57%). Although PRMDs are complex phenomena, subject to multiple influences, and there is not much literature on the topic, engaging in physical activity could be an effective strategy for lowering the risk of PRMDs (see Chapter 3).

When asked to state sources of health-related information, most respondents mentioned their teachers and college lectures. As 77% of 192 piano students mentioned music educators as the main source of their awareness of PRMDs (Ling et al., 2016), this once again highlights the important role of higher music education institutions, and teachers in particular, in health education. Only 9% of respondents in the present study mentioned websites or BAPAM as a source of information. It may be that in addition to music students' not receiving much training on certain relevant issues such as the importance of PA, more effort should be invested in making such information relevant and/or attractive so as to engage them. After all, 40% of respondents reported not finding it easy to access information about PRMDs.

Respondents' knowledge of PA guidelines for healthy adults was especially poor, even though most met and in some cases exceeded the recommended 150 minutes per week. This seems to replicate a similar pattern found among university dance students (Hanna et al., 2017). More than a third of those who thought they knew the official PA guidelines over-estimated the actual figure. On one hand, over-estimating the guidelines – like thinking that PA means only going to the gym, and therefore not engaging in it – could be a barrier. On the other hand, engagement in only 150 minutes per week of PA, while certainly to be encouraged in the general population for a range of health benefits, may be insufficient for preventing PRMDs in musicians. Given that most respondents completed the questionnaire online they could have looked up the national recommendations for PA. Given that there were so few correct answers this did not seem to happen.

The distribution of mean total PA per week between vigorous, moderate PA and walking was comparable to mean data from adults in 28 European countries, although musicians reported less vigorous and moderate exercise and considerably more walking (Gerovasili, Agaku, Vardavas, & Filippidis, 2015). Unpublished data on 483 music students in the UK and Switzerland suggests that almost 80% exceeded the recommended guidelines for PA (also measured via the IPAQ-SF), although they scored poorly on objective measures of strength and flexibility such as plank, press up, and sit-and-reach tests (Wasley et al., 2017).

The percentage of people meeting the national guidelines for PA in the UK ranges from 19% to 76% (Loyen et al., 2016) while the prevalence of physical inactivity varies between 2% and 71% in more than 50 countries (Guthold, Ono, Strong, Chatterki, & Morabia, 2008) and between 23% and 44% in European countries (Gerovasili et al., 2015; Sjöström, Oja, Hagstromer, Smith, & Bauman, 2006). These variations can be at least partially attributed to the use of self-report and different methods of assessment producing different results (Van Hecke et al., 2016). The respondents in Loyen et al.'s study reported a mean of 2543 MET-mins/week, slightly more than than the mean of 2326 in the present study.

It is difficult to compare the results of the present study with those of previous studies because, even though a standard questionnaire was used, as most questionnaires only have acceptable to moderate reliability and validity. Also, findings can be reported in different ways (e.g. total PA mins/week, MET-mins/week or in terms of categories: low, medium and high; and although the IPAQ protocol recommends the use of median scores, means are often reported instead). Kapteyn et al. (2018) observe that respondents disagree on what constitutes PA and struggle to distinguish between moderate and vigorous intensities. Respondents might also consider the same activities as constituting both moderate and vigorous ones, thereby counting them twice. Nevertheless it is cheaper and easier to administer questionnaires than to collect objective measures of PA.

The most notable barriers to engaging in PA reported by respondents in the present study were social influences, and lack of time, energy, willpower and resources including access to facilities such as jogging trails,

swimming pools and showers, and money. These barriers are similar to those identified by researchers internationally, including Arzu, Tuzun and Eker (2006); Asthon, Hutchesson, Rollo, Morgan, and Collins (2017), and Gomez-Lopez, Granero Gallegos and Baena Extremera (2010). Social influences could be interpreted as insufficient endorsement of the benefits of PA at institutional, occupational and social levels, while the other barriers reflect the busy lives led by music students. Environmental resources (facilities for PA, their geographical proximity and the attractiveness of the local area), planning for and confidence while engaging in PA („beliefs about consequences") and goal conflict did not represent barriers. Taylor et al. (2013), who report similar mean scores, mean range, and hierarchy of barriers, hypothesize that goal conflict may not be an issue since multi-tasking is now so common.

Respondents in the present study spent less time sitting, when not playing their instruments, than UK students who have been found, in other studies, to spend more than eight hours a day in sedentary behaviours including studying and watching TV (Deforche, Van Dyck, Deliens, & De Bourdeaudhuij, 2015; Johnston et al., 2010; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008; Rouse & Biddle, 2010). Indeed, between 40% and 50% of university students worldwide are classed as physically inactive (Keating, Guan, Pinero, & Bridges, 2010; Pengpid et al., 2015). Similarly, a comparison of musicians with athletes suggests that musicians are sedentary for less of their leisure time (Weiler et al., 2015).

Frequency and severity of reported PRMDs were similar to those reported in the existing literature, that is, rather low, while scores for reported perceived exertion were lower than those reported by Ackermann et al. (2002) and Chan et al. (2014a, b).

Painkillers, anti-inflammatory drugs and martial arts were both believed and perceived to be least effective for preventing/treating PRMDs. However, Paarup et al. (2011) found that 44% of the women and 26% of the men in a cross-sectional study of 342 orchestral players in Denmark reported taking mild painkillers (e.g. paracetamol) at least once a month (for any reason). Physiotherapy was believed, but not perceived, to be most effective. Lonsdale, Laakso and Tomlinson (2014) found similar results for pain relief strategies. Some authors speculate that musicians may recommend

techniques such as relaxation, stretching, rest and massage because they experience muscular tension caused by psychological stress (e.g. Kaneko, Lianza, & Dawson, 2005). This could be equivalent to the association between anxiety, PRMDs, pain and perceived exertion found in the present study. Rest breaks have already been endorsed as a potentially effective technique for managing PRMDs (Chan & Ackermann, 2014).

According to cut-off scores, 34% of respondents had ‚normal' levels of anxiety, 23% had ‚borderline abnormal', and 43% had ‚abnormal' levels of anxiety. These levels were similar to those obtained from a sample of 69 musicians seeking or undergoing hand surgery in Germany (Spahn et al., 2001). Another study found that, in a sample of 239 music students in Germany, 33.5% had means above 8 on the anxiety scale, which are categorised as both borderline abnormal and abnormal. These scores were significantly higher than those obtained from medical and sports students (Spahn et al., 2004). This represents a proportion of respondents considerably lower than 66% whose levels of anxiety were categorised as borderline abnormal and abnormal in the present sample.

4.2 Relationships between variables

The more hours respondents reported practising each week, the longer they practised in each session before taking a break and therefore the less often they took a break. Furthermore, the more often they took breaks, the more likely they were to warm up away from the instrument and engage in physical activity. Although causality cannot be inferred, it could be that students who practise more are less likely to use strategies for preventing PRMDs, such as taking breaks, and more likely to over-practise. It may also be that respondents considered breaks as a way of 'warming up away from the instrument'. Further, the more respondents engaged in non-occupational sedentary behaviour, the less they practised and the shorter their practice sessions before taking a break. It is unclear what might explain these (admittedly weak) associations. Perhaps students who practise less and sit more are better at resting and relaxing, or perhaps practising more motivates students to be more active when not practising, although this contradicts the idea that practice can lead to more fatigue and thus less willingness and energy to engage in physical activity. Further investigation of these relationships is needed.

General anxiety measured on the HAD Scale was significantly and positively associated with frequency and severity of PRMDs, bodily pain, bodily pain interfering with practice and performance, and perceived exertion. Evidence for an association between anxiety and physical pain in musicians is inconsistent to date, so needs further investigation (Davies & Mangion, 2002; Kaneko et al., 2005; Kenny & Ackermann, 2015; Leaver et al., 2011; Spahn et al., 2001). It could be speculated that anxiety manifests itself via muscular tension experienced while playing thus jeopardizing performance and increasing the player's anxiety (Davies & Mangion, 2002; Kaneko et al., 2005). Although causality cannot be inferred in the present study, anxiety could cause pain and *vice versa*.

The more respondents engaged in non-occupational sedentary behaviour at weekends, the more frequent and severe were their reported PRMDs. Correlations were weak and the direction of the relationship is, of course, unclear. Perhaps more frequent and severe PRMDs forced respondents to be more sedentary when they could, or perhaps their symptoms resulted from insufficient muscle-strengthening physical activity.

No significant associations were found between practice-related strategies and PRMDs, pain or reported perceived exertion. Studies of relationship between playing time and musculoskeletal problems have produced mixed findings to date (e.g. Kaufman-Cohen & Ratzon, 2011; Kochem & Silva, 2017). Arguably the most reliable evidence suggests that warming up both on and away from the instrument is associated with reduced perceived exertion (McCrary et al., 2016). Other evidence to support popular recommendations is anecdotal and/or inconclusive (e.g. Davies & Mangion, 2002; Yeung et al., 1999). Although an association between engagement in physical activity and PRMDs has been both supported and disconfirmed (Ling et al., 2018; Yeung et al., 1999) no significant associations were found between PA and muscle strengthening and PRMDs, pain, perceived exertion and/or anxiety. It may be that general physical activity is not enough to support musical activities and/or target imbalanced muscles (Kenny & Ackermann, 2015). No optimal dose of physical activity has yet been agreed.

Generally, non-significant results can be attributed to small sample sizes for certain variables, floor effects such as low scores for PRMDs, and ceiling

effects such as high scores for PA; over-estimation was due, perhaps, to the recall effect and/or social desirability bias. Other limitations of this study include the lack of comparison data from objective measurements of PA (Adams et al., 2005; Chastin, Culhane, & Dall, 2014); use of non standardized measures of PRMDs; and the length of the questionnaire, which could have led to response fatigue and, thus, lower reliability of respondents' answers towards the end. The order of items was the same for all respondents so there could have been confounding effects of item order.

Studies using longitudinal designs are needed to establish causal relationships and disentangle temporal interactions between predictors and outcomes. This would enable undoubtedly complex interactions to be understood better and interventions to be designed that are more likely to be effective. The barriers to and determinants of physical activity most often identified in the present study could be investigated further via tailored questionnaires or explored qualitatively via interviews. Specific exercises rather than general levels of PA could be aimed at preventing PRMDs. It could also be useful to find out what motivates music students to engage in such activities (Taylor et al., 2013). Targeted interventions could be undertaken to improve health-related knowledge, particularly in relation to PA, as well as promoting evidence-based strategies for preventing and managing of PRMDs. Even though respondents in the present study reported exceeding national recommendations for PA, this could have been the result of over-estimation. Furthermore, given the high levels of borderline abnormal and abormal anxiety in the present sample, strategies need to be put in place for preventing and managing anxiety.

To conclude: this was the first study to investigate sedentary behaviour in music students, and engagement in muscle strengthening separately from general levels of PA. In addition, it investigated potential determinants of, and barriers to, engagement in PA, actual knowledge of PA guidelines among music students, and the extent to which respondents received information about the importance of PA as part of their professional training. Relationships between variables have been explored and potential directions for future research identified.

Chapter 8

General Discussion

This thesis reports research that was embedded into a larger, longitudinal project, Musical Impact, which aimed to investigate and improve the health and wellbeing of musicians in the UK. The studies reported were designed and undertaken to fulfil the aims of Better Practice, one of Musical Impact's three research strands focusing on health promotion and health education. Two main questions guided the research:

1) What can be learned from existing approaches to promoting musicians' health?, and 2) How can such approaches be adapted, applied and evaluated across educational and professional contexts in the UK and internationally?

The first question was addressed in Chapters 1-3, and the second question in Chapters 4-6. Further questions arising from the findings of the reviews and studies already carried out were addressed in Chapter 7. This chapter provides a summary of key findings of the research undertaken to answer the two questions, and discusses them. Next, it highlights the strengths and limitations of the research and discusses its implications. Finally, it offers a brief overview of ongoing research and suggestions for future work.

1 Research Question 1:

What can be learned from existing approaches to promoting musicians' health?

1.1 Key findings

In order to answer the first research question I conducted a systematic review of literature reporting evaluations of health education courses and a survey of health education courses implemented and/or planned in European conservatoires during the 2016-2017 academic year. These are both described in Chapter 2. Next, I reviewed the literature on interventions to prevent or mitigate MPA and interventions to conserve musicians'

hearing, and conducted a systematic review of the literature on interventions to prevent or mitigate PRMDs. These reviews are to be found in Chapter 3. Finally, I conducted a secondary analysis of data on RNCM students' self-referrals for counselling between 2000 and 2016, in order to look at trends over time in relation to the numbers of students registered each year; to identify the reasons why and the issues for which they sought counselling and to investigate differences by sex, programme, nationality and instrument. These are reported in Chapter 4. The key findings of the four reviews, the survey and the analysis of data are as follows:

1.1.1 Systematic review of literature reporting evaluations of health education courses for music students

Seven articles were reviewed. Interventions were eclectic and diverse, involving injury prevention, the management of stress and anxiety, hearing loss, lifestyle and ergonomics. The outcomes that were measured included music students' awareness and knowledge; perceived competency, responsibility and importance; and health- and practice-related behavioural changes. Due to methodological limitations such as failure to assign participants randomly to intervention and control groups, or using insufficiently matched groups or not using a control group at all; high attrition rates; unvalidated tools; and results influenced by ceiling effects, findings were far from robust. Significant pre-post changes in warming up before playing were found, however, in one study (Lopez & Martinez, 2013); improvements in preventative behaviour in only one of the intervention sub-groups in another study (Zander et al., 2010); and pre-post changes in behaviours related to practice and performance, but not lifestyle, in two other studies (Barton & Feinberg 2008; Su et al., 2012). Two studies reported improvements in perceived (Laursen & Chesky, 2014) and actual knowledge respectively (Barton & Feinberg, 2008). Finally, only one study reported in the seven articles was aimed specifically at health education (Laursen & Chesky, 2014). In this case participation in the intervention was associated with pre-post changes in awareness, perceived knowledge, competency and responsibility. Because so few articles reporting evaluations of health education courses framed as interventions were found, thus limiting the conclusions that could be drawn, it was decided to carry out a survey of European conservatoires and equivalent

institutions, even though data were gathered too late for them to inform the development of the RNCM Health and Wellbeing for Musicians course.

1.1.2 A survey of health education courses implemented and/or planned in European institutions of higher music education during the 2016-2017 academic year

A questionnaire was sent to 300 institutions via the European Association of Conservatoires (AEC) but, like the systematic review reported above, also produced data from only a very small proportion of those surveyed. Nevertheless, the data gathered reflected a wide variety of health education and health promotion courses aiming to provide students with the training they need to improve their awareness, knowledge, resilience and capacity for protecting themselves against injury and other disorders. Most of the courses were embedded into the curriculum; aimed at undergraduate students; engaged a variety of stakeholders in course design; and addressed a broad variety of topics. Again, firm conclusions could not be drawn from the evidence obtained, since the response rate was so low and provision across institutions was so varied. The low response rate may have been partly to do with the limited time available to respondents (assuming they all have the heavy workloads typical of administrators and managerial staff at my own institution), but may also have been to do with the length of the questionnaire and problems with some of its items, which were my responsibility. Findings, such as they were, indicated that only half of the courses had been designed explicitly on the basis of theoretical assumptions deriving from published research. The content of the majority of courses depended more on the knowledge and expertise of the staff responsible for delivering the course and less on information to be found in textbooks and journal articles. Half of the courses were evaluated in terms of students' awareness, knowledge, perceived competency and responsibility for avoiding performance-related health risks. These findings, particularly if extended by data from a wider survey, could help to inform future curricula for health.

1.1.3 Review of interventions to prevent or mitigate MPA

This review built on the most recent systematic review by Burin and Osorio (2016) by considering publications not included in that review or that have

appeared since 2016. The evidence suggests that effective strategies for MPA include cognitive and behavioural components, psychoeducation, group discussions and mindfulness, and therapeutic approaches based on ACT, cognitive hypnotherapy and EMDR. The lectures and seminars on MPA included in the Health and Wellbeing for Musicians course at RNCM drew on this review, as well as evidence from the articles not included in Burin and Osorio's review.

1.1.4 Systematic review of interventions to prevent or mitigate PRMDs

This summarised the findings of 17 studies conducted with the participation of music students and professional orchestral players involving complex and specific interventions designed to test the effects of yoga and meditation, Tuina and exercise on the prevention and mitigation of PRMDs. It is hard to compare RCTs with pre-post designs. Methodological weaknesses in the studies themselves included small sample sizes and high attrition rates. Results in many cases were unconvincing, partly because the possibility that they derived from placebo effects. It can, however, be concluded, however tentatively, that interventions based on endurance and/or muscle strengthening may help to decrease the intensity of pain and the extent to which it interferes with playing, reduce the prevalence of PRMDs, and lessen perceived exertion and muscle fatigue. Unsurprisingly, they are also likely to improve strength and endurance. The findings of this review informed the survey and analysis of data relating to students' use of PA reported in Chapter 7.

1.1.5 Review of interventions to conserve musicians' hearing

Only four papers were identified. Despite their varied focus and target populations, the findings suggest that even minimal education on hearing conservation can improve awareness and perceived knowledge of risks to hearing and promote the use of hearing protection. This finding informed the inclusion of hearing and hearing protection in the pre-post questionnaire used to evaluate the Health and Wellbeing for Musicians course reported in Chapter 5.

1.1.6 Students' self-referrals for counselling

A total of 645 RNCM students attended a mean of eight and a median of four counselling sessions between 2000 and 2016. Most of them were female, from the UK and registered on the undergraduate programme. Percentages of students attending counselling sessions, out of students registered each year, fluctuated but increased across time from 1% in 2000-2001 to 17% in 2013-2014. Presenting concerns were mainly related to self-esteem, self-confidence, ego strength and coping ability, while main reasons for continuing counselling were related to self and identity, relationships, academic concerns, loss, abuse and anxiety. Presenting concerns, as rated by the two counsellors, caused considerable or severe anxiety and distress affecting several or all areas of functioning, including students' coping ability. Females, postgraduate students and singers were most likely to attend counselling. Undergraduate students were more likely than postgraduates to mention bereavement as a presenting concern, and postgraduates were more likely to report performance anxiety as a main reason for continuing counselling. Some of the students' presenting concerns and main reasons for attending counselling have been incorporated as part of the Health and Wellbeing for Musicians course, within the limits imposed by the course format. These concerns and reasons were incorporated into topics covered in lectures and seminars such as coping skills, anxiety, stress and academic concerns such as procrastination and time management.

2 Research question 2:

How can such approaches be adapted, applied and evaluated across educational and professional contexts in the UK and internationally?

2.1 Key findings

In order to answer the second research question, my supervisory team and I, in conjunction with other members of the *Musical Impact* research team, Healthy Conservatoires and members of staff at RNCM, designed a course entitled Health and Wellbeing for Musicians. The course is described, the methods whereby it was evaluated and part of the results of the evaluation are reported in Chapter 5. The course was embedded in a module entitled

Artist Development 1, compulsory for all first-year undergraduate students. So far as possible, within the constraints of real-world research, it was based on the findings of the reviews outlined in Section 1. I gave two of the seven whole-cohort lectures and facilitated ten seminars for groups of 10-15 students on one of the topics addressed by the five seminars. I also designed the questionnaire that was used for a pre-post within-group evaluation of the effects of the course on primary and secondary outcomes.

Primary outcomes consisted of perceived knowledge of course content and knowledge and awareness of potential risks to health, while secondary outcomes included general health; health-related quality of life; health-promoting behaviours; self-efficacy; emotional state; perceived stress; frequency and severity of PRMDs; and perceived exertion.

The key findings, in terms of primary outcomes, were as follows: students reported increased perceived knowledge, from pre- to post-intervention, of all the topics covered in the course. The students' awareness of risk factors for musculoskeletal injuries associated with learning and playing an instrument or singing increased, as did their knowledge of potential risks in relation to the sound levels associated with hearing loss and the health and safety issues arising from learning and playing a musical instrument.

Given that the course was designed to teach these topics it would have been disappointing if there had not been increases in students' awareness and knowledge of them, but further research would need to be undertaken to find out how long they retained the information and how well they made use of it throughout the remainder of their studies, into the musical profession where appropriate and in their teaching of the next generation of students, since this is particularly important in the light of Norton's (2016) finding that instrumental and vocal teachers do not feel equipped to advise their students on issues related to health and wellbeing.

In terms of secondary outcomes, students' self-efficacy increased from pre- to post-intervention, while their reported perceived exertion decreased. By contrast, their health-related quality of life and positive affect decreased, and they reported increased sleep problems, distress and lack of vitality.

There were no changes to their self-reported health-promoting behaviours or the frequency and/or severity of the PRMDs they experienced.

In addition, the questionnaire explored students' self-reported hearing and use of hearing protection. Tinnitus and hyperacusis were reported by both first year and third year students, although by larger proportions of the latter. Respondents made more use of hearing protection when rehearsing with others but less when practising alone. These findings reflect the general trends reported in the literature reviewed in Chapter 2: education on hearing loss is scarce and, on its own, without other ingredients, does not necessarily lead to the routine use of hearing protection.

Students' performance on the course was assessed by essays on one or more topics covered on the course. Their choices of topic provided an indication of those topics that were most of interest and/or concern to them. A total of 103 essays were submitted. Just over half were about managing MPA, on the one hand, and life skills and behaviour change techniques, on the other. The reasons for the popularity of these two topics remain unclear. However, MPA as a topic is both popular and relevant to musicians. It might also constitute one of their main concerns. The lecture on life skills and behaviour change was broad, which made it applicable to a range of situations and contexts, and the seminars were flexible so I could be responsive to students' needs in different sessions.

Subsequently, post-intervention, I recruited a control group of students who had been first-year students the year before the course was introduced, administered the same questionnaire that had been used in the pre-post evaluation and conducted between-group comparisons. The key findings of this analysis were that students in the control group reported lower perceived exertion than did students in the intervention group. They experienced more severe depression, distress and lack of vitality; lower positive affect, higher negative affect and more perceived stress. No other differences between the two groups were observed. This finding supports evidence that university students experience more, and more severe health issues over the years, and is in turn supported by the findings from the analysis I made of counselling self-referrals showing that postgraduate students attended more counselling sessions than undergraduates.

However, undergraduate and postgraduate students had slightly different reasons for seeking counselling and continuing to attend sessions. Meanwhile, the number of undergraduate students attending counselling sessions decreased from the first to the fourth year of study. This might be explained by their becoming gradually accustomed to college life.

Finally, I carried out a qualitative evaluation of the students' perceptions of the course by conducting 20 interviews, transcribing and thematically analysing the data. The methodology and findings are reported and discussed in Chapter 6. Five themes were identified: 1) the course as a catalyst for engagement with health; 2) behavioural changes and other gains; 3) barriers to engaging with the material and to initiating changes; 4) suggestions for improvement; and 5) miscellaneous.

Under the broad heading of Theme 1), all participants agreed that the conservatoire is an appropriate environment for a health education programme. Students particularly enjoyed and felt stimulated by seminars, to a greater extent than the lectures, as they were more intimate. The content of the course was perceived by students as relevant to them; it raised their awareness of topics previously unknown to them. They reported feeling empowered to integrate the knowledge they had gained into their learning more widely, particularly by relating it to the advice they receive from their instrumental or vocal teachers.

Under the heading of Theme 2), students reported initiating behavioural changes related both to their health and their daily instrumental or vocal practice. Examples included increasing the amount of PA in which they engaged, establishing warm-up routines and planning how to use their practice sessions most effectively.

Under the heading of Theme 3), perceived barriers included lack of specificity in whole-cohort lectures; this was perhaps inevitable given, for example, that topics relevant to instrumental players, or players of particular instrument families may not seem relevant to singers and *vice versa.* Students would have preferred more focus on solutions than problems, despite the lecturers' reluctance to offer 'quick fixes'. They objected to the repetition of the same content from one lecture to the next

or from lecture to seminar; again, perhaps inevitable given that different lecturers delivered or facilitated different sessions. Some felt uncomfortable discussing their and others' mental health in groups. The perceived attitudes of certain lecturers were seen as off-putting. Other perceived barriers included lack of access to in-house health services, restrictions on finances and time, and the fear of 'sensitisation', that is, that the mere mention of a potential problem might cause them to experience it.

Under the heading of Theme 4), students requested more information on most of the topics covered in the course, more small-group seminars, more practical sessions, more input from role models, more access to sources of information. Instances of misinformation were included under the heading of Theme 5). These findings might broadly reflect the music students' potentially unaddressed needs, and/or the specific needs of first-year students attempting to get used to their own transition into adulthood, the stress of the academic environment, and the pressure of the professional musical world. Suggestions for practice and future research are made in Section 5 of this chapter.

2.2 Study of physical activity, sedentary behaviour, anxiety and PRMDs

The results of the literature reviews and evaluation of the Health and Wellbeing for Musicians course raised the questions that were addressed in Chapter 7: Given the importance of PA for musicians, what is the music students' perceived and actual knowledge of official guidelines, in terms of both aerobic activity and muscle strengthening? What are music students' levels of sedentary behaviour? What are the relationships between sedentary behaviour, PA, anxiety, PRMDs, pain and perceived exertion? What are the relationships between PRMDs and practice-related habits (such as warming up and taking breaks from practice)? What are the sources of health-related information used by music students? To what extent do music students receive the health-related training they need?

To answer these questions, I designed a cross-sectional questionnaire study that I undertook with 111 students at RNCM and other UK music

conservatoires. Its aims were to investigate respondents' experience of variables that have been or may be associated with risk factors for PRMDs, including PA, anxiety, sedentary behaviour, and practice-related such as taking breaks, and warming up. These variables were investigated both independently and in relation to each other. The questionnaire also explored respondents' perceived and actual knowledge of PA guidelines, barriers to and determinants of PA engagement, attitudes towards the prevention and treatment of PRMDs, and the extent to which they received health-related training and from what sources.

The key findings are as follows: respondents showed poor knowledge of PA guidelines, despite reporting relatively high levels of PA and levels of sedentary behaviour which tended to be lower than those among UK students in general. Respondents still rely on their teachers, as reflected by previous research, but also on college lectures for health-related information. It is therefore incumbent on conservatoires to provide high-quality health education. Respondents also reported high levels of anxiety. The implications of these findings are presented in Section 5 of this chapter.

3 Main strengths of the research

The research reported in this thesis was part of a funded project involving not just myself working under the supervision of a team of three but also the rest of the *Musical Impact* team and Healthy Conservatoires. This enabled the work to be constantly discussed with and informally assessed critically by a network of experienced researchers in related fields. The larger project in which this thesis is embedded allowed for a lot of freedom to explore further the results of the studies proposed in the original grant application (RQ1 and RQ2) by raising new questions and addressing them via the cross-sectional questionnaire study. Decisions relating to the design of the main intervention study (Chapters 5 and 6) and follow-up survey of PA were rooted in a comprehensive and thorough investigation of the relevant literature, both published and unpublished. This thesis describes findings from the first evidence-based course to be designed and delivered in a UK conservatoire. Models exist elsewhere, as reported in Chapter 2, but a real effort was made to learn from them and design both a course and

a way of evaluating it that would represent improvements on what had gone before, so that others can design even better courses and evaluate them more effectively. The study capturing data from RNCM students attending counselling between 2000 and 2016 by means of secondary analysis is unique in that it represents the first instance of research on music students' use of counselling services, revealing the proportions of students seeking counselling as percentages of those enrolled each year at the same institution. Lastly, the findings of the research inform the development of the current and future studies that are outlined in Section 6 of this chapter.

4 Main limitations of the research

The methodological limitations of each review and study have been acknowledged throughout the thesis. The most ambitious study, at the heart of the Better Practice project and therefore the main study reported in the thesis, involved the design, implementation and evaluation of the RNCM Health and Wellbeing for Musicians course (Chapters 5 and 6). This had originally been intended as a pilot for the development and evaluation of courses at the other UK conservatoires, but lack of time and resources made this unfeasible. It would also have been impossible to exert control over course content and delivery, something addressed in Ackermann and Wijsman's online *SoundPerformers* course developed in Australia (https://soundperformers.com).

The criticisms outlined in Chapter 2 of how other courses were evaluated include small sample sizes and lack of control groups. Sample size in the RNCM study was not an issue, since the course was compulsory for all first-year undergraduates, more than 100 in total. Because the course was compulsory, however, it was not possible to recruit an active control group. Our solution, although better than not having a control group at all, was less than satisfactory. The course itself, although every effort was made to ensure that it was evidence-based, was nevertheless eclectic. Like many other courses it was complex in that it included many potentially active ingredients that cannot be teased apart. Some of the tools that were used for data collection, such as those measuring perceived knowledge, awareness, competency and responsibility, were the best available at the time they were chosen, but they were neither valid nor reliable, so the

results must be treated with caution. Ceiling effects resulting from high scores at baseline suggest that some items were not capable of demonstrating subtle changes over time or between groups. The questionnaire itself was too long. Although RNCM offered a great deal of support in that invitations to complete the questionnaire were endorsed by senior members of staff and the questionnaires themselves were sent out by course administrators, many students failed to complete them.

It was important to collect interview data to evaluate qualitative aspects of the Health and Wellbeing course, as these provide the first, first-hand accounts of students' experiences on such courses, so far as I know. Further investigations of students' experiences are needed, however. It may be that the best recommendation for the course – other than the fulfilment of its aim to incorporate up-to-date evidence in digestible teaching materials and practical tools – is that it remains part of the undergraduate curriculum, accepted by students and staff alike as an integral component of teaching and learning in the conservatoire.

A limitation of the final, follow-up study investigating risk factors for PRMDs (Chapter 7) was the perhaps overly ambitious nature of its aims. Although I had begun to collect information on the basis of which I planned to design and carry out a second intervention study, I soon realised that it would take too long to collect as much information as I would need *and* design, implement and evaluate the effects of the intervention. I therefore decided to focus on increasing the sample size for the survey. The tools I used to determine potential barriers to engaging in PA may not, however, have been appropriate for musicians. In future research, barriers to and enablers of engagement with PA should be investigated via one-to-one and focus group interviews.

A limitation of the survey of European higher music institutions (Chapter 2) designed to complement the review of published literature on health education courses was that it was too time-consuming for respondents to complete. Furthermore, it may neither have captured the richness of health education provision in those institutions, nor the potentially intricate manner in which health education is embedded in the broader institutional provision, including one-to-one teaching, in-house services and initiatives

by students' unions. A briefer and more specific measurement tool could be used in future, aiming to collect less detailed information from a large number of respondents, but complemented by qualitative approaches to gather rich data too.

5 Implications of the findings of the research

A number of implications can be made on the basis of the findings of the the reviews and studies presented in this thesis.

First, issues raised by participants in the course of the interviews reported in Chapter 6 include low awareness of where students can seek help for health-related problems. To address this, *counsellors* could engage more with the students outside counselling sessions.

Second, the interview data also suggest that the main findings of the evaluation of the Health and Wellbeing for Musicians course should be explored further by *researchers and those responsible for the curriculum* to inform improvements to the course, ensuring that it is as closely aligned as possible to students' needs, while simultaneously preparing them to become better thinkers. Improvements may involve experimentation with teaching methods and formats so as to engage students as much as possible and provide them with relevant, stimulating content. Intimate sessions conducted in small groups were particularly successful in the Health and Wellbeing for Musicians course and could be extended to other courses. The introduction of ‚safe spaces' is recommended, where students can be encouraged to think for themselves while discussing sensitive topics and thus find their own ways into adulthood. In other teaching and learning contexts pain and anxiety should, at least to some extent, be normalised proactively, and the simplistic dichotomy of positive and negative should be promoted to a lesser extent. Relationships in particular should be included as a topic for teaching, again in a variety of teaching and learning contexts, given its ubiquitous presence in our lives and its ranking among students' top reasons for attending. Ultimately, the evidence from the reviews and studies presented in this thesis suggests that, above all, students need to be helped to recognise their own complexity and gain an understanding of how they function as human beings, as well as musicians, and in their other

roles. In the conservatoire context the temptation, deriving from the ‚practice makes perfect' approach, to make more time available for practice by removing potentially useful courses should be resisted (Parncutt & Williamon 2005).

Third, *instrumental and vocal teachers*, given their vital role as first and often most important points of contact between the student and the institution, will need (if they do not do so already) to take these issues on board. Both top-down and bottom-up approaches are needed for this to be effective. In other words, tutors need to be asked about their own needs; suggestions for future steps; perceived barriers to and facilitators of teaching and learning; and be rewarded and validated for their work. However, at the same time, *policy-makers and managers* need to ensure that instrumental and vocal teachers receive the training they need in issues related to health, wellbeing, critical thinking etc., and that they are held responsible if and when they choose to rely solely on intuition and prior experience.

Fourth, *researchers* should investigate music students' belief systems further, since they hold the key to understanding contemporary musical culture. The common belief that musicians need to ‚suffer for one's art' and the perception that science and artistry are incompatible should be challenged. After all, dysfunctionality is not necessarily desirable, and it is not necessarily helpful for young musicians of the present day to have as their role models musicians from the past who had no opportunity to acquire other kinds of knowledge (Collins, 2014; Hays, 2002).

Fifth, in relation to MPA, *instrumental and vocal tutors, teachers and lecturers* should be careful to base their teaching on evidence while being sensitive to individual students' needs. For example, telling students they should reframe the symptoms they know as MPA as excitement rather than anxiety because research shows that this will improve their performance quality is over-simplistic and is likely to be met with resistance, especially when students have first-hand experience of the complexity of MPA or are struggling with it. Practices and/or solutions from fields related to music pedagogy do not necessarily need to be copied or followed just because they are perceived to be more advanced in their research and practice.

Therefore, more experimentation should be encouraged in conservatoires, although changing mindsets and professional cultures will inevitably take time (Pecen, Collins, & MacNamara, 2016).

Sixth, in order to bridge the gap between research and practice, the successful translation of findings from studies aiming to prevent injuries into one-to-one and group teaching methods and content needs to be relevant, accessible and legitimate (i.e. credible: Bekker, Paliadelis, & Finch, 2017). Different strategies may be needed for framing and disseminating information to aid preventative health and/or performance enhancement respectively. However, although findings from a systematic review (Drew, Raysmith, & Charlton, 2017) found strong evidence that injuries had a negative impact on athletic success and that injury prevention should be key in enhancing performance, the relationship between injury prevention and musical performance quality is less clear.

Nevertheless, several proposals have been made by Pecen and colleagues. These include encouraging members of interdisciplinary teams to work together both in terms of research and practice (i.e. teaching and learning contexts), as the communication and implementation of evidence-based strategies to and with musicians requires practitioners who are knowledgeable about their specific fields and are also capable of applying robust principles in a culturally sensitive manner, prioritising pragmatism (Pecen et al., 2016). Although music is arguably less developed in terms of research and practice than other performance-related fields such as sport, knowledge about how research can best be implemented in practice and/or performance psychology coaching applied to musicians is even scarcer. (At least one participant in the interview study reported in Chapter 6 suggested that musicians could benefit from performance psychology coaching.) Pecen et al. (2016) further argue that the language of performance coaching may need to be adapted so that it uses terminology both culturally sensitive and appropriate for musicians. For example, musicians might respond better to ‚flow' than ‚being in the zone'; and with ‚being strong for your art' rather than ‚toughen up' (Pecen et al., 2016). Although there are similarities between musicians and athletes, musicians focus more on artistic quality than scores (e.g. time taken to run a race, height of hurdle to be jumped, number of goals scored in a game) so may prefer qualitative to

quantifiable approaches. Finally, according to Pecen et al., PA could be portrayed more in connection with the benefits it confers on fitness to perform (e.g. lower levels of injury and increased alertness for practice; a stronger heart for performance). As illustrated in the interview data, participants rarely spoke of health as though it were independent of their art. Rather, they saw health in the context of their broader view of musicianship and the importance of keeping healthy for the sake of quality and excellence in their performance.

6 Ongoing and future directions

The field of health education in conservatoires is poorly regulated with no policies, currently, on the provision of health education in higher music education. No official recommendations or guidelines are in place as to the health-related topics that should be included as part of music students' training, on the basis of the available literature, however scarce or incomplete. Instead, there is a tendency for conservatoires to teach established practices that have the great advantage of having gained popularity among music students but whose mechanisms are in many cases not, or poorly, understood.

However, the field has recently begun to change. A team of researchers based in Australia was successful in raising funding to promote mobility for researchers to work on musicians' health literacy and organised two meetings in the interests of expanding their network to include researchers from Canada, the Netherlands, New Zealand, South Africa, and the UK (Worldwide Universities Network, 2018[4]). The importance of health literacy in musicians' training has now been recognised (Wijsman & Ackermann, 2018). Health literacy is a key determinant of health (WHO, 2013) and represents "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health" (1998). Health literacy incorporates both personal abilities to improve lifestyles and community abilities to improve living conditions, thereby empowering people. Nutbeam

[4] Worldwide Universities Network (WUN) - https://wun.ac.uk/wun/research/view/health-education-literacy-and-mobility-for-musicians-a-global-approach

(2000) distinguishes between different levels of literacy, from basic skills in reading and writing to critically evaluating the information at hand in order to improve one's control over one's life, and calls the latter 'critical literacy'.

Furthermore regarding the latest changes in health education, in the UK, a new academic post has been created at RNCM, and in January 2019 a lecturer in musicians' health and wellbeing will become responsible for the health education curriculum and all other health-relevant activities at the conservatoire. Together, BAPAM and Healthy Conservatoires are in the early stages of creating a set of guidelines on the content of health education courses that will be informed, in part, by the findings reported in this thesis.

I too have received funding from a variety of sources including Realab; the Institute of Musical Research; Royal Musical Association; North West Consortium Doctoral Training Partnership; and the Psychology Postgraduate Affairs Group [PsyPAG]) to work with another final-year PhD student at RNCM, Keith Phillips, on a set of guidelines for developing musicians' health literacy, explicitly from the perspective of psychology. One of the best ways in which guidelines can be set is by seeking and eventually achieving some kind of expert consensus. The highly influential recommendations of the HPSM project were developed in this way, as was the MHL-Q20 (see below). The second step in the research for which my colleague and I have received funding is to create guidelines for developing musicians' health literacy by providing music students with evidence-based health education. The guidelines will be designed to encapsulate the complexity of the concept of both physical and mental health and health literacy conceptualised as knowledge and skills for critical thinking that empower the individual. We envisage the guidelines as a document created on the basis not only of expert consensus but also of evidence from the available literature.

The methodology was inspired by a group of researchers who aimed to develop an evidence-based behavioural sciences curriculum, on the basis of expert consensus (Bundy et al., 2009), for undergraduate medical trainees at the University of Manchester. They organised two workshops with a total of 47 self-selected medical professionals, psychologists and medical educationalists whom they divided into smaller mixed-professional

groups. First, they gave a 15-minute presentation about the need for such a curriculum. Second, they asked participants to discuss a comprehensive list of topics in psychology; how well they could be matched to the Good Medical Practice (GMC) guidelines and thus the extent to which they were relevant to medical students' training; their priority, relevance and how they could be contextualised to the medical profession; and gaps in the topic list. Third, the discussions were summarised and the participants' contributions were assembled into the final output: a document containing a set of guidelines for a core curriculum. Finally, a group of critical readers including heads of UK medical schools, professors of medical education and psychology were asked to read the document and comment on the appropriateness, relevance and structure of the guidelines. The curriculum has now been endorsed by experts and organisations such as the BPS and is cited in GMC recommendations for medical schools.

Accordingly, my colleage and I planned and undertook four workshops with experts in relevant fields (psychologists in various specialisms, health professionals, sports, dance and music researchers with an interest in health, health librarians, musicians and music students) in London and Manchester, each with approximately 20 attendees. Prior to the first workshop, I created a list of psychology topics taken from the BPS core curriculum for Graduate Basis for Registration with the BPS; the 2016 subject benchmark statement on psychology by the Quality Assurance Agency for Higher Education (QAA, 2016); and the BPS syllabi for postgraduate qualifications in health, clinical and occupational psychology (BPS, 2017b, c, d, e). I also created three lists of cognitive biases on the basis of the available Cognitive Bias Codex (Benson, 2016); logical fallacies on the basis of a comprehensive Wikipedia page; and critical health appraisal tools recommended for journalists and/or the general public (Austvoll-Dahlgren et al., 2015; Evans, Thornton, Chalmers, & Glasziou, 2011; Irwig, Irwig, Trevena, & Sweet, 2008). Topics on the lists were accompanied by brief definitions and were illustrated with examples to make it easier to assess their applicability to musicians' health.

At each workshop participants were asked to read the documents independently and then discuss them in small, interdisciplinary groups. They were asked to consider the extent to which each topic presented was relevant to a curriculum for evidence-based health education for musicians,

and if there were any topics they thought were missing from the lists. All attendees were encouraged to take notes and return them to me at the end. One person in each group gave feedback to the other attendees as to the main points discussed. Their comments were noted in writing by my colleague.

In future, a panel of appropriately-qualified experts will be assembled and asked to rate the relevance and priority of each topic and give their views on the content and delivery of an ideal health education course for music students. A clearly defined consensus will be sought using the Delphi method. The guidelines will be drafted and sent to other experts and representatives of relevant organisations for consideration and further feedback.

The next step is to investigate musicians' levels of health literacy, and I have applied for funding to do so. Originally I planned to use the Health Literacy Questionnaire (HLQ: Osborne, Batterham, Elsworth, Hawkins, & Buchbinder, 2013), but I am now considering using another instrument that was developed subsequently. The HLQ is a tool with strong psychometric properties. This questionnaire uses the WHO definition of health literacy, and consists of 44 items that measure a total of nine dimensions which include: 1) Feel understood and supported by healthcare providers; 2) Have sufficient information to manage my health; 3) Actively managing health; 4) Have social support for health; 5) Appraise health information; 6) Ability to actively engage with healthcare providers; 7) Ability to navigate the healthcare system; 8) Ability to find good health information; 9) Ability to understand health information well enough to know what to do.

While the HLQ addresses health literacy in terms of *general* health, the Worldwide Universities Network-funded team led by Suzanne Wijsman (see above) aimed to develop a health literacy tool specifically for health literacy in relation to playing, singing, practising and performing music. Having carried out an exhaustive review of all available health literacy tools, the team decided to adapt the HLS-EU-Q47 (Sørensen et al., 2015), which derives from the following 12-factor matrix: access/obtain, understand, process/appraise, and apply/use information relevant to health, medical and clinical issues (health care), risk factors for health (disease prevention), health in the social and physical environment (health promotion). The

resulting instrument, created using the Delphi method, consists of 20 items asking respondents to find, understand, judge and apply information relating to health promotion, healthcare and injury prevention, in relation to music making, and is called the Musicians' Health Literacy tool (MHL-Q20: Baadjou et al., 2018). The tool is currently in the process of being piloted in Australia, Canada and New Zealand, and I believe that it will be invaluable in my proposed research.

7 Conclusion

This thesis reports research making an original contribution to the fields of music psychology and performing arts medicine in which I investigated health education and health promotion for music students via several routes. In an attempt to answer the two questions re-stated at the beginning of this chapter, which guided the bulk of the research, I conducted literature and systematic reviews of the relevant literature. Next, I designed and undertook five studies. Based on responses received from 21 institutions of higher music education, the provision of health education is highly variable, largely unregulated and potentially not making use of the best available data. A secondary analysis of data obtained from 645 RNCM students representing their use of counselling between 2000 and 2016 suggests an increasing trend in the number of students attending counselling over time. Main reasons for counselling included issues related to self and identity, relationships, academic concerns, loss, abuse and anxiety. The Health and Wellbeing course was designed and implemented at RNCM on the basis of the best available evidence. According to pre-post quantitative findings, 81 students reported improvements in perceived knowledge of health-related topics, and awareness of relevant risk factors. Data from interviews with 20 students show that they appreciated the course especially for its intimate seminars; in addition they reported a range of changes in their behaviours and attitudes. Finally, a survey of 111 conservatoire students in the UK found poor knowledge of PA guidelines, although they reported acceptable levels of PA and other behaviours. Music students rely overwhelmingly on their teachers, but also on college lectures, for health-related information, and their anxiety levels are high.

Numerous ways have been suggested whereby these findings could be pursued further to improve both the quality and quantity of health education provided in conservatoires, and health promotion more broadly. If these suggestions were adopted, the conservatoire could become a laboratory for experimentation. Ideally, its aims would be to implement innovative pedagogical approaches and to provide services creatively designed not only to address its students' health and wellbeing, but also to prepare them to become exemplary thinkers as well as exceptional performers.

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Appendices

Appendix A. Summary of health education courses

Authors	Country	Participants	Design	Treatment	Control	Outcome measures	Main results
1.Arnason, Briem, & Arnason (2018)	Iceland	*N*=23 undergraduate: Intervention=13 first-year; Control=10 second-year; range of instruments; mean age 23; ratio of males to females (%): 40:60	Pre-post controlled study, 9 months	Education and prevention course 'Musician's Health' – 4 lectures and 16 applied sessions: info about the musculoskeletal system, risk factors for PRMDs, common injuries in musicians; applied sessions on general physical activity and optimal body alignment through physical exercises; muscle strengthening, mobility exercises and warm-up routines; Duration: 9 months	Passive	Questions about body awareness in different playing situations and during daily living activities (ADLs); importance of good health (from 0-'not at all important' to 10-'very important'); PRMDs history, engagement in regular physical activity, warm-up habits before playing and use of PRMDs preventive strategies	Warm-up before playing – score improved in IG at post-test (p=0.036); Body awareness – score improved in IG at post-test for practice (p=0.03, d=1.01) and for ADLs (p=0.05, d=0.83) Importance of good health – undesirable decrease in both groups (p=0.03)

2.Baadjou et al (2018)	The Netherlands	*N*=170 undergraduate: Intervention=84; Control=86; range of instruments; mean age 20; ratio of males to females (%): 43:57	Parallel RCT with intention-to-treat analysis with measurements at T0 (baseline), T1 (10 weeks), T2 (20 weeks), T3 (post-treatment), T4 (16-month follow-up), T5 (24 month follow-up)	PRESTO-Play, a biopsychosocial course – 11 classes during one academic year: body posture while playing, instrument-specific instructions; awareness, motivation and implementation skills to induce health behaviour change; discussion on psychosocial themes; group size: 8. Duration: 18 hours in one year	PRESTO-Fit, a 5 session-course providing education about physical activity recommendations for the general population (use of pedometer, self-monitoring; goal setting, discussion); group size: max.16. Duration: 18 hours in one year	Disability: (DASH with the Performing arts module; Pain disability index; Quality of life (Short Form-37: Physical and mental component scores); PRMD (yes/no single item); Health behaviour (self-developed questionnaire)	NS

3.Barton & Feinberg (2008)	Canada	*N*=23 under-graduates; range of instruments; age range: 18-22 years (*M*=18.5); ratio of males to females (%): 30.8:69.2	Repeated measures (pre, post, 6 weeks follow up)	Occupational course 'Health Promotion and Prevention of Injury for Musicians': common topics such as nutrition, physical fitness, sleep, injury prevention (postural awareness and stretching) and emotional wellbeing (dealing with performance anxiety and muscular tension through visualization, breathing and relaxation); Duration: 8 weeks	Intervention group was its own control group	13-question Self-Assessment Questionnaire (SAQ) (Factor 1: practice and performance issues, Factor 2: health and lifestyle problems); 15- question multiple-choice questionnaire (medical problems, risk factors, injury prevention strategies) (Course Content Questionnaire – CCQ)	CCQ – scores improved at both post-tests (p<0.001) SAQ (factor 1) - scores improved between pre-test and post-test 2 (p<0.001)
4.Laursen & Chesky (2014)	USA	*N*=29 undergraduate music education majors; age: 18-25 years; range of instruments and singers; ration of males to females (%): 58:42	Pre-post	Health education embedded into five 50-minute class meetings of a brass methods course over 15 weeks (one term) (topics: national trends in music and medicine, musculoskeletal injuries and risk factors, hearing health	None	Questionnaire asking about 1) awareness; 2) knowledge; 3) perception of competency and 4) perception of responsibility of future music educators regarding health	1)Five items (p<0.01, p<0.01, p=0.14, p=0.13, p<0.01); 2) Three items (p<0.01, p<0.01, p<0.01); 3) Two items (p=0.02, p<0.01); 4) Two items (p=0.05, p=0.20)

5.Lopez & Martinez (2013)	Spain	*N*=149: Intervention = 90; Control = 59, range of instruments; mean age: 23.1 years; ratio of males to females (%): 50.7:49.3	Repeated measures: baseline, 6 months from baseline (half-way through), 12 months from baseline (at the end)	'Ergonomics and the Prevention of Musculoskeletal Injuries' – a programme of warm-up exercises and postural hygiene divided into 3 sections: 1) theoretical section, 2) practical section; 3) private lessons (personalized instruction); Duration: one year	Passive and matched for age, gender and hand dominance	Questionnaire asking about warm-up habits, practice frequency, frequency and duration of rests, descriptions of physical symptoms, treatments used, body areas with experienced discomfort	Warm-up - Baseline: 90% of the intervention group did not warm-up before practicing; Follow-up 2: 90% of the intervention group did a correct warm-up before practicing; Baseline: 62% of the intervention group did not warm up at all; Follow-up 2: 87.6% reported they warmed up between 3 and 7 days/week Physical problems related to playing an instrument – 77.9% decrease in the intervention group All results at $p<0.04$.

6.Su et al. (2012)	Taiwan	*N*=15 postgraduate music students; range of instruments, but also music education; age range: 25 ± 2.9 years; ratio of males to females (%): 7:93	Repeated measures (pre, post, 1 month follow up)	E-learning curriculum, 'Health Promotion for Music Performers' (HPMP) involving 14 online sessions (each involving a 60-minute pre-recorded Microsoft PowerPoint presentation and a 40-minute interactive live online discussion) on: 1) Foundation course - muscular and skeletal structure, psychological health, health-related physical fitness, and preventative care; 2) Advanced core course - performance anxiety, performance-related hearing loss, vocal cord self-care, and performance-related muscular and skeletal injuries; 3) Application course - stress management and Alexander relaxation technique, evidence-based performance medicine, and somatic movement therapy; Duration: 14 weeks	None	Self-Assessment Questionnaire (SAQ) (Factor 1: practice and performance issues; Factor 2: health and lifestyle problems)	Better scores on Factor 1 items (p=0.01, d=0.62) and total score (p=0.02, d=0.69) between follow-up test and pretest

7.Zander, Voltmer & Spahn (2010)	Germany	*N*=247 first & second year music students (Intervention=144, Control=103), variety of instruments; mean age: 20.66 years; ratio of males to females (%): 38.8:61.8	Repeated measures: pre, post (end of 1st year of university), and one year follow-up (end of 2nd year)	'Musician-Specific Health Promotion' – a two-semester health promotion course in the first year of university – theoretical part (6 sessions on functional anatomy and physiology, lectures on Feldenkrais); practical section (health promotion for musicians; performance coping, practicing); concluding section (practical exercises, relaxation training and Feldenkrais, instrument-specific sessions)	Usual classes	Health outcomes and	Psychological health: EPI questionnaire (differentiating between Certified Music Teacher (CMT), Artistic Training (AT) and School Music Division (SM) students: improvement over time (p<0.05);

Appendix B. Quality assessment of health education courses (adapted from the EPHPP quality assessment tool for quantitative studies)

Component	Arnason, Briem, & Arnason (2018)	Baadjou et al (2018)	Barton & Feinberg (2008)	Laursen & Chesky (2014)	Lopez & Martinez (2013)	Su et al. (2012)	Zander, Voltmer & Spahn (2010)
Selection bias	Weak	Strong	Moderate	Strong	Strong	Weak	Strong
Study design	Moderate	Strong	Moderate	Moderate	Moderate	Moderate	Moderate
Confounders	Strong	Strong	Weak	N/A	Moderate	N/A	Moderate
Blinding	N/A	Strong	N/A	N/A	N/A	N/A	Weak
Data Collection Methods	Weak	Weak	Weak	Weak	Weak	Weak	Moderate
Withdrawals and Drop-outs	Weak	Moderate	Strong	Strong	Strong	Strong	Moderate
Overall	Weak	Moderate	Weak	Moderate	Moderate	Weak	Moderate

Appendix C. Survey on health education in Europe

Health education programmes in European higher education music institutions - Survey

According to the World Health Organisation, health education "comprises consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health." (WHO, 1998, pp. 4). Life skills could include decision making and problem solving, creative thinking and critical thinking, self-awareness and empathy, communication skills and interpersonal skills, coping with emotions and managing stress.

By health promotion courses we refer to any programme (such as stand-alone courses, modifications to existing courses, seminars, guest lectures, and other relevant activities) designed for educating student musicians or music teachers as a primary strategy for health promotion. Please refer to the 2016/2017 academic year only and think of the courses that have just been completed or have been planned during this time, then fill out this survey separately for each lecture or stand-alone course you are describing.

1. Name of Conservatoire/Music Academy/Music College/Musikhochschule/……..

2. Country……

3. City……

4. Name of the stand-alone course on musicians' health and/or wellbeing: …….

5. What were/are the main aim(s)/objective(s) of the course?

……
……
……
……

6. When was the course implemented for the first time? (MM-YY)……

7. Is it ongoing? Yes/No

8. Has it been modified since being implemented? Yes/No

9. If yes, based on what?.....

10. Was/Is the course embedded in the school curriculum? Yes/No

11. Was/is the course compulsory or optional?
……

12. What stakeholders were involved in the design of the course (Please circle all applicable):

a) Music teachers b) Music students c) Managerial staff d) Administrative staff e) Health professionals f) Researchers g) Other (please specify)…….

13. Was/Is the course based on any explicit theoretical assumptions and/or model?

Yes/No

14. If yes, what theoretical assumptions was/is the course based upon? (Please circle all applicable):

a) A known psychological model such as the health belief model (or other similar models – please specify) …….

b) Somatic education models such as Alexander technique, the Feldenkrais Method or Body Mapping

c) Recommendations made by the Health Promotion in Music Schools (HPMS) Project

d) Any set of assumptions based on published scientific articles on musicians' health and wellbeing

e) Any set of assumptions based on opinions (of experts or not)

f) Any set of assumptions based on anecdotal evidence (evidence collected in an informal manner, based on personal testimony)

g) Any set of assumptions based on internal institutional data (e.g. surveys)

h) Other (Please specify what)…….

15. To whom was/ is it addressed? (Circle all applicable):

a) Undergraduate b) Postgraduate c) Piano and keyboard students d) String players e) Brass players f) Wind players g) Percussionists h) Singers i) Students in Pop music j) Students in music education k) Joint degree students l) Music teachers (please specify what type of music teachers, if applicable):…….. m) Other (please specify): …….

16. How long was/is the course? (Circle all applicable):

a) Less than one month b) One month c) One term d) One year e) Two years f) More than two years

17. What is the frequency of classes?
…….. ……

18. How are sessions run? (Circle all applicable):

a) In small groups (<15 participants) b) In large groups (>15 participants) c) One-to-one

19. Are sessions:

a) Purely theoretical (e.g. lectures, discussions)

b) More theoretical than practical

c) Purely practical (e.g. performing in front of peers and applying various techniques, warm-up activities, breathing exercises)

d) More practical than theoretical

e) Both theoretical and practical

20. Who runs/teaches the sessions (Please circle all that apply):

a) Musicians b) Music teachers c) Medical doctors d) Physiotherapists e) Nurses f) Psychologists g) Researchers h) Psychiatrists i) Specialists in occupational health j) Specialists in public health k) Other health professionals (please specify)…… j) Other specialists (please specify)……

21. What topics did/does the course cover? (Please circle all that apply)

a) Performance-related musculoskeletal disorders (PRMDs)/Physical injury

b) Prevention/treatment of PRMDs

c) Anatomy and/or physiology

d) Ergonomics

e) Performance anxiety

f) Effective solutions for dealing with performance anxiety

g) Pre-performance routines

h) Mental skills

i) Mental health

j) Stress and stress management

k) Noise-Induced Hearing Loss (NIHL) and hearing protection use

l) Nutrition and eating disorders

m) Substance abuse

n) Alcohol abuse

o) Smoking

p) Physical activity/Exercise

q) Sleep

r) Practice strategies and practice planning

s) Memorisation techniques

t) Time management techniques

u) Information on relevant health services within the institutions, or in the geographical proximity

v) Other (please specify):
……

22. Were/are there any assessments at the end of the course? Yes / No

23. If yes, what? (Please circle all applicable)

a) Oral exam b) Written essay c) Other (please specify what)……

24. Did/does the course incorporate: Lectures / Seminars / Both?

25. Are sessions: Face to face / Online / Both?

26. What information sources have/are you using (Please circle all applicable)?

a) Staff knowledge and expertise

b) Textbooks/Books

c) Journal articles

d) Links to websites

e) Other (please specify what)……..

27. Have you evaluated/Do you intend to evaluate the course's success/effectiveness in any way?

Yes/No

28. If yes, how have you evaluated/intend to evaluate the course's success/effectiveness, if at all (please circle all applicable)?

a) Students' feedback via survey(s)

b) Students' feedback via interviews

c) Standardised questionnaire(s) on health outcomes (e.g. anxiety, physical pain, stress, etc) (Please specify which outcomes)…….

d) Questionnaire(s) on health-related behaviour change (e.g. changes in physical activity, diet, alcohol intake, sleep, etc) (Please specify which changes)……..

29. Have you assessed/do you intend to assess students' awareness? Yes / No

30. If yes, how? .....

31. Have you assessed/do you intend to assess students' knowledge or perceived knowledge? (Please circle which)

32. If yes, how? .....

33. Have you assessed/do you intend to assess students' perceived competency with respect to health risks associated with professional singing/instrument playing? Yes / No

34. If yes, how? .....

35. Have you assessed/do you intend to assess students' perceived responsibility of health risks associated with professional singing/instrument playing? Yes / No

36. If yes, how? …….

37. How did you conduct/do you intend to conduct the course evaluation?

a) Pre-post b) At various time points c) Only at the end d) Other (please specify)…….

38. Who analysed/intends to analyse the quantitative data?

a) A researcher b) A PhD student c) A psychologist d) An administrative staff member e) Other (Please specify)……

39. Who conducted and analysed/intends to conduct and analyse the qualitative data?

a) A researcher b) A PhD student c) A psychologist d) A member of administrative staff e) Other (Please specify)……

40. Have findings been/Will findings be disseminated among stakeholders? Yes/No/I don't know

41. Have findings been/Will findings be used towards the improvement of the course? Yes/No/I don't know

42. Have findings been/Will findings be published in the form of a research paper? Yes/No/I don't know

Appendix D. CUK certificate of ethical approval for health education questionnaire

Conservatoires UK

CERTIFICATE OF ETHICAL APPROVAL

This certificate confirms that the application made by **Raluca Matei** to the CUK Research Ethics Committee was **APPROVED**.

Project title: **Health promotion in European music institutions**

Date approved: **21.07.17**

Signed: Date: 21.07.17

Dr Emma Redding

(*Chair of CUK Research Ethics Committee*)

Appendix E. Summary of PRMDs interventions

Authors	Country	Participants	Design	Treatment	Control	Outcome measures	Main results
1.Ackermann, Adams & Marshall (2002)	Australia	*N*=19 undergraduate music majors; Strength training=10, Endurance training=9; age:18-28 years; female to males (14:5); range of instruments	Repeated measures (pre, midway, post)	Guided endurance (lower weights + higher repetitions) vs. guided strength training for 6 weeks (higher weights + lower repetitions) (11 exercises run twice weekly in a 45-minute class before regular classes)	Randomised	Visual Analog Scale (VAS) (intensity and frequency of PRMDs) Perceived exertion (RPE) Field measurements (isokinetic and isometric measures: recording weights and repetition maximums (RM))	Field measurements: Mid- to posttest: reverse fly (p<.01), bent over row (p=.01), shoulder extension (p<.01), shoulder flexion (p<.01), back extension (p<.01), lateral raise (p<.01), triceps (p=.01), biceps (p=.04); Between group difference in the mid- to posttest: back extension (p=.02), lateral raise (p=.04) RPE: baseline vs posttest in endurance group dropped (p=.03) PRMDs: trend to decrease in both groups
2.Baadjou et al (2018)	The Netherlands	*N*=170 undergraduate students: Intervention=84; Control=86; range of	Parallel RCT with intention-to-treat analysis with measurements at T0	PRESTO-Play, a biopsychosocial course – 11 classes during one academic year: body posture while	PRESTO-Fit, a 5 session-course providing education about physical activity	Disability: (DASH with the Performing arts module; Pain disability index;	NS

		instruments; mean age 20; ratio of males to females (%): 43:57	(baseline), T1 (10 weeks), T2 (20 weeks), T3 (post-treatment), T4 (16-month follow-up), T5 (24 month follow-up)	playing, instrument-specific instructions; awareness, motivation and implementation skills to induce health behaviour change; discussion on psychosocial themes; group size: 8. Duration: 18 hours in one year	recommendations for the general population (use of pedometer, self-monitoring; goal setting, discussion); group size: max.16. Duration: 18 hours in one year	Quality of life (Short Form-37: Physical and mental component scores); PRMD (yes/no single item); Health behaviour (self-developed questionnaire)	
3.Chan, Driscoll & Ackermann (2014a)	Australia	*N*=53 orchestral musicians; Intervention=30, Control=23; Mean age: 44; Range of instruments; Ratio of male to females in intervention group (%): 27:73	Repeated measurements (baseline T0, post-intervention T1 and 6 months follow-up T2)	Tailored exercise programme (for the neck, shoulders, abdomen, spine and hips) (sixteen 35-minute sessions) for 10 weeks led by a physiotherapist + booklet with instructions	Passive	PRMDs (frequency and severity); RPE during different playing conditions; Performance-related factors (posture, ease of movement, stress, concentration, etc.)	Intervention group: lower frequency (p<.05) and severity (p<.05) of PRMDs at T1, but not at T2 compared with control group Intervention group: better RPE scores during private practice at T1 (p<.01) and T2 (p<.01), but not during rehearsal and performance
4.Chan, Driscoll & Ackermann (2014b)	Australia	*N*=50 orchestral musicians; Mean age: 45 years; male to female ratio: 22:28; range of instruments	Pre-post measurements	The same exercise programme as above, but as a DVD for 12 weeks	None	PRMDs (frequency and severity); RPE during different playing conditions; Performance-related factors (posture, ease of movement, stress, concentration, etc.)	PRMDs decreased in frequency and severity post-intervention (p<.01)

5.de Greef et al (2003)	The Netherlands	*N*=45 orchestral musicians; Intervention = 17; Control = 28; range of instruments; male to female ratio in intervention group (%): 50:50; Mean age: 46.5 years	RCT (3 measurement points: 2 weeks before intervention, post-intervention and 3 month follow-up)	Groningen Exercise Therapy for 15 weeks (warming up and cooling down, relaxation, postural exercises, exercises to enhance physical workload) (45-minute sessions) guided by a therapist	Passive, randomised	Physical Competence Scale (PCS) World and Health Questionnaire for Musicians (WHQM)	Group x time interactions for PRMDs (p<.05) and perceived physical competence (p<.04) Effect sizes for intervention group regarding increases in perceived physical competence: d=0.22, for decreases in PRMDs: d=0.21
6.Kava et al (2010)	USA	*N*=14 university music students; male to female ratio: 5:9; Mean age: 20.93 years (range: 18-29 years); range of instruments	Pre-post, interrupted time-series design (baseline, pre-test, post-test)	Pilates vs. conventional trunk endurance exercise programme for 6 weeks (two one-hour sessions/week) guided by a physiotherapist (also trained in Pilates)	None	Objective muscle endurance and lumbopelvic control Presence, frequency and intensity of pain, fatigue, muscular tension, perceived exertion, perceived level of musicality VAS	Trunk muscle endurance: Improvements between pre- and post-testing in both groups for extensors (p=.03), right lateral (p<.01) and left lateral trunk muscles (p<.01); Pre-posttest for muscle fatigue (p<.01); perceived exertion (p=.04); pain (p=.01); pain intensity (p<.01); pain frequency (p=.01)

7.Khalsa & Cope (2006)	USA	*N*=18 musicians; Intervention= 10; Control= 8; Mean age: 25.5 years (range: 21-30 years); male to female ration in intervention group: 5:5; range of instruments and voice	Pre-post measurements	Intensive Kripalu Yoga + meditation programme for 2 months (sessions twice a day, group discussions and interactions, counseling and psychotherapy)	Passive	1)PRMDs Questionnaire (frequency, severity and RPE); 2)Performance Anxiety Questionnaire (PAQ) ; 3)Dispositional Flow Scale (DFS-2) ; 4)The Profile of Mood States (POMS)	1)No changes; 2)Decreases for IG in the solo condition only (p=.05); 3) NS; 4)Greater increases in anger score in CG compared to IG (p=.03)
8. Khalsa et al (2009)	USA	*N*=45 musicians; Yoga lifestyle group = 15; Yoga and meditation = 15; Control = 15; Mean age for intervention groups (24.5/25.4 years); male to female ratio (6:9; 8:7); range of instruments and voice	Repeated measurements (pre-post, 1 year follow-up)	Kripalu Yoga lifestyle vs. yoga + meditation (randomized) for 2 months (each group attended 3 yoga/meditation classes/week)	Passive	1) PRMDs Questionnaire (frequency, severity, RPE); 2) Performance Anxiety Questionnaire (PAQ) ; 3) The Profile of Mood States (POMS); 4) The Perceived Stress Scale (PSS); 5) The Pittsburgh Sleep Quality Index (PSQI)	1) No changes; 2) Decreases in both yoga only and yoga lifestyle groups for group and solo performance and music practice for yoga lifestyle only (p<.05). Improvements maintained at follow-up only in yoga only group for group and solo performance (p<.05); 3) Both yoga groups combined scored lower than CG on tension/anxiety (p=.02), and anger/hostility (p=.008); 4) NS; 5) NS

9.Khalsa et al (2013)	USA	*N*=135 adolescent music students; Intervention=84; Control=51; Mean age: 16 years; male to female ratio: 30:54; range of instruments and voice	Pre-post measurements	Kripalu Yoga programme (three one-hour sessions/week) for 6 weeks	Passive	1)PRMDs Questionnaire (frequency, severity, RPE); 2) The Performance Anxiety Questionnaire (PAQ); 3) The Music Performance Anxiety Inventory for Adolescents (MPAI-A); 4) The State-Trait Anxiety Inventory (STAI).	1)No changes; 2) Lower performance anxiety in IG compare to CG for group performance contexts (p<05); 3)Lower somatic/cognitive MPA than CG (p<.001) and evaluation anxiety (p<.001); 4) NS.
10.Lopez & Martinez (2013)	Spain	*N*=149 conservatoire students: Intervention = 90; Control = 59, range of instruments; mean age: 23.1 years; ratio of males to females (%): 50.7:49.3	Repeated measures: baseline, 6 months from baseline (half-way through), 12 months from baseline (at the end)	'Ergonomics and the Prevention of Musculoskeletal Injuries' – a programme of warm-up exercises and postural hygiene divided into 3 sections: 1) theoretical section, 2) practical section; 3) private lessons (personalized instruction); Duration: one year	Passive and randomized matched for age, gender and hand dominance	Questionnaire asking about warm-up habits, practice frequency, frequency and duration of rests, descriptions of physical symptoms, treatments used, body areas with experienced discomfort	Warm-up - Baseline: 90% of the intervention group did not warm-up before practicing; Follow-up 2: 90% of the intervention group did a correct warm-up before practicing; Baseline: 62% of the intervention group did not warm up at all; Follow-up 2: 87.6% reported they warmed up between 3 and 7 days/week Physical problems related to playing an instrument – 77.9% decrease in the intervention group All results at p<.04.

11. Lundborg & Grooten (2018)	Sweden	*N*=24 professional string players; Median age: 51, age range: 36-63; ratio of males to females (%): 29:71	Pre-post	11 weeks of twice a week isometric strength and isometric back endurance (each session: 5-10 warm-up, 30-40 resistance training for upper extremity, lower extremity and whole body)	None	1)Isometric pain-free strength of wrist and shoulder Lateral neck flexion and neck extension (dynamometer) Ismoetric back endurance (Biering-Sorensen test); 2) Occurrence of PRMDs (2 items: PRMDs in the last week and right now – yes/no); 3)Intensity of PRMDs (0-10); 4)Changes in perceived PRMDs	1)Improvements in: Wrist dorsal extension, right: *p*=.02 Wrist dorsal extension, left: *p*=.04 Shoulder abduction right: *p*=.03 Shoulder abduction left: *p*=.02 Neck lateral flexion right: *p*=.03 Neck lateral flexion left: *p*=.03 Back extensors: *p*<.001 2) NS; 3) NS; 4) NS
12. Nygaard Andersen et al (2017)	Denmark	*N*=23 orchestral musicians (SST=12; GFT=11)	Feasibility study, randomized	9 weeks of Specific Strength Training (SST) vs. 'General Fitness Training' (GFT) – three times per week for 20 minutes	SST vs GFT; no control	Self-reported pain intensity during the last 7 days (visual analogue scale)	Significant pre-post reduction in pain intensity for SST (*p*=.05), but not for GFT (*p*=.09)

13.Rardin (2007)	USA	*N*=130 adolescent string players; Intervention=65; Control=65; Age:14-15 years	Quasi-experimental, pre-post design	10-week multiple-modality intervention based on warm-ups, postural and bodily awareness (based on Alexander Technique and the Feldenkrais Method) and educational components (weekly sessions)	Normal routine	1) Pain frequency during the past week (7-point numerical scale); 2) Pain severity (7-point numerical scale); 3) Tension/discomfort frequency in the past week (7-point numerical scale); 4) Tension/discomfort severity (7-point numerical scale); 5) 'No pain, no gain' attitude (7-point Likert scale from 'No, never' to 'Yes, always')	1) Group x Time effect (p<.01) (pain frequency increased in the CG, but decreased in the IG); 2) Group x Time effect (p=.04) (pain severity increased in the CG, but decreased in the IG); 3) Time factor (p<.01); Group x Time effect (p=.04) (scores in IG increased more than those in the CG, so undesirable result); 4) NS; 5) Time factor (p<.02); Group x Time effect (p=.01) (decrease in the IG and increase in the CG)
14.Roos & Roy (2018)	Canada	*N*=30 orchestral players; Intervention=15; Control=15; mean age 36.8 [I], 39.3 [I]; range of instruments; ratio of males to females (%): 47:53.	Single-blind RCT	A 11-week rehabilitation program including an educational introduction and home and supervised exercise sessions	Passive	1)MPIIQM pain intensity, pain interference; 2)Nordic Musculoskeletal Questionnaire (NMQ) (symptom prevalence and frequency)	1)Better results in IG pre-post: MPIIQM pain intensity: p=.01, η^2=0.38 MPIIQM pain interference: p=.006, partial η^2=0.43; 2) NS

15.Sousa et al (2015)	Portugal	*N*=69 orchestral players: Intervention=39; Control=30; mean age=38.9 [I], 36 [C]; range of instruments; ration of males to females (%): 64:36	RCT, single-blinded	Tuina self-administered exercises (based on high-frequency pressure and vibration); Duration: 3 weeks (twice daily)	Tuina self-administered exercises away from the commonly used acupuncture points	Numeric Verbal Scale (NVS) for pain intensity	Better score in IG on days 1, 3, 5, 10, 15, 20 (p<.01)
16.Spahn, Hildebrandt, & Seidenglanz (2001)	Switzerland	*N*=44 conservatoire students: Intervention=22; Control=22; age range 19-35 (*M*= 24.57 [I], 23.70 [C]); range of instruments; ratio of males to females (%): 30:70	Pre-post measures	Elective course 'Physiology of Music and Performing Arts Medicine' (weekly two 2-hour face-to-face sessions; mix of physiology, posture and exercises, anatomy, performance anxiety and relaxation exercises = 34 teaching units); Duration: 17 weeks	Passive (matched according to age, sex, course of study, number of semesters spent at conservatory and musical instrument)	Kiel Modification Sensitive Symptom List (KASSL); Frankfurt Body Concept Scale (FKKS); Epidemiological Questionnaire for Musicians; Questionnaire on Coping with Work as a Musician (HIL Scale); Evaluatory Questionnaire	Lower frequency and severity of symptoms (p<.05) and emotional disturbances (p<.01) (KASSL); improvements on the 'Health and Physical Wellbeing' scale of the FKKS (p<.05); lower music-making related symptoms (p<.01) (HIL Scale); better coping with work from t1 to t2 (p<.001); less insecurity in 'confidence in stage situations (HIL Scale) (p<.05)

17.Zander, Voltmer & Spahn (2010)	Germany	*N*=247 first & second year music students (Intervention=144, Control=103), variety of instruments; mean age: 20.66 years; ratio of males to females (%): 38.8:61.8	Repeated measures: pre, post (end of 1st year of university), and one year follow-up (end of 2nd year)	'Musician-Specific Health Promotion' – a two-semester health promotion course in the first year of university – theoretical part (6 sessions on functional anatomy and physiology, lectures on Feldenkrais); practical section (health promotion for musicians; performance coping, practicing); concluding section (practical exercises, relaxation training and Feldenkrais, instrument-specific sessions)	Usual classes	Health outcomes and health behaviours: Giessen Symptom Questionnaire (GBB) – measures physical symptoms experienced by subjects such as fatigue, exhaustion, heavy sweating etc. Epidemiological Questionnaire for Musicians; Kiel Modification Sensitive Symptom List (KASSL)	Psychological health: EPI questionnaire (differentiating between Certified Music Teacher (CMT), Artistic Training (AT) and School Music Division (SM) students: improvement over time (p<.05); KASSL (Psychological problems): increased symptoms over time for Control group AT students (p<.05) and SM students (p<.01), among AT students, mainly in males (p<.05), among SM students, mainly in females (p<.01); at t2, mean value deviation between Intervention and Control groups (p<.05); at t2 and t3, Control group female CMT students had increased symptoms vs. Intervention group (p<.05); Control group female AT students had increased symptoms vs. Intervention group (p<.05). Health behaviour: CMT students in Intervention group increased in preventive behaviour (p<.001).

Appendix F. Quality assessment of PRMDs studies (adapted from the EPHPP quality assessment tool for quantitative studies)

	Selection bias	Study design	Confounders	Blinding	Data collection methods	Withdrawals and drop-outs	Overall
Ackermann et al (2002)	Weak	Strong	Weak	Moderate	Moderate	Strong	Weak
Baadjou et al (2018)	Weak	Strong	Strong	Strong	Moderate	Moderate	Moderate
Chan et al (2014a)	Weak	Strong	Moderate	Weak	Moderate	Strong	Weak
Chan et al (2014b)	Weak	Moderate	N/A	Weak	Moderate	Strong	Weak
De Greef et al (2003)	Weak	Strong	Weak	Weak	Moderate	Moderate	Weak
Kava et al (2010)	Weak	Strong	N/A	Moderate	Moderate	Moderate	Moderate
Khalsa & Cope (2006)	Weak	Strong	Strong	Moderate	Weak	Weak	Weak
Khalsa et al (2009)	Weak	Strong	Strong	Moderate	Weak	Moderate	Weak
Khalsa et al (2013)	Weak	Strong	Strong	Moderate	Weak	Strong	Weak
Lopez & Martinez (2013)	Strong	Moderate	Moderate	N/A	Weak	Moderate	Moderate
Lundborg & Grooten (2018)	Weak	Moderate	N/A	N/A	Moderate	Strong	Moderate
Nygaard Andersen et al (2017)	Weak	Strong	Weak	Moderate	Weak	Weak	Weak
Rardin (2007)	Weak	Strong	Moderate	Weak	Weak	Strong	Weak
Roos & Roy (2018)	Weak	Strong	Moderate	Moderate	Strong	Strong	Moderate
Sousa et al (2015)	Weak	Strong	Strong	Moderate	Weak	Strong	Weak
Spahn et al (2001)	Weak	Moderate	Weak	Weak	Weak	Strong	Weak
Zander et al (2010)	Strong	Moderate	Moderate	Weak	Moderate	Moderate	Moderate

Appendix G. Summary of hearing protection interventions

Authors	Country	Participants	Design	Treatment	Control	Outcome measures	Main results
1.O'Brien, Driscoll & Ackermann (2015)	Australia	Orchestral players and management staff	N/A	Continuous comprehensive hearing conservation program since 2005	N/A	Process evaluation comprising focus groups and historical data	Stage 1 (program description and delivery) – exposure monitoring via dosimeters, awareness of risk via educational sessions, annual audiological screening. Delivery also occurs in terms of engineered controls, administrative controls, personal control (i.e. custom moulded earplugs) Stage 2 (program reception) (via interviews and focus groups): a variety of themes relevant to each group (management committee, musicians and program coordinator).
2.Laursen & Chesky (2014)	USA	*N*=29 undergraduate music education majors; age: 18-25 years; range of instruments and singers; ration of males to females (%): 58:42	Pre-post	Health education embedded into five 50-minute class meetings of a brass methods course over 15 weeks (one term) (topics: national trends in music and medicine, musculoskeletal injuries and risk factors, hearing health	N/A	Questionnaire asking about 1) awareness; 2) knowledge; 3) perception of competency and 4) perception of responsibility of future music educators regarding health	1) Five items (p<0.01, p<0.01, p=0.14, p=0.13, p<0.01); 2) Three items (p<0.01, p<0.01, p<0.01); 3) Two items (p=0.02, p<0.01); 4) Two items (p=0.05, p=0.20)

3.Powell & Chesky (2017)	USA	*N*=6 jazz band instructors (from late 30's to 60 years old)	Counterbalanced within-subjects (no display for 3 weeks, followed by 3 weeks with a display and another 3 weeks with a second display)	Ambient Information System (AIS) which monitors sound pressure levels and translates that data into useful information via ambient displays reflecting the data in an attempt to trigger relevant behavioural changes in ensemble instructors; 2 displays during 9 weeks	N/A	Sound levels for two different series of displays: no display-histogram-bubbles and no display-bubbles-histogram. Sound levels were assessed according to 8 types of behavioural changes in terms of sound level: mean, median, coefficient of variation, skewness (asymmetry of the sound level frequency distribution), kurtosis ('peakedness' of the sound level frequency distribution), dose (noise exposure risk) and percent of time talking (or time <73 dB(A)).	Behavioural changes that significantly altered the pattern in dosimeter data (*p*-values between .002 and .052) occurred across instructors, in various sound level parameters and across the two series of displays, most notably in the bubble display.
4.Zeigler & Talyor (2001)	USA	Freshmen music majors (*N*=248); age not specified; range of instruments	Pre-post measurements	Written questionnaire providing information about tinnitus and simultaneously inquiring about a) exposure to noise; b) hearing conservation histories; c) incidence of tinnitus	N/A	Survey including items on noise exposure and hearing conservation behaviours (i.e. wearing hearing protection devices).	Inconclusive – no pre-post differences were statistically analysed; only between-group differences post-survey

Appendix H: Counselling group headings and categories

AUCC Categorisation of Client Concerns
3rd Edition Summer 2009

The Components

- **Group Headings** A set of fifteen general headings, each of which is partnered to a set of Main Detailed Categories, which help define the scope of the group heading.
- **Main Detailed Categories under the Group Headings**

Group headings

A	Abuse
B	Academic
C	Anxiety
D	Addictive Behaviour
E	Depression, Anger & Mood Change or Disorder
H	Loss
J	Other Mental Health Conditions
K	Physical Health
L	Eating Disorders
M	Relationships
R	Self & Identity
S	Sexual issues
T	Transitions
U	Welfare & Employment
X	Self Harm

The Categories

A ABUSE

100	Abuse – where client is/was abuser
101	Physical abuse – where client is/was being abused
102	Psychological abuse –client is/was being abused
103	Sexual abuse – where client is/was being abused
104	Persecution/bullying/harassment/stalking – client is being or has been persecuted/bullied by other(s) (see also some more specific categories further on in this section)
105	Rape – where client has been raped
106	Attempted rape or sexual indecency – where **client has experienced** sexual assault
107	Client is target of assault or crime
108	Crime **by client** including client has been accused (falsely or otherwise) of committing crime
109	Harassment, Persecution/Discrimination **by** client – where client is harassing/bullying/persecuting other(s)
110	Danger to others - client is concerned about being a **danger to others**
111	Persecution/Discrimination - **Racial/Religious** - client is/has been persecuted/discriminated against racially or on religious grounds
112	Persecution/Discrimination - **Sexual** – client is currently or has been persecuted/discriminated against sexually
113	Domestic violence **towards** client
114	Domestic violence by client **towards another**
115	Trauma experienced recently (note for Historical experience of trauma use code 308)
116	Forced Marriage concerns

117 Drink Spiking – client has experienced having their drink spiked
118 Cult membership/involvement
119 Blank for own categories

B ACADEMIC

120 Dyslexia
121 Learning difficulties/special needs
122 Poor study skills/time management
123 Struggling academically
124 Exam related stress/anxiety
125 Performance anxiety – not exams
126 Appeals/complaints/grievances (academic)
127 Relating to academic procedures
128 Request for written support/reference/report
129 Lack of academic motivation/concentration and procrastination
130 Disappointment with course/course content
131 Suspension/withdrawal/time out from course/Intercalation
132 Placement/work experience
133 Poor command of English
134 Unrealistic academic standards
134a Exam failure
135 Assessment for entry or continuation – client concern about
135a Inadequate conditions/facilities for study
135b Inadequate feedback on academic progress
136 Over-work or under-work
136a Problems participating in academic sessions
136b Loss of academic course/course closure
137 Consultation with academic colleagues
137 a Pre-university/college discussion
138 Disciplinary procedure – eg Plagiarism
139 Fitness to Practice issues/procedures – course related

C ANXIETY

140 Anxiety – mild and/or generalised
141 Severe anxiety state
142 Panic attacks
143 Phobia
144 Stress
145 Shock state
146 Post traumatic stress (inc PTSD)
147 Social Anxiety/Social Phobia
148 - 149 Blank for own categories

D ADDICTIVE BEHAVIOURS

160 Alcohol abuse/dependency
161 Drug abuse/dependency (illegal)
162 Drug abuse/dependency (prescribed medication)
163 Nicotine abuse/dependency
164 Solvent abuse/dependency
165 Gambling
166 Addictive behaviours/thoughts, not specifically listed
167 Addictive behaviour of partner
168 – 179 Blank for own categories

E DEPRESSION, ANGER & MOOD CHANGE OR DISORDER

180 Low mood
181 Depression
182 Mood swings
183 Anger – client has difficulty managing own anger
184 Anger – client experiences anger towards them
185-199 Blank for own categories

H LOSS

200 Abandoned
201 Adoption
202 Bereavement – a loss of a relationship through death
203 Separation/divorce – of a client's parents
204 Separation/divorce of client
205 Loss of family stability
206 Letting go after a relationships ends
207 Loss of hopes/plans/expectations – non-academic/work
208 Relationship loss through illness (client's or other's illness)
209 Theft or loss of property of client
210 Loss of childhood
211 Emotional abandonment by parent
212 Loss of adolescence
213 Bereavement through Suicide of partner/relative/close friend
214 -219 Blank for own categories

J OTHER MENTAL HEALTH CONDITIONS

220 Psychosomatic disorders
221 Thought disorder – eg symptoms of psychosis
222 Bi-polar symptoms or manic episode
223 Personality disorder
224 Obsessive compulsive disorder
225 Concerns over own mental health
226 Impact of mental health problems of others (e.g. in household or family)
227– 229 Blank for own categories

K PHYSICAL HEALTH

240 Illness – general or non-specific
241 Injury
242 Surgery
243 Disability
244 Pre-menstrual tension
245 Post viral fatigue/ME/Chronic Fatigue Syndrome (CFS)
246 Sleep disturbance
247 Menopause/HRT
248 Fear/concern over client's own physical health (e.g. cancer)
249 Concern over illness of significant other (partner, parent etc.)
250 Blank for own categories

L EATING DISORDERS

260 Anorexia
261 Bulimia
262 Compulsive eating
263 Loss of appetite/not eating
264 Other eating disorders or non-specific eating disorder
264-270 Blank for own categories

M RELATIONSHIPS

271 – 279 Blank for own categories
280 Relationship with friend(s) and/or house mates
281 Relationship with partner
282 Relationships in the family or with a family member
283 Relationship with other/s (including staff)
284 Difficulties with authority
285 Difficulty with intimacy
286 Lack of relationships/lonely/isolated
287 Arranged marriage concerns
288 Socially inappropriate behaviour
289 Understanding other and being understood
290 Concern about the safety and welfare of others
291 Difficulties with house/flat mates
292 Difficulties in relationship with the opposite gender
293 Difficulties in relationship with the same gender
294 Difficulty starting a relationship
295 Difficulty ending a relationship
296 Family problems rather than difficulties in the relationships
297 Childcare and parenting difficulties
298 Step-parent difficulties
299 Blank for own categories

R SELF & IDENTITY

300 Self-esteem/Self-confidence/ego strength/coping ability
301 Personal growth/search for values and meaning
302 Spiritual concerns
303 Sexual identity/orientation
304 Cultural identity
305 Acting-out behaviour
306 Fragmentation/lack of containment
307 Mistrusting/difficulty to trust others
308 Early trauma and its effects
309 Decision making – finding it difficult to make decisions & stick to them
310 Mid life crisis
311 Denial
312 Talking to gain clarity about a situation
313 Perfectionism
314 Lack of direction (career or otherwise)
315 Autism Spectrum Condition (inc Asperger's Syndrome)
316 -319 Blank for own categories

S SEXUAL ISSUES

320 Pregnancy – client or partner has become pregnant
321 Miscarriage

322 Abortion – client or client's partner is considering or has had an abortion
323 Contraception
324 Anxieties about sex
325 Loss of sexual interest and drive
326 Sexual dysfunction
327 Sexually transmitted infection (including HIV)
328 Fertility/Infertility
329 Blank for own category

T TRANSITIONS

340 Leaving home/homesickness
341 University/Institution/college – adjustment to
342 University/ Institution/college – transferring/changing
343 University/ Institution/college – leaving
344 Cultural change
345 Institutional change within the University
346 Client has become a parent
347 Major life change contemplated
348 Referral to other/outside/community agency post-university
349 Refugee/Asylum-Seeker related
350 -359 Blank for own categories

U SERVICES, WELFARE & EMPLOYMENT

360 Relationship difficulty with colleague(s) – ie co-workers
361 Retirement/redundancy
362 Accommodation
363 Employment and vocational;
364 Family issues – including advice about childcare, parenting, dependent relatives
365 Financial
366 Immigration and work-permit
367 Legal
368 Burn-out
369 Grievances/disciplinary action
370 Grievance/dissatisfaction with University/Institution/college Services/Facilities
371 Grievance/dissatisfaction with NHS/other services
372 Accommodation issues e.g. request for evidence to change accommodation
373 Difficulties in the workplace
374 Conditions of work / unhappy at work
375 Bullying/harassment at work
376 Sexual harassment at work
377 Work-related stress
378 – 379 Blank for own categories

X SELF HARM

380 Intentional Self-harm – e.g. cutting, burning, over-exercise, self medication
381 Suicidal thoughts or feelings
382 Past suicide attempt – more than 6 months previous
383 Recent suicide attempt – within last 6 months
384 Unintentional self-harm (e.g. through self-neglect)
385 High risk behaviour (e.g. extreme sports, driving carelessly, unsafe sex etc.)
386 – 400 and beyond Blank for own categories

Appendix I: Counselling severity rating scale

AUCC Categorisation of Client Concerns
3rd Edition Summer 2009

Severity Rating Scale

0	Experiencing normal issues of living, mood stable, functioning **well**.
1	The issue presented concerns the client **intermittently**, it is within control but may require attention sooner or later.
2	The issue requires attention because it is having a negative but **limited** impact on the client's life.
3	The issue is causing anxiety and distress: there is an awareness of it affecting **one area** of functioning significantly.
4	The issue is causing considerable anxiety and distress which in turn is affecting **several areas** of functioning.
5	The issue is causing severe anxiety and distress affecting **all areas** of functioning and the client's ability to cope is severely limited.
6	The issue is affecting all aspects of the client's life: extreme distress; highly anxious; may be self-harm, acting out; loss of hope, sense of unreality, unable to be comforted or reassured. Functioning with **extreme** difficulty.
7	Not coping; out of control; despair and hopelessness; emotionally **overwhelmed**; suicidal thoughts/intent.

Appendix J. RNCM certificate of ethical approval for the counselling data study

CERTIFICATE OF ETHICAL APPROVAL

This certificate confirms that the application made by **Raluca Matei** and **Jane Ginsborg** to the CUK Research Ethics Committee was **APPROVED**.

Project title: **Health referrals among music students**

Date approved: 14/07/2016

Signed: Date: 14th July 2016

Professor Barbara L. Kelly

(*Deputy Chair of CUK Research Ethics Committee*)

Appendix K. RNCM certificate of ethical approval for the evaluation of the H&W course

RNCM
ROYAL NORTHERN COLLEGE of MUSIC

This is to confirm that the application made by Raluca Matei to the Royal Northern College of Music Research Ethics Committee was APPROVED.

Project title: Health and Wellbeing

Date approved: 26 September 2016

Signed: Date: 26 September 2016

Prof Barbara Kelly Director of Research
(on behalf of the RNCM Research Ethics Committee)

Appendix L. H&W pre-post questionnaire

Health and Wellbeing Questionnaire

Raluca Matei (PhD candidate) and Professor Jane Ginsborg (RNCM) are investigating music performance students' health and wellbeing as part of the *Better Practice* work package of the AHRC-funded CUK-wide research project Musical Impact (www.musicalimpact.org).

Please complete this questionnaire online and submit it at the end of the session, or complete it as legibly as possible and give it to Raluca at the end of the session. It should take you about 20 minutes.

If you have any questions while you are completing it, please ask Raluca, or you can contact her afterwards at raluca.matei@student.rncm.ac.uk, or Jane Ginsborg at jane.ginsborg@rncm.ac.uk.

By completing and submitting the questionnaire the researchers will assume that you have given your informed consent to take part in the research. You do not *have* to answer every question but it would be very helpful indeed for the research if you could do so.

Your name will be kept separately from your responses to the questionnaire. All the information that is collected about you will be kept strictly confidential. Any information about you that is disseminated will have your name removed so you cannot be identified by it.

The results of the research will be used to evaluate the effectiveness of the Health and Wellbeing component of the Artist Development 1 module and will be reported in Raluca's PhD thesis and related outputs such as conference proceedings and journal articles.

Thank you for completing and submitting this questionnaire.

TODAY'S DATE :
I. Questions about you
1. Are you (please tick): ☐ **Male** ☐ **Female** ☐ **Prefer not to say**
2. How old are you (years / months)? _____
3. Degree: **BMus (Hons) Classical Music** ☐ **GRNCM (joint course students)** ☐
4. What is your main instrument? _____
5. Total number of years playing main instrument: _____**(years)**

II. Please indicate which statements best describe your own state of health today by placing a tick in one box in each group below.

1. Sleeping

I am able to sleep normally, i.e. I have no problems with sleeping. ❑

I have slight problems with sleeping, e.g. difficulty in falling asleep, or sometimes waking at night. ❑

I have moderate problems with sleeping, e.g. disturbed sleep, or feeling I have not slept enough. ❑

I have great problems with sleeping, e.g. having to use sleeping pills often or routinely, or usually waking at night and/or too early in the morning. ❑

I suffer severe sleeplessness, e.g. sleep is almost impossible even with full use of sleeping pills, or I stay awake most of the night. ❑

2. Depression

I do not feel at all sad, melancholic or depressed. ❑

I feel slightly sad, melancholic or depressed. ❑

I feel moderately sad, melancholic or depressed. ❑

I feel very sad, melancholic or depressed. ❑

I feel extremely sad, melancholic or depressed. ❑

3. Distress

I do not feel at all anxious, stressed or nervous. ❑

I feel slightly anxious, stressed or nervous. ❑

I feel moderately anxious, stressed or nervous. ❑

I feel very anxious, stressed or nervous. ❑

I feel extremely anxious, stressed or nervous. ❑

4. Vitality

I feel healthy and energetic. ❑

I feel slightly weary, tired or feeble. ❑

I feel moderately weary, tired or feeble. ❑

I feel very weary, tired or feeble, almost exhausted. ❑

I feel extremely weary, tired or feeble, totally exhausted. ❑

III. Your feelings and emotions. Please read each item and then put the number from the scale below next to each word to indicate the extent you have felt this way over the past week:

1	2	3	4	5
Very slightly/ Not at All	A Little	Moderately	Quite a Bit	Extremely

1. Interested _____	11. Irritable _____

2. Distressed _____	12. Alert _____
3. Excited _____	13. Ashamed _____
4. Upset _____	14. Inspired _____
5. Strong _____	15. Nervous _____
6. Guilty _____	16. Determined _____
7. Scared _____	17. Attentive _____
8. Hostile _____	18. Jittery _____
9. Enthusiastic _____	19. Active _____
10. Proud _____	20. Afraid _____

IV. Your present way of life or personal habits. Please respond to each statement as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behaviour by circling

N for never, **S** for sometimes, **O** for often, or **R** for routinely.

	Never	Sometimes	Often	Routinely
1.Discuss my problems and concerns with people close to me.	N	S	O	R
2. Choose a diet low in fat, saturated fat, and cholesterol.	N	S	O	R
3. Report any unusual signs or symptoms to a physician or other health professional.	N	S	O	R
4. Follow a planned exercise programme.	N	S	O	R
5. Get enough sleep.	N	S	O	R
6. Feel I am growing and changing in positive ways.	N	S	O	R
7. Praise other people easily for their achievements.	N	S	O	R
8. Limit use of sugars and food containing sugar (sweets).	N	S	O	R
9. Read or watch TV programmes about improving health.	N	S	O	R
10. Exercise vigorously for 20 or more minutes at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber).	N	S	O	R
11. Take some time for relaxation each day.	N	S	O	R
12. Believe that my life has purpose.	N	S	O	R
13. Maintain meaningful and fulfilling relationships with others.	N	S	O	R
14. Eat 3-5 servings of bread, cereal, rice and pasta each day.	N	S	O	R
15. Question health professionals in order to understand their instructions.	N	S	O	R
16. Take part in light to moderate physical activity (such as sustained walking 30-40 minutes 5 times or more times a week).	N	S	O	R
17. Accept those things in my life which I can not change.	N	S	O	R
18. Look forward to the future.	N	S	O	R
19. Spend time with close friends.	N	S	O	R
20. Eat 2-4 servings of fruit each day.	N	S	O	R

21. Get a second opinion when I question my health care provider's advice.	N	S	O	R
22. Take part in leisure-time (recreational) physical activities (such as swimming, dancing, bicycling).	N	S	O	R
23. Concentrate on pleasant thoughts at bedtime.	N	S	O	R
24. Feel content and at peace with myself.	N	S	O	R
25. Find it easy to show concern, love and warmth to others.	N	S	O	R
26. Eat 3-5 servings of vegetables each day.	N	S	O	R
27. Discuss my health concerns with health professionals.	N	S	O	R
28. Do stretching exercises at least 3 times per week.	N	S	O	R
29. Use specific methods to control my stress.	N	S	O	R
30. Work toward long-term goals in my life.	N	S	O	R
31. Touch and am touched by people I care about.	N	S	O	R
32. Eat 2-3 servings of milk, yoghurt or cheese each day.	N	S	O	R
33. Inspect my body at least monthly for physical changes/danger signs.	N	S	O	R
34. Get exercise during usual daily activities (such as walking during lunch, using stairs instead of elevators, parking car away from destination and walking).	N	S	O	R
35. Balance time between work and play.	N	S	O	R
36. Find each day interesting and challenging.	N	S	O	R
37. Find ways to meet my needs for intimacy.	N	S	O	R
38. Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day.	N	S	O	R
39. Ask for information from health professional about how to take good care of myself.	N	S	O	R
40. Check my pulse rate when exercising.	N	S	O	R
41. Practice relaxation or meditation for 15-20 minutes daily.	N	S	O	R
42. Am aware of what is important to me in life.	N	S	O	R
43. Get support from a network of caring people.	N	S	O	R
44. Read labels to identify nutrients, fats, and sodium content in packaged food.	N	S	O	R
45. Attend educational programs on personal health care.	N	S	O	R
46. Reach my target heart rate when exercising.	N	S	O	R
47. Pace myself to prevent tiredness.	N	S	O	R

48. Feel connected with some force greater than myself.	N	S	O	R
49. Settle conflicts with others through discussion and compromise.	N	S	O	R
50. Eat breakfast.	N	S	O	R
51. Seek guidance or counselling when necessary.	N	S	O	R
52. Expose myself to new experiences and challenges.	N	S	O	R

V. Your feelings and thoughts <u>during the last month</u>. Please put a tick in the appropriate column to indicate how often you felt or thought a certain way.

0 = Never	1 = Almost never	2 = Sometimes	3 = Fairly Often	4 = Very Often

	0	1	2	3	4
1.In the last month, how often have you been upset because of something that happened unexpectedly?					
2. In the last month, how often have you felt that you were unable to control the important things in your life?					
3. In the last month, how often have you felt nervous and „stressed”?					
4. In the last month, how often have you felt confident about your ability to handle your personal problems?					
5. In the last month, how often have you felt that things were going your way?					
6. In the last month, how often have you found that you could not cope with all the things that you had to do?					
7. In the last month, how often have you been able to control irritations in your life?					
8. In the last month, how often have you felt that you were on top of things?					
9. In the last month, how often have you been angered because of things that were outside of your control?					
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?					

VI. Below are ten statements about yourself. Please indicate the extent to which each one is true of you by putting a tick in the appropriate column.

	1	2	3	4
	Not at all true	Hardly true	Moderately true	Exactly true

1. I can always manage to solve difficult problems if I try hard enough.				
2. If someone opposes me, I can find the means and ways to get what I want.				
3. It is easy for me to stick to my aims and accomplish my goals.				
4. I am confident that I could deal efficiently with unexpected events.				
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.				
6. I can solve most problems if I invest the necessary effort.				
7. I can remain calm when facing difficulties because I can rely on my coping abilities.				
8. When I am confronted with a problem, I can usually find several solutions.				
9. If I am in trouble, I can usually think of a solution.				
10. I can usually handle whatever comes my way.				

VII. Performance related musculoskeletal disorders (PRMDs) may be defined as any pain, weakness and numbness; tingling or any other symptoms that interfere with your ability to play your instrument at the level you are accustomed to. This definition does not include mild transient aches or pains.

1. Please indicate how often you suffer from a PRMD by circling the most appropriate number:

Never 0 1 2 3 4 5 6 7 8 9 10 Constantly

2. Please indicate on the line below the average severity of any PRMD that you suffer from:

None 0 1 2 3 4 5 6 7 8 9 10 Most severe

VIII. Please rate the amount of effort that you feel it takes you to complete an average daily practice routine. This is done by scoring your rating of Perceived Exertion (RPE). You are required to choose a number between 6 and 20 that corresponds to the physical exertion of performing this practice. For example; the number 6 represents an activity that requires no effort. The number 13 means that the exercise feels somewhat hard at the time, while the number 20 represents maximal effort.

Please circle the number below that you feel best represents the degree of effort required to get through your daily hours of practice:

RPE SCALE

6
7 very, very light
8
9 very light

10
11 fairly light
12
13 somewhat hard
14
15 hard
16
17 very hard
18
19 very, very hard
20

IX. Your hearing and use of hearing protection

1. Do you use ear protection aids (ear plugs/noise-reducing headphones) ?

	Never	Seldom	Sometimes	Often	Always
While practising alone					
At rehearsals with other players					
At performances (my own)					
Other people's performances					

2. Use of hearing protectors

I got used to wearing them right away ❑

It took me weeks/months/years (circle the correct choice) to get used to them ❑

I didn't get used to them, but I use them anyway ❑

I didn't get used to them, so I stopped using them ❑

I have never used them (please skip to Question 8 in this section) ❑

3. The type of ear protection aids I use

Single use soft ear-plugs ❑

Reusable (more expensive) soft ear-plugs ❑

Personally tailored, custom-made ear plugs ❑

4. While using your ear plugs, did you encounter any of the following difficulties?

The ear plugs hindered my own performance ❑

The ear plugs decreased my ability to hear the other player ❑

Ear plugs were uncomfortable ❑

Ear plugs were difficult to put into ears ❑

Ear plugs caused me an ear infection ❑

Ear plugs made me feel dizzy ❑

Ear plugs caused a pressure sensation in my ear ❑

If other, what? .....

5. Is your instrument suitable for playing with mute (muffler)? (please circle)

Yes No

6. If yes, how often do you use it on your instrument? (please circle)

Never Seldom Often Always

Tinnitus = *a sound of duration of minimum 5 minutes, an occasional sensation of a ringing, roaring, or buzzing sound in the ears or head even though no such sound is present*

7. Do you have tinnitus?

Hyperacusis (high sensitivity to sound) = *abnormal sensitivity to everyday sound levels or noises. Often there is also sensitivity to high pitched sounds*.

8. Do you experience hyperacusis?

❑ yes, since _____ ❑ no

Distortion = *when sound reaches a certain level, it is perceived as being impure, cracked, distorted*

9. Do you experience distortion?

❑ yes, since [date]_____ ❑ no

Diplacusis = *the pitch of a sound presented to both ears is heard differently in each of the two ears*

10. Do you experience diplacusis?

❑ yes, since [date]_____, ❑ no

11. When was your hearing last checked?

In the last 12 months ❑

1-3 years ago ❑

4-5 years ago ❑

6-10 years ago ❑

Over 10 years ago ❑

I don't know ❑

I have never had a hearing test ❑

12. When your hearing was checked, were you told that you have hearing loss? (Please circle)

Yes No Cannot say

X. Your responsibility, awareness, knowledge, competency and attitude as a future professional musician with respect to health and wellbeing

1.Please rate your current level of knowledge of the following topics (which you will be exploring as part of the AD1 course) as applied to music making by circling the appropriate number (in all cases 0=none and 10=greatest possible).

Topic	
1. Effective practising strategies	0 1 2 3 4 5 6 7 8 9 10
2. Effective rehearsing strategies	0 1 2 3 4 5 6 7 8 9 10
3. Learning and memorising strategies	0 1 2 3 4 5 6 7 8 9 10
4. Ergonomics/posture	0 1 2 3 4 5 6 7 8 9 10
5. Music performance anxiety	0 1 2 3 4 5 6 7 8 9 10
6. Life skills and behaviour change techniques	0 1 2 3 4 5 6 7 8 9 10
7. Presentation skills	0 1 2 3 4 5 6 7 8 9 10

2. How important do you regard the following topics (which you will be exploring as part of the AD1 course) in relation to how well you perform musically on your instrument? Please circle the appropriate number (in all cases 0=none and 10=greatest possible).

Topic	*Effect of each topic on performance*
1. Effective practising strategies	0 1 2 3 4 5 6 7 8 9 10
2. Effective rehearsing strategies	0 1 2 3 4 5 6 7 8 9 10
3. Learning and memorising strategies	0 1 2 3 4 5 6 7 8 9 10
4. Ergonomics/posture	0 1 2 3 4 5 6 7 8 9 10
5. Music performance anxiety	0 1 2 3 4 5 6 7 8 9 10
6. Life skills and behaviour change techniques	0 1 2 3 4 5 6 7 8 9 10
7. Presentation skills	0 1 2 3 4 5 6 7 8 9 10

Please respond to the statements below using the scale 0–10 (please circle).

3. Learning and performing music may involve hazards that have a negative impact on health.

Do Not Agree 0 1 2 3 4 5 6 7 8 9 10 Totally Agree

4. The way an individual plays a musical instrument/sings influences his/her level of risk of injury or health problems.

Do Not Agree 0 1 2 3 4 5 6 7 8 9 10 Totally Agree

5. As a future professional musician, are you aware of any performance factors that are related to musculoskeletal injuries associated with learning and playing an instrument/singing?

Not at All 0 1 2 3 4 5 6 7 8 9 10 Completely

6. Do you know what sound intensity levels are associated with hearing loss?

Not at All 0 1 2 3 4 5 6 7 8 9 10 Completely

7. As a future professional musician, do you feel you have the resources, understanding, and knowledge to deal with the health and safety issues associated with learning and performing a musical instrument/singing?

Not at All 0 1 2 3 4 5 6 7 8 9 10 Completely

8. As a future professional musician, do you feel responsible for being informed and educated about health and safety issues related to learning and performing music?

Not at All 0 1 2 3 4 5 6 7 8 9 10 Completely

9. Do you feel personally responsible for preventing health problems that may occur?

Not at All 0 1 2 3 4 5 6 7 8 9 10 Completely

10.As a future professional musician, are you prepared to address the current recommendations launched by relevant international organisations to aid in the prevention of health and safety concerns that may arise through the learning and performance of musical instruments/singing?

Not at All 0 1 2 3 4 5 6 7 8 9 10 Completely

Thank you very much for completing this questionnaire!

Please give it to Raluca now. Alternatively, you can submit it online during the coming week or finish completing it in your own time, as long as you submit it to her next week.

If any issues have arisen for you as a result of completing this questionnaire, please contact one of the student counsellors, Bryan Fox and Claire Donoghue, via telephone

(0161 907 5324) or email counselling@rncm.ac.uk.

Appendix M: H&W interviews - Participant information sheet and consent form

RNCM ROYAL NORTHERN COLLEGE of MUSIC | MUSICAL IMPACT

Health and Wellbeing

You are being invited to take part in a research project. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me/us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

Funding body

Musical Impact/Conservatoires UK/Arts and Humanities Research Council (grant ref. AH/K002287/1).

Research team

Raluca Matei; Prof. Jane Ginsborg, Royal Northern College of Music

What is the purpose of the project?

The Health and Wellbeing module within the Artist Development 1 course was designed to raise awareness of the health related issues musicians are facing (e.g. debilitating performance anxiety, performance-related musculoskeletal issues, hearing loss), to deliver evidence-based information according to the latest research in the field, to support music students in their understanding of psychology and anatomy as applicable, to facilitate the exploration of a range of time management skills and practice strategies, as well as to support music students in implementing behaviour change. The module you attended comprised both cohort lectures and seminars offering the chance to explore relevant areas and topics of interest further.

We would also like to evaluate this course so we are asking you to take part in focus group interviews. This evaluation will help us further develop the programme and increase its relevancy for music students.

Do I have to take part?

It is up to you to decide whether or not to take part. Refusal to take part will involve no penalty or loss of benefits to which you are otherwise entitled. If you do decide to take part you will be given this information sheet to keep (and be asked to sign a consent form). You are free to withdraw at any time, without penalty or loss of benefits, and without giving a reason.

What will happen to me if I take part?

You will be given a copy of the Consent Form and the Participant Information Sheet to be signed.

This will involve taking part in a group discussion about the AD1 course (i.e. your general feedback, perceived effects of the course, what you liked/disliked, issues and suggestions for improvement) lasting no more than two hours. The session will be recorded and transcribed verbatim for analysis.

What do I have to do?

Apart from attending the course, there are no restrictions as a result of participating.

Research Department, Royal Northern College of Music, 124 Oxford Road, Manchester, M13 9RD, T: 0161 907 5228

CONSENT FORM

Title of Project: Health and Wellbeing – focus group

Name of Researcher: Raluca Matei

Participant Identification Number for this project (first two letters of your mother's maiden name and last two numbers of your student ID): **……..**

Please initial box

1. I confirm that I have read and understand the information sheet dated 21/09/2016 for the project in which I have been asked to take part and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. ☐
3. I understand that my responses will be anonymised before analysis. I give permission for members of the research team to have access to my anonymised responses. I understand that all personal data about me will be kept confidential. ☐
4. I understand that the investigator(s) must adhere to the BPS Code of Human Research Ethics ☐
5. I agree to take part in the above research project. ☐

Name of participant	Date	Signature
___Raluca Matei_____ Researcher	_21/09/16_____ Date	_____ Signature

Appendix N: Interview schedule

Thoughts surrounding the topic in general

- What are your general thoughts on the AD1 course?
- What were your thoughts towards health and wellbeing prior to this course?
- How has this course changed those views, if at all?

Use of the skills

- Which of the skills that you've learned on this course have you continued or decided to use in your:
    - practice (how? why?)
    - performance preparation
    - general life/wellbeing
- Did the course pique your interest in any areas that you would now like to develop (or have developed) further?
- To what extent has this course had an impact on your approaches to learning/practising/ teaching and performing, and how?
- Is a course at a conservatoire an appropriate place/way to provide such training? If not, where and how do you think it should be provided?

Evaluation of the programme

- Which topics included in the course stand out as having been particularly useful or relevant to you personally?
- Which topics from the course were the least useful or relevant?
- What would you change or wish had been done differently about the:
    - Topics
    - Presentation of the topics
    - How the classes were run
- How useful did you find the seminars and in what ways?

Appendix O: Physical activity, sedentary behaviour, anxiety and PRMDs

Physical activity, Anxiety and Musculoskeletal issues Questionnaire

As part of the Better Practice work package of the AHRC-funded CUK-wide research project Musical Impact (www.musicalimpact.org), Raluca Matei (PhD candidate) and Professor Jane Ginsborg (RNCM) are investigating physical activity, anxiety and performance-related musculoskeletal disorders (PRMDs), and modifiable behaviours that might constitute risk factors including sedentary behaviour, and failure to warm up before practice sessions and take enough breaks when practising.

The survey is open to all students at any UK conservatoire, providing they play one or more instruments (i.e. not composers, conductors or singers), aged 18 years and above. Please complete this questionnaire and return it to the person who gave it to you by **15 December 2017**. It should take you about 25 minutes.

If you have any questions, please contact Raluca at raluca.matei@student.rncm.ac.uk, or Jane Ginsborg at jane.ginsborg@rncm.ac.uk.

By completing and submitting the questionnaire the researchers will assume that you have given your informed consent to take part in the research. You do not have to answer every question but it would be very helpful indeed for the research if you could do so.

Your responses to the questionnaire will remain anonymous. All the information that is collected about you will be kept strictly confidential. Any information about you that is disseminated will have your code identifier removed so you cannot be identified by it.

The results of the research will be reported in Raluca's PhD thesis and related outputs such as conference proceedings and journal articles. They will also be used to design a behaviour change intervention and investigate the extent to which changes affect the risk of PRMDs.

Thank you for completing and submitting this questionnaire.

TODAY'S DATE :

Questions about you

2. Are you (please tick): ☐ Male ☐ Female ☐ Prefer not to say

3. How old are you (years / months)? _____

4. Nationality _____

5. a) Degree:

❑ BMus (Hons) Classical Music ❑ MMus (Hons) Classical Music ❑ Joint course students

❑ BMus (Hons) Popular Music ❑ Other (please specify) .....

b) Where do you study?

❑ Royal College of Music, London ❑ Guildhall School of Music and Drama

❑ Trinity Laban Conservatoire of Music and Dance ❑ Royal Academy of Music

❑ Birmingham Conservatoire ❑ Royal Northern College of Music

❑ Royal Conservatoire of Scotland ❑ Royal Welsh College of Music and Drama

❑ Leeds College of Music

6. Current academic level:

❑ Undergraduate ❑ Postgraduate

Your practice and preparation

7. What is your main instrument? .....
8. Total number of years playing main instrument..... (years)

Please answer the following questions with reference to the past 7 DAYS. (If the past 7 days do NOT represent a typical week, please think back to the most recent typical week.)

How much playing did you do (on all instruments) in the following categories?

9. Playing (e.g. professional work, rehearsals) .....total hrs/week
10. Individual practice: ..... total hrs/wk
11. How often did you take breaks during practice sessions (please circle)?

Never Occasionally Quite frequently Very frequently

a. How long was each break, on average? (minutes) .....
b. How long did you practise before you took each break? .....mins

9. How often did you warm up ON your instrument (e.g. slow scales, long tones, finger exercises) beefore practising or playing (please circle)?

Never Occasionally Quite frequently Very frequently

10. How often did you warm up AWAY from your instrument (e.g. movement, stretching, cardiovascular, core muscle exercises) before practising or playing (please circle)?

Never Occasionally Quite frequently Very frequently

11. During the course of your training, have you received advice on the following (please tick)?

	Yes	No
How to sit comfortably when playing (including correct chair height, type of chair, position of stand)		
How to play with flexibility and free movement		
When to take breaks during playing and practice sessions		
How to pace yourself during periods of intensive practice and playing		
How to look after your muscles and prevent strain		
How to warm up (away from your instrument)		
How to warm up (on your instrument)		
Why you should engage in aerobic/cardio physical activity		
Why you should do muscle strengthening exercises		

Your physical activity

We are interested in your knowledge of the official guidelines on physical activity for health purposes. The more honest your responses, the more helpful for us!

12. Do you know what the national recommendations are for taking part in physical activity, in terms of minutes per week of moderate intensity physical activity? (Please circle)

Yes No

13. If yes, what are the national recommendations for taking part in physical activity, in terms of minutes per week of moderate intensity physical activity?

..... minutes/week

14. Do you know what the national recommendations are for taking part in MUSCLE STRENGTHENING exercises only (legs, hips, back, abdomen, chest, shoulders and arms), in terms of days per week? (Please circle)

Yes No

15. If yes, what are the national recommendations for taking part in MUSCLE STRENGTHENING exercises only (legs, hips, back, abdomen, chest, shoulders and arms), in terms of days per week?

..... days/week

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the

activities you do at work, as part of your house and yard work (gardening), to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the VIGOROUS activities that you did in the LAST 7 DAYS. VIGOROUS physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think ONLY about those physical activities that you did for at least 10 minutes at a time.

During the LAST 7 DAYS, on how many days did you do VIGOROUS physical activities like heavy lifting, digging, aerobics, or fast bicycling?

16. Number of days per week (if none, skip to question 27)

17. How much time in HOURS and MINUTES did you usually spend doing VIGOROUS physical activities in ONE of those days?

(Write your answer in the following format: HH:MM. Example: 00:17 - seventeen minutes)

Think about all the MODERATE activities that you did in the LAST 7 DAYS. MODERATE activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

During the LAST 7 DAYS, on how many days did you do MODERATE physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

18. Number of days per week (if none, skip to question 29)

19. How much time in HOURS and MINUTES did you usually spend doing MODERATE physical activities on ONE of those days?

(Write your answer in the following format: HH:MM. Example: 00:17 - seventeen minutes)

Think about the time you spent WALKING in the LAST 7 DAYS. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

During the LAST 7 DAYS, on how many days did you WALK for at least 10 minutes at a time?

20. Number of days per week (if none, skip to question 31)

21. How much time in hours and minutes (HH:MM) did you usually spend WALKING on ONE of those days? (Write your answer in the following format: HH:MM. Example: 00:20 - twenty minutes)

22. Please indicate the extent to which you agree with the statements below regarding your physical activity by circling the appropriate number.

	1 Strongly Disagree	**2**	**3**	**4**	**5**	**6**	**7 Strongly Agree**
I know what the recommended levels of physical activity are	1	2	3	4	5	6	7
I DO NOT know the reasons why I should be meeting the nationally recommended physical activity guidelines	1	2	3	4	5	6	7
I have NOT previously read information about the current nationally recommended physical activity guidelines	1	2	3	4	5	6	7
Facilities are available to help me to do physical activity	1	2	3	4	5	6	7
There is NOWHERE to do physical activity near me	1	2	3	4	5	6	7
My local area is NOT very attractive and this puts me off doing physical activity	1	2	3	4	5	6	7
I want to do physical activity	1	2	3	4	5	6	7
I CANNOT be bothered to do physical activity	1	2	3	4	5	6	7
I feel motivated to do physical activity	1	2	3	4	5	6	7
I DO NOT feel confident when doing physical activity	1	2	3	4	5	6	7
Doing physical activity makes me feel embarrassed	1	2	3	4	5	6	7
I FIND IT HARD to do physical activity when I see others doing well at physical activity (e.g. watching others run for a long time on the treadmill)	1	2	3	4	5	6	7
I can do physical activity to a good enough standard	1	2	3	4	5	6	7
I've NEVER really had sports skills so I DON'T do physical activity	1	2	3	4	5	6	7
I don't seem to have the skills to keep going in physical activity sessions	1	2	3	4	5	6	7
Daily life is too stressful for physical activity	1	2	3	4	5	6	7
I have too many negative emotions which prevent me from doing physical activity	1	2	3	4	5	6	7
When I think about doing physical activity, I start to worry	1	2	3	4	5	6	7
My friends DON'T support or encourage my physical activity	1	2	3	4	5	6	7
The people I spend my free time with don't do physical activity	1	2	3	4	5	6	7
I DON'T have anyone to do physical activity with	1	2	3	4	5	6	7
If I do physical activity, it will benefit me in the short term (e.g. burn calories, sleep better etc.)	1	2	3	4	5	6	7
If I do physical activity it will benefit me in the long term (e.g. live longer, lose weight etc.)	1	2	3	4	5	6	7
I think physical activity will change my life for the better	1	2	3	4	5	6	7
I tend to plan where my physical activity will happen (e.g. at the park, leisure centre etc.)	1	2	3	4	5	6	7
I do not tend to plan when my physical activity will happen (e.g. Monday at 6pm etc.)	1	2	3	4	5	6	7
I tend to plan how my physical activity will happen (e.g. how to get there, kit needed etc.)	1	2	3	4	5	6	7
I do not tend to plan what type of physical activity I will do (e.g. aerobics class, walking to work, session at the gym etc.)	1	2	3	4	5	6	7
I know what to do in difficult situations in order to make sure I do the physical activity I have planned	1	2	3	4	5	6	7
I get easily distracted from the physical activity I have planned	1	2	3	4	5	6	7
I always work around obstacles to physical activity; nothing really stops me	1	2	3	4	5	6	7

I WOULD NOT be prepared to give up work/practice ambitions to do physical activity	1	2	3	4	5	6	7
I would be prepared to give up things I usually do in my leisure time for physical activity	1	2	3	4	5	6	7
I WOULD NOT be prepared to give up spending time with my friends for physical activity	1	2	3	4	5	6	7

In each of the past 4 WEEKS (i.e. over the past month), how many times did you do physical activities or exercises to STRENGTHEN your muscles? Do NOT count the times you did aerobic activities such as walking, running, or bicycling. Count the times you did activities using your own body weight such as yoga, sit-ups or push-ups and those using weight machines, free weights, or elastic bands. If none, skip to question 34.

23. .....times per week
24. .....times per month

25. Listed below are some of the reasons that people give for not getting as much physical activity as they think they should. Please read each statement and indicate how likely you would be to give each of the following reasons:

	Very unlikely 0	Somewhat unlikely 1	Somewhat likely 2	Very likely 3
My day is so busy now, I just don't think I can make the time to include physical activity in my regular schedule.				
None of my family members or friends like to do anything active, so I don't have a chance to exercise.				
I'm just too tired after studying and practicing to get any exercise.				
I've been thinking about getting more exercise, but I just can't seem to get started.				
I'm getting older so exercise can be risky.				
I don't get enough exercise because I have never learned the skills for any sport.				
I don't have acccess to jogging trails, swimming pools, bike paths, etc.				
Physical activity takes too much time away from other commitments – time, practice, study, family, etc.				
I'm embarrassed about how I will look when I exercise with others.				
I don't get enough sleep as it is. I just couldn't get up early or stay up late to get some exercise.				
It's easier for me to find excuses not to exercise than to go out to do something.				
I know of too many people who have hurt themselves by overdoing it with exercise.				
I really can't see learning a new sport at my age.				
It's just too expensive. You have to take a class or join a club or buy the right equipment.				
My free times during the day are too short to include exercise.				
My usual social activities with family or friends do not include physical activity.				
I'm too tired during the week and I need the weekend to catch up on my rest.				
I want to get more exercise, but I just can't seem to make myself stick to anything.				
I'm afraid I might injure myself or have a heart attack.				
I'm not good enough at any physical activity to make it fun.				
If we had exercise facilities and showers in college, then I would be more likely to exercise.				

Your sedentary behaviour

Sedentary behaviour refers to any waking activity characterized by a reduced energy expenditure *and* a sitting or reclining posture. In general, this means that any time a person is sitting or lying down, they are engaging in sedentary behaviour. Common sedentary behaviours include TV viewing, video game playing, computer use (collectively termed "screen time"), driving automobiles, and reading.

26. On a typical WEEKDAY, how much time do you spend (from when you wake up until you go to bed) doing the following? (Please tick)

	None	15 min. or less	30 min.	1 hr	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs or more
Watching TV (including videos on VCR/DVD/computer).									
Playing computer or video games.									
Sitting listening to music on the radio, tapes, or CDs.									
Sitting and talking on the phone.									
Doing paperwork or computer work (office work, emails, paying bills, etc.)									
Sitting reading a book or magazine.									
Playing a musical instrument.									
Doing artwork or crafts.									
Sitting and driving in a car, bus, or train.									

27. On a typical WEEKEND DAY, how much time do you spend (from when you wake up until you go to bed) doing the following? (Please tick)

	None	15 min. or less	30 min	1 hr	2 hrs	3 hrs	4 hrs	5 hrs	6 hrs or more
Watching TV (including videos on VCR/DVD/computer).									
Playing computer or video games.									
Sitting listening to music on the radio, tapes, or CDs.									
Sitting and talking on the phone.									
Doing paperwork or computer work (office work, emails, paying bills, etc.)									
Sitting reading a book or magazine.									
Playing a musical instrument.									
Doing artwork or crafts.									
Sitting and driving in a car, bus, or train.									

Pain

28. How much bodily pain have you had during the past 4 weeks? (Please tick)

- ❑ None
- ❑ Very mild
- ❑ Mild
- ❑ Moderate
- ❑ Severe
- ❑ Very severe

29. During the past 4 weeks, how much did pain interfere with your practice and performance? (Please tick)

- ❑ Not at all
- ❑ A little bit
- ❑ Moderately
- ❑ Quite a bit
- ❑ Extremely

Performance-related musculoskeletal disorders (PRMDs)

Performance related musculoskeletal disorders (PRMDs) are defined as any pain, weakness, numbness, tingling or any other symptoms that interfere with your ability to play your instrument at the level you are accustomed to. This definition does NOT include mild transient aches or pains.

30. Below is a list of activities that have been suggested as possible strategies for preventing/treating playing-related symptoms. How effective do you think each one would be?

	Not effective 1	Somewhat effective 2	Very effective 3	Extremely effective 4	Not sure 0
Rest					
Easing off playing					
Slight adjustment of playing technique					
Exercise such as swimming					
Painkillers (e.g. aspirin)					
Anti-inflammatory drugs					
Stretching, Yoga					
Developing upper-body strength at gym					
Physiotherapy					
Posture correction (e.g. Alexander Technique)					
Body awareness (Feldenkrais, Alexander Technique)					
Marial arts (e.g. Aikido, Tai Chi)					
Meditation, Visualisation					
Regular massage					
Other (please specify).....					

31. For the strategies from the same list that you have used yourself, please indicate how effective you found it/them.

	Not	Somewhat	Very	Extremely	Not

	effective 1	effective 2	effective 3	effective 4	sure 0
Rest					
Easing off playing					
Slight adjustment of playing technique					
Exercise such as swimming					
Painkillers (e.g. aspirin)					
Anti-inflammatory drugs					
Stretching, Yoga					
Developing upper-body strength at gym					
Physiotherapy					
Posture correction (e.g. Alexander Technique)					
Body awareness (Feldenkrais, Alexander Technique)					
Marial arts (e.g. Aikido, Tai Chi)					
Meditation, Visualisation					
Regular massage					
Other (please specify).....					

32. Have you ever been given any information on how to prevent playing-related pain (please circle)?

Yes **No**

a. If yes, from what sources (e.g. magazine, doctor, teacher, lecture-demonstration, health care practitioner)?

.....

33. In general, have you found it easy to access information about preventing/treating PRMDs (please circle)?

Yes **No**

34. Please indicate how often you suffer from a PRMD by circling the most appropriate number:

Never 0 1 2 3 4 5 6 7 8 9 10 Constantly

35. Please indicate the average severity of any PRMD that you suffer from:

None 0 1 2 3 4 5 6 7 8 9 10 Maximally severe

A Rating of Physical Exertion (RPE) represents the amount of effort needed to carry out an activity on a scale of 6 to 20 in which 6 represents no effort, 13 represents "somewhat hard at the time", and 20 represents maximal effort.

Please answer the following questions with reference to the past 7 DAYS. (If the past 7 days represent do NOT represent a typical week, please think back to the most recent typical week.)

36. Please circle the number below that you feel best represents the amount of effort you needed to carry out your daily practice:

RPE SCALE

6	
7	**very, very light**
8	
9	**very light**
10	
11	**fairly light**
12	
13	**somewhat hard**
14	
15	**hard**
16	
17	**very hard**
18	
19	**very, very hard**
20	

Anxiety

Tick the box beside the reply that is closest to how you have been feeling over the past 7 DAYS. Please don't take too long over your replies: we want to know your immediate response to each item.

	Most of the time	A lot of the time	From time to time, occasionally	Not at all
37. I feel tense or 'wound up'				

	Very definitely and quite badly	Yes, but not too badly	A little, but it doesn't worry me	Not at all
38. I get a sort of frightened feeling as if something awful is about to happen				

	A great deal of the time	A lot of the time	From time to time, but not too often	Only occasionally
39. Worrying thoughts go through my mind				

	Definitely	Usually	Not often	Not at all
40. I can sit at ease and feel relaxed				

	Not at all	Occasionally	Quite often	Very often
41. I get a sort of frightened feeling like 'butterflies' in the stomach				

	Very much indeed	Quite a lot	Not very much	Not at all
42. I feel restless as I have to be on the move				

	Very often indeed	Quite often	Not very often	Not at all
43. I get sudden feelings of panic				

Thank you very much for completing this questionnaire!

If any issues have arisen for you as a result of completing this questionnaire, please contact the British Association for Performing Arts Medicine (BAPAM), via telephone (020 7404 8444) or email info@bapam.org.uk

Appendix P. CUK certificate of ethical approval for physical activity, anxiety and PRMDs study

Conservatoires UK

CERTIFICATE OF ETHICAL APPROVAL

This certificate confirms that the application made by **Raluca Matei** to the CUK Research Ethics Committee was **APPROVED**.

Project title: **Physical activity, anxiety, and musculoskeletal issues**

Date approved: **04/04/2017**

Signed: Date: 04/04/2017

Dr Emma Redding

(*Chair of CUK Research Ethics Committee*)

Supplementary material: Copies of Matei et al. (2018); Matei and Ginsborg (2017); and Matei et al. (2015)

frontiers in Psychology

ORIGINAL RESEARCH
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Health Education for Musicians

*Raluca Matei[1], Stephen Broad[2], Juliet Goldbart[3] and Jane Ginsborg[1]**

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Context and aims: Many musicians suffer for their art, and health is often compromised during training. The Health Promotion in Schools of Music (HPSM) project has recommended that health education should be included in core curricula, although few such courses have been evaluated to date. The aim of the study was to design, implement and evaluate a compulsory health education course at a UK conservatoire of music.

Methods: The course design was informed by a critical appraisal of the literature on musicians' health problems and their management, existing health education courses for musicians, and the HPSM recommendations. It was delivered by a team of appropriately-qualified tutors over 5 months to 104 first-year undergraduate students, and evaluated by means of questionnaires at the beginning and end of the course. Thirty-three students who had been in their first year the year before the course was introduced served as a control group, completing the questionnaire on one occasion only. Items concerned: hearing and use of hearing protection; primary outcomes including perceived knowledge and importance of the topics taught on the course; and secondary outcomes including physical and psychological health and health-promoting behaviors. The content of the essays written by the first-year students as part of their course assessment served as a guide to the topics they found most interesting and relevant.

Results: Comparatively few respondents reported using hearing protection when practicing alone, although there was some evidence of hearing loss, tinnitus, and hyperacusis. Perceived knowledge of the topics on the course, and awareness of the risks to health associated with performing music, increased, as did self-efficacy; otherwise, there were negative effects on secondary outcomes, and few differences between the intervention and control groups. The topics most frequently covered in students' essays were managing music performance anxiety, and life skills and behavior change techniques.

Conclusion: There is considerable scope for improving music students' physical and psychological health and health-related behaviors through health education, and persuading senior managers, educators and students themselves that health education can contribute to performance enhancement.

Keywords: health education, health promotion, musicians, course design, course evaluation

OPEN ACCESS

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INTRODUCTION

Although many classical musicians derive positive emotions from their music making and find their profession meaningful (Ascenso et al., 2017), they can also suffer for their art. The largest survey to date was conducted by Fishbein et al. (1988). Seventy-six percent of 2,212 players from 47 American orchestras reported a medical problem severe enough to impair performance. The most prevalent were musculoskeletal, affecting the shoulder (20%), neck (22%), and back (16%). They also reported acute anxiety (13%), depression (17%), and sleep disturbances (14%). More recent research shows that musicians experience hearing loss (O'Brien et al., 2014), visual problems (Beckers et al., 2016), and eating disorders (Kapsetaki and Easmon, 2017). In addition, there is a higher prevalence of insomnia and psychological distress among musicians than in the general population, and they may be more likely to use psychotherapy and psychotropic drugs such as sedatives, antidepressants, hypnotics and/or medication for attention deficit hyperactivity disorder (ADHD) (Vaag et al., 2016a,b,c).

When compared with students in a variety of health-related disciplines, music students reported suffering from more varied and more severe symptoms (Spahn et al., 2004; Ginsborg et al., 2009; Panebianco-Warrens et al., 2015). When compared with age-matched members of the general population, undergraduate and postgraduate students from 10 British conservatoires showed higher levels of wellbeing and lower levels of fatigue. However, they also scored lower on measures of health responsibility, stress management, sleep quality, self-rated health, and use of coping skills (Araujo et al., 2017).

Performance-Related Musculoskeletal Disorders

Performance-related musculoskeletal disorders (PRMDs) have been defined as symptoms that have a negative impact on the ability to play (Zaza and Farewell, 1997). Studies of the prevalence of PRMDs in musicians playing a wide variety of instruments have now been conducted in many European countries, the USA, Brazil and Asia. Prevalence ranges between 26 and 93% (Zaza, 1998; Bragge et al., 2006; Ranelli et al., 2008; Leaver et al., 2011; Paarup et al., 2011; de Souza Moraes and Antunes, 2012; Ackermann et al., 2014; Arnason et al., 2014; Silva et al., 2015; Steinmetz et al., 2015; Kok et al., 2016; Lonsdale and Kuan Boon, 2016; Ciurana Moñino et al., 2017; Stanek et al., 2017). Kok et al. (2013) suggest that music students might experience musculoskeletal symptoms considerably more often than medical students, especially in the upper body and upper extremity.

A wide range of risk factors is associated with PRMDs. These can be psychosocial, such as anxiety, stress, perfectionism, and/or physical, including playing conditions such as temperature or length of rehearsals and performance and insufficient break periods, past injury, awkward posture and instrumental technique, poor fitness level and suboptimal injury management (Zaza and Farewell, 1997; Bragge et al., 2006; Kaufman-Cohen and Ratzon, 2011; Leaver et al., 2011; Chan and Ackermann, 2014; Steinmetz et al., 2015; Kochem and Silva, 2017).

Music Performance Anxiety (MPA)

Like other forms of performance anxiety, including those related to test-taking, public speaking, and writing, MPA is a complex phenomenon with multiple causes encompassing genetics and environmental factors, but also personal experience, thoughts, emotions, and behaviors (Kenny, 2011). Although a certain level of arousal can facilitate optimal performance and a certain degree of anxiety is part of the normal bodily response to perceived threat, the differences between facilitating and debilitating anxiety, and between anxiety as a normal response to a relevant situation or context and anxiety as a mental disorder, may not be made explicit often enough (Miller and Chesky, 2004; Osborne et al., 2014; Kenny et al., 2016). Music students may struggle with anxiety more than experienced players (Kenny et al., 2012).

Hearing Loss

Musicians are regularly exposed to sound volume levels that exceed the recommended limit of 85 dB(A), which can produce noise-induced hearing loss (NIHL) and/or cause other disorders and symptoms such as tinnitus, hyperacusis, distortion, and diplacusis, some of which are incurable (Laitinen, 2005; Health Safety Executive, 2008; Santucci, 2009). Although sound exposure depends on variables such as instrument and repertoire played (Schmidt et al., 2011), and exposure time and environment, such as surrounding instruments and seating arrangements (Behar et al., 2006), musicians have an almost 4-fold higher hazard ratio (HR) for NIHL and 57% higher HR for tinnitus when compared to the general population (Schink et al., 2014). O'Brien et al. (2014) conducted a study of almost 600 musicians from eight Australian orchestras and found that 43% reported hearing loss. Although music students and professional musicians are recommended to use hearing protection, and they report receiving appropriate information about it, devices such as ear plugs may well be underused (Laitinen, 2005; Miller et al., 2007; Zander et al., 2008). However, in countries where legislation has raised awareness of potential hearing problems, usage has increased: for example, in Australia, 64% of the orchestral musicians surveyed by Ackermann et al. (2014) reported using hearing protection.

Efforts to educate orchestral musicians as to the effects of sound exposure have been made over the past two decades, most notably in the UK and Australia. In 2001 the Association of British Orchestras (ABO) published "A Sound Ear," offering practical guidance and training for symphony orchestras (Wright-Rei et al., 2008). In 2011, the British Broadcasting Corporation (BBC) published a similar document in the form of a guide for musicians and a toolkit for managers (Hansford, 2011a,b,c).

Health Education and Health Promotion

Health promotion is "a process of enabling people to increase control over, and to improve their health" (Rootman et al., 2001, p. 13), thus empowering individuals. The Ottawa Charter for Health Promotion, based on the Report to the Canadian Ministry of Health (Lalonde, 1974) was adopted in 1986 (Chesky et al., 2006). It defines public health in relation to supportive settings: healthy working and living environments; health promotion as

part of the daily activities of the setting; and links with the wider community (Dooris et al., 2010). These are also known as "settings for health" or "healthy settings," that is, organizational structures in which health promotion may take various forms, such as schools, work sites, hospitals, villages, and cities.

One example of a healthy setting is the health-promoting school. Dooris et al. (2010) argue that the university context is particularly well-suited to promoting public health. The UK Healthy Universities Network[1] was established in 2006 as a small and informal group, but has grown with support from the Higher Education Funding Council of England (HEFCE). The Network currently brings together 83 HEIs, 20 non-UK HEIs and 24 other stakeholder organizations, creates electronic tools, shares best practices and facilitates national projects. It also signed the Okanagan Charter for Health Promoting Universities and Colleges, an international framework for health promotion in higher education and post-secondary sector. The Charter uses a whole-system approach, taking advantage of every opportunity for health promotion: engaging all stakeholders (e.g., students, staff, administrators) in decision-making processes; facilitating interdisciplinary and cross-sector collaborations; promoting evidence-based policies, and practices; building strengths based on an informed understanding of contexts and local social landscapes (e.g., values, cultural diversity, etc.); and acting on the basis of the universal human right to health (Okanagan Charter, 2015). The Healthy Conservatoires Network[2], modeled on the Healthy Universities Network, was established in 2015 as an outcome of the UK Arts and Humanities Research Council (AHRC)-funded Musical Impact project (see below).

Health promotion implies both increasing individuals' health literacy (via health education: building health-related knowledge and developing life skills to enhance capability, motivation, and self-efficacy) and trying to improve broader socio-economic, political and environmental living conditions by building supportive environments, encouraging community action, informing public health policies and ensuring that health services are oriented toward achieving population health outcomes. Life skills include stress management and emotional self-regulation, communication, and interpersonal skills, decision making, problem solving, critical thinking, and creative thinking (WHO, 1998). Given the complexity of health promotion, it should be distinguished from health education, which is more appropriately delivered through higher education curricula.

The US-based Health Promotion in Schools of Music (HPSM) project (2004–2006) resulted from a collaboration between the University of North Texas and the Performing Arts Medicine Association, and aimed to prevent musicians' playing-related occupational injuries. Their consensus-based recommendations aim to incorporate health-supportive environments and better educational programmes as part of professional music training, and include adopting a health promotion framework; developing and offering an undergraduate occupational health course for all music majors; educating students about hearing loss as part of ensemble-based instruction; and assisting students through active engagement with health care resources (Chesky et al., 2006).

Musical Impact was a 4-year AHRC-funded research project that brought together nine conservatoires in the UK to investigate and enhance the health and wellbeing of student and professional musicians (Musical Impact, 2013–2017) (Chesky et al., 2006). The project encompassed three strands: (1) Fit to Perform, investigating physical and mental performance fitness, as well as musicians' health-related attitudes and behaviors; (2) Making Music, exploring the physical and psychological demands of music making; and (3) Better Practice, focusing on interventions to promote health. The present study emerges from the Better Practice strand and investigates the effectiveness of a compulsory health education course, Health and Wellbeing for Musicians, for undergraduate music students.

The Present Study

The course provided health education for first year undergraduate music students at a UK music conservatoire. The aims of the study were to (a) explore students' hearing and use of hearing protection; (b) design an evidence-based health education course; (c) assess the effects of the course on primary outcomes (perceived knowledge of course content and knowledge and awareness of potential risks to health) and secondary outcomes (including general health, health-related quality of life [HRQoL], health-promoting behaviors, self-efficacy, emotional state, perceived stress, frequency and severity of PRMDs, and perceived exertion); and (d) identify the topics most salient to students on the basis of the issues they chose to engage with in their course assessment.

MATERIALS AND METHODS

Health and Wellbeing for Musicians: Course Design

The course reflected all HPSM recommendations other than the adoption of a single health promotion framework. Its curriculum was informed by the findings of research on MPA and PRMDs; the findings of evaluations of other courses designed to improve musicians' health; theories and models deriving from health psychology (Taylor, 2012); discussions with the Acting Head of Undergraduate Studies at the institution where the first and fourth authors are based; and members of the Healthy Conservatoires Network.

Interventions designed to prevent and/or mitigate MPA were reviewed systematically by Burin and Osorio (2016), see also Matei and Ginsborg (2017), Spahn et al. (2016), Steyn et al. (2016), and Juncos et al. (2017). Interventions designed to prevent and/or mitigate PRMDs have been evaluated by Ackermann et al. (2002), Chan et al. (2014a,b), Kava et al. (2010), and Lee et al. (2012).

Few evaluations of health courses for musicians have been published, although they are delivered worldwide (Manchester, 2007a,b,c). Typical courses address mental and physical health, work satisfaction and coping, time management, wellbeing, and performance quality. They include information on general lifestyle, such as nutrition, physical fitness, and sleep (Barton and Feinberg, 2008). They teach physiology, functional anatomy

[1](Healthy Universities, 2017). www.healthyuniversities.ac.uk
[2](Musical Impact, 2017). www.musicalimpact.org

and performing arts medicine (Spahn et al., 2001; Hildebrandt and Nubling, 2004; Zander et al., 2010), ergonomics (Martín López and Farías Martónez, 2013), injury prevention (Barton and Feinberg, 2008), and hearing health (Laursen and Chesky, 2014). They advocate concentration, mental rehearsal and imagery for effective practice and enhanced performance (Clark and Williamon, 2011). They recommend techniques such as visualization, breathing, relaxation, cognitive restructuring, and self-talk for performance anxiety (Barton and Feinberg, 2008; Clark and Williamon, 2011; Osborne et al., 2014; Spahn et al., 2016). They use behavioral exposure in the form of public performance (Clark and Williamon, 2011; Spahn et al., 2016) and offer classes in Feldenkrais Method and Alexander Technique (Zander et al., 2010; Su et al., 2012).

The reports listed above provide little information as to how curricula were designed and whether formative methodologies such as literature reviewing, feedback from a range of stakeholders, pilot testing and subsequent adjustments to the design were made. The distinction between health promotion and health education is almost never made explicitly. This matters because the latter should be evaluated in terms of the extent to which students' awareness, perceived competency, perceived knowledge *of* and perceived responsibility *for* health risks increased as a result of taking the course; to date, only Laursen and Chesky (2014) have reported these outcomes in relation to changes to a brass methods curriculum.

Health and Wellbeing for Musicians: Course Structure, Content, Delivery and Assessment

The course was designed as the major component of a module entitled Artist Development 1, compulsory for all first-year students at a tertiary-level music conservatoire in the UK. The other components were recording and self-promotion. The module took place over the first and second terms of the academic year (September-March) and consisted of ten weekly 1-hour lectures delivered to the whole cohort (104 students) and eight weekly 1-hour seminars delivered to ten small groups of 10–15 students. Seven of the lectures and five of the seminars related, broadly, to health and wellbeing.

Lecture 1, *How to practice more effectively*, was delivered by the Head of the School of Strings. Topics included deliberate practice; listening back to self-recordings; appraising ideal performances and designing exercises for overcoming identified weaknesses.

Lecture 2, *How to rehearse more effectively*, was delivered by the Head of Chamber Music with live illustrations from a first-year piano trio. Topics included warming up and rehearsing as a group; overcoming technical difficulties and problems with rhythm, articulation, bowing and breathing; intonation in groups with and without piano; learning how to identify errors, and to give and receive constructive criticism; the use of recordings when developing interpretations; responding and listening to the music while playing; interacting with the audience.

Lecture 3, *Introduction to health and wellbeing*, was delivered by the first author. Topics included the findings of recent research on the prevalence and symptoms of, and risk factors for MPA, PRMDs and hearing loss; healthy lifestyles (e.g., nutrition and sleep) and health-promoting behaviors (e.g., physical activity and reducing sedentary behavior); behavior-change strategies focusing on the concept of life skills as defined by WHO (1998).

Lecture 4, *Life skills for musicians including behavior change techniques*, was also delivered by the first author and focused on both health and music-making. Life skill topics included time management, exposure (e.g., to healthy options or public performance) and restriction (i.e., intentionally reducing exposure). Behavior change techniques included goal setting and self-monitoring (Michie et al., 2009; Dombrowski et al., 2012; see also Samdal et al., 2017); planning; self-talk; grading tasks; cognitive reframing (Brooks, 2014); disputation as a solution for reducing the impact of negative thoughts, in (McLeod, 2015).

Lecture 5, *Anatomy and physiology for musicians*, was delivered by a specialist in performing arts medicine. Topics included sensorimotor integration particularly in relation to MPA.

Lecture 6, *Managing music performance anxiety*, was delivered by a music psychologist. Topics included prevalence; symptoms; causes; and the relationship between arousal and performance quality. Potential solutions were suggested in the form of a toolbox of evidence-based strategies including peak performance approaches.

Lecture 7, *Presentation skills*, was delivered by a senior member of the School of Vocal Studies. The session focused on public speaking and included information on physical (e.g., voice warm-ups) and mental preparation.

Ten groups of students (three groups of singers, three groups of string players, two groups of keyboard players and two groups of wind, brass and percussion players) each took part in five seminars that were intended to reflect the content of the seven lectures. The first author facilitated all ten seminars entitled *Life skills for musicians*; the performing arts medicine specialist facilitated all those entitled *General ergonomics: How do I improve my posture?* The remaining seminars were entitled *Injury prevention and management, including hearing protection; Preparation for performance*; and *Successful careers: Time management, finances, life on tour* and were facilitated by a range of tutors including the fourth author.

Students were required to submit a portfolio of assessments including a 1,000-word essay in response to both the following questions: (1) Looking back on the Health and Wellbeing component of Artist Development 1, what new information, useful for your own music-making, have you learned from one lecture or one workshop/seminar?; (2) How have you been able to put this information into practice when making music (e.g., practicing, rehearsing, performing or studying more generally)?

Health and Wellbeing for Musician: Course Evaluation

A mixed-methods approach to evaluation was adopted: quantitative analyses of within-subject data gathered at baseline and post-intervention, and between-group data (intervention vs. controls); and qualitative, semi-structured interviews (Matei et al., 2017). The research was approved by the institution's

research ethics committee. While the course was compulsory for all first-year students, informed consent to participate in the research was given by completion of the questionnaires, which took about 30 min. These were administered at the beginning of the first lecture of the course in September 2016 and at the end of the last lecture in February 2017, via Bristol Online Surveys and as hard copy. The control group consisted of students who had been in the first year of their undergraduate studies in 2015–2016 (i.e., the year before the course was introduced) and responded to the same questionnaire, slightly modified, in March and April 2018, when they were third-year students.

Measures

The full questionnaire can be seen in the Appendix in Supplementary Material. It includes items reflecting relevant demographic data; hearing; primary and secondary outcomes.

Hearing and use of hearing protection were measured using 12 items adapted from Laitinen and Poulsen (2008).

Primary outcomes were measured using 15 items adapted from Laursen and Chesky (2014): perceived knowledge of seven topics covered in the course; awareness of potential risks to health associated with music performance; knowledge of potential risks to hearing, health and safety; responsibility for self-education and prevention of ill-health; and competency to implement recommendations for healthy performance. In order to assess the value they attached to the topics covered in the course, respondents were asked to rate their perceived importance, since health-related perceived importance has been associated with a higher likelihood of engaging in health promoting behaviors (Wardle and Steptoe, 1991; Näslund and Fredrikson, 1993; Orji et al., 2012). All ratings were made using 11-point scales from 0 (none) to 10 (greatest possible) or equivalent.

Secondary outcomes were measured as follows:

a) *General health*, a single item of self-rated health status of the RAND Short Form 36 Health Survey (SF-36; Ware and Sherbourne, 1992; McDowell, 2006), measured on a scale from 1 (excellent) to 5 (poor). Responses are recoded as scores of 100, 75, 50, 20, and 0, with higher values suggesting better perceived health.
b) *Health-related quality of life* (HRQoL): four items from the 15D scale (Sintonen, 1994): (problems with) sleeping, depression, distress, and (lack of) vitality, measured on a scale from 1 (normal) to 5 (severe).
c) *Health-promoting behaviors:* the Health Promoting Lifestyle Profile II questionnaire (HPLP II: Walker and Hill-Polerecky, 1996), consisting of 52 items representing six sub-scales: health responsibility (HR), physical activity (PA), nutrition (NU), spiritual growth (SG), interpersonal relations (IR), and stress management (SM), measured on a scale from 1 (never) to 4 (routinely).
d) *Self-efficacy* (i.e., self-appraisal of one's capability to deal with a situation or solve a problem), which might facilitate both engagement in health-promoting behaviors and maintenance of healthy habits (Kreutz et al., 2008): the Self-Efficacy Scale (SES: Schwarzer and Jerusalem, 1995): ten items, measured on a scale from 1 (not at all) to 4 (exactly true).
e) *Emotional states* during the previous week: the Positive and Negative Affect Schedule (PANAS: Watson et al., 1988), a set of 20 adjectives describing positive (10) and negative (10) affective states, measured on scales from 1 (very slightly) to 5 (extremely). Kreutz et al. (2008) argue that positive emotions may stimulate engagement in health-promoting behaviors and thereby reinforce them.
f) *Perceived stress:* the Perceived Stress Scale (PSS-10: Cohen and Williamson, 1988) was found to be a reliable and valid tool in a study of college students (Roberti et al., 2006): ten items relating to stress levels in the previous month, measured on a scale from 0 (never) to 4 (very often). Ratings are added to produce a total, rather than a mean score. The total score can range from 0 to 40.
g) *Frequency and severity of PRMDs*: two items adapted from Ackermann and Driscoll (2010), measured on 11-point Likert scales, from 0 (never) to 10 (constantly), and from 0 (none) to 10 (most severe) respectively.
h) *Perceived exertion*, to evaluate the amount of physical effort respondents needed to complete their daily practice routines: the Borg Rating Scale (Borg, 1998), which ranges from 6 (no exertion at all) to 20 (maximal exertion).

The respondents' 1,000-word essays, written for the purposes of course assessment, also served as a source of data.

ANALYSES

Quantitative data were analyzed using IBM SPSS 22. Descriptive and inferential statistics are presented. Statistical significance was considered at $p = 0.05$. Confidence intervals of 95% were used throughout. Missing data were handled using listwise deletion for the exploration of changes across time and between groups.

For within-subject analyses, Wilcoxon Signed-Rank tests for paired samples were run, because the assumptions for normality were not met. Effect sizes were calculated using the following formula: $r = Z/\sqrt{N}$ (where N is the total number of cases, not participants). The paired-samples sign test was run when the assumption of symmetrical distribution was not met.

For between-group analyses, Mann-Whitney U-tests for independent samples were used, while effect sizes were calculated using the following formula: $\eta^2 = Z^2/(N-1)$ (where N is the total number of participants). For normally distributed data, independent t-tests were conducted.

Respondents' essays were anonymised and their titles (or content, in the absence of titles) categorized using open (bottom-up) coding, according to course topics covered.

RESULTS

Sample Characteristics: Attrition Rate and Demographics

Intervention Group

Of a total of 104 first-year undergraduate students enrolled on the course, only 13 did not complete the baseline questionnaire (12.5%). Of the 91 students who did, 81 (90%) completed the same questionnaire post-intervention: an attrition rate of

only 10%. The mean age of these 81 respondents (37 males, 41 females, 3 undisclosed sex) was 19 years (range 18–26, $SD = 1.34$). Twenty-nine (36.3%) were singers, 19 (23.8%) were string players, 17 (21.3%) were wind and brass players, 11 were pianists (13.8%), three were composers (3.8%), and one was a percussionist (1.3%). The mean number of years they had sung, or played their main instrument, was 9.4 (range 2–18, $SD = 3.09$). They reported carrying out a mean of 14.3 h of personal practice per week (range 0–84 h, $SD = 11.08$).

Control Group

Thirty-three third-year undergraduate students (18 male, 14 female, and one who preferred not to disclose their sex) with a mean age of 22 (range 20–27, $SD = 1.71$) completed the questionnaire either online or as hard copy in March–April 2018. Fifteen were string players (46.9%), six were keyboard players (18.8%), six were wind and brass players (18.8%), three were singers (9.4%), and two were composers (6.3%). Information on main instrument was missing for one respondent. They had played their main instruments for a mean of 12 years (range 7–18, $SD = 3.16$).

Hearing and Use of Hearing Protection

For the purposes of comparing the intervention group with controls, data from all the students who completed to the questionnaire at baseline, including those who did not complete it post-intervention, are shown in **Table 1** as numbers and percentages of respondents to each question.

Use of Hearing Protection

In both groups, minorities of respondents reported using hearing protection "sometimes," "often" or "always" while practicing alone (10% of the intervention group and 9% of controls), and during their own performances (8% of the intervention group and 12% of controls). By contrast, 20% of the intervention group and 30% of controls reported using hearing protection while rehearsing with other people, and 19% of the intervention group and 36% of controls used it while listening to other people's performances. Seventy percent of those who did use hearing protection used reusable soft ear plugs. Of those whose instruments can be muted, 17.5% of the intervention group and 22.2% of controls reported using the mute "often" or "always."

Experiences of Using Hearing Protection

Fifty-six percent of the respondents in the intervention group who used hearing protection, but only 33% of controls, reported having got used to wearing them right away; another 33% of controls said it had taken them "weeks/months/years" to get used to them.

Difficulties Using Hearing Protection

The most frequently-reported problems experienced by respondents in the intervention and control groups were a decrease in their ability to hear other players (26.8 and 45.5% respectively). The next most frequently-reported problems were difficulty inserting ear plugs (21.4% of intervention group responses) and hindrance to the player's own performance (33.3% of control group responses). The questionnaire included an invitation to report other problems: responses included "not being able to hear details in the sound;" "made listening to my sound more difficult;" "can't sing with them in;" "I felt isolated and anxious over the sounds I was making and tuning;" "I can hear my mouth moving—very distracting;" and "hear myself from within my mouth when playing".

Hearing Issues

Tinnitus was reported by 8% of the intervention group and 21% of controls, and hyperacusis by 6% and 22% respectively. Only one member of the intervention group experienced distortion and no-one reported diplacusis.

Hearing Loss

While only 36% of the intervention group and 47% of controls had had a hearing test in the previous 10 years, only 10% of the former and none of the latter had been diagnosed with hearing loss.

Primary Outcomes

Descriptive and inferential statistics are shown in **Table 2** for perceived knowledge and importance of topics covered in the course, and awareness and knowledge of potential risks to health.

Perceived Knowledge

There were statistically significant increases from baseline to post-intervention in mean ratings for perceived knowledge of all topics covered in the course: effective practicing strategies ($Z = -4.32$, $p < 0.001$); effective rehearsing strategies ($Z = -3.84$, $p < 0.001$); learning and memorizing strategies ($Z = -2.37$, $p = 0.01$); ergonomics and posture ($Z = -2.45$, $p < 0.01$); managing MPA ($Z = -4.97$, $p < 0.001$); life skills and behavior change techniques ($Z = -3.12$, $p = 0.002$); presentation skills ($Z = -2.31$, $p = 0.02$). Small to medium effect sizes associated with these changes varied between $r = 0.18$ and $r = 0.42$ (Cohen, 1988). There was a trend such that respondents rated their perceived knowledge, post-intervention, higher than controls on managing MPA ($Z = -1.69$, $p = 0.09$) but the difference between means did not reach significance.

Perceived Importance

Respondents rated their knowledge of effective learning and memorizing strategies, post-intervention, higher than controls ($Z = -2.07$, $p = 0.03$, $\eta^2 = 0.04$), and tended to give higher ratings for the perceived importance of ergonomics and posture ($Z = -1.80$, $p = 0.07$) although the difference between means did not reach significance. Otherwise, there were no differences between the ratings of the intervention and control groups, nor changes from baseline to post-intervention.

Awareness of Potential Risks

There was a significant increase from baseline to post-intervention in ratings for one of the three items: awareness of performance factors related to musculoskeletal injuries associated with learning and playing an instrument/singing ($Z = -3.09$, $p = 0.002$, $r = 0.26$). There were no significant differences between the ratings of respondents, post-intervention, and controls.

TABLE 1 | Hearing and use of hearing protection.

	Intervention (T1 only) N (%)	Control N (%)
USE OF HEARING PROTECTION		
Do you use ear protection aids (ear plugs/noise-reducing headphones)…		
…while practizing alone (89 Intervention, 33 Control)		
Never/Seldom	80 (89.9%)	30 (90.9%)
Sometimes/Often/Always	9 (10.1%)	3 (9.1%)
…at rehearsals with other players (89 I, 33 C)		
Never/Seldom	71 (79.8%)	23 (69.7%)
Sometimes/Often/Always	18 (20.2%)	10 (30.3%)
…at performances (my own) (89 I, 33 C)		
Never/Seldom	82 (92.1%)	29 (87.9%)
Sometimes/Often/Always	7 (7.9%)	4 (12.1%)
…at other people's performances (90 I, 33 C)		
Never/Seldom	73 (81.1%)	21 (63.6%)
Sometimes/Often/Always	17 (18.9%)	11 (36.4%)
Use of hearing protectors (39 I users, 21 C users)		
I got used to wearing them right away	22 (56.4%)	7 (33.3%)
It took me weeks/months/years to get used to them	6 (15.4%)	7 (33.3%)
I didn't get used to them, but I use them anyway	7 (17.9%)	4 (19.0%)
I didn't get used to them, so I stopped using them	4 (10.25%)	3 (14.3%)
I have never used them	51	11
Type of ear protection (37 I users, 20 C users)		
Single use soft ear-plugs	10 (27%)	4 (20%)
Reusable (more expensive) soft ear plugs	26 (70.3%)	14 (70%)
Personally tailored, custom-made ear plugs	1 (2.7%)	2 (10%)
While using your ear plugs, did you encounter any of the following difficulties?[a] 56 I, 38 C)		
The ear plugs hindered my own performance	9 (16.1%)	11 (33.3%)
The ear plugs decreased my ability to hear the other player	15 (26.8%)	15 (45.5%)
Ear plugs were uncomfortable	10 (17.9%)	4 (12.1%)
Ear plugs were difficult to put into ears	12 (21.4%)	4 (12.1%)
Ear plugs made me feel dizzy	2 (7.1%)	0
Ear plugs caused a pressure sensation in my ear	8 (14.3%)	4 (12.1%)
If your instrument is suitable for playing with mute (muffler), how often do you use it on your instrument? (40 I, 18 C)		
Never/Seldom	29 (72.5%)	14 (77.8%)
Often/Always	11 (17.5%)	4 (22.2%)
HEARING ISSUES		
Do you have tinnitus? (88 I, 33 C) YES	7 (7.95%)	7 (21.2%)
Do you experience hyperacusis? (86 I, 33 C) YES	5 (5.8%)	5 (15.15%)
Do you experience distortion? (80 I, 33 C) YES	1 (1.25%)	0
Do you experience diplacusis? (80 I, 33 C) YES	0	0
When was your hearing last checked? (66 I, 32 C)		
I don't know	19 (28.8%)	4 (12.5%)
I have never had a hearing test	18 (27.3%)	10 (31.3%)
Over 10 years ago	5 (7.6%)	3 (9.4%)
6–10 years ago	9 (13.6%)	2 (6.3%)
4–5 years ago	3 (4.5%)	3 (9.4%)
1–3 years ago	6 (9.1%)	3 (9.4%)
In the last 12 months	6 (9.1%)	7 (21.9%)
When your hearing was checked, were you told that you have hearing loss? (40 I, 26 C)		
Yes	4 (10%)	0
No	29 (72.5%)	19 (73.1%)
Cannot say	7 (17.5%)	7 (26.9%)

[a]*Respondents could choose more than one option.*

TABLE 2 | Perceived knowledge and importance of topics, awareness and knowledge of potential risks.

	N	*T1 (mean, SD)*	*N*	*T2 (mean, SD)*	*Z value*	*p*	*Effect size (r)*	*N*	*Control (mean, SD)*	*Z value (comparison with intervention group at T2)*	*p*	*Effect size (η^2)*
PERCEIVED KNOWLEDGE OF:												
1. Effective practizing strategies	80	5.62 (2.02)	81	6.92 (1.60)	−4.32	**<0.001**	**−0.37**	33	7.18 (1.77)	−1.32	0.18	
2. Effective rehearsing strategies	80	5.21 (2.26)	79	6.40 (1.72)	−3.84	**<0.001**	**−0.32**	33	6.57 (2.00)	−1.04	0.29	
3. Learning and memorizing strategies+	80	5.76 (2.24)	81	6.39 (2.07)	−2.37	**0.01**	**−0.18**	33	6.51 (2.37)	−0.56	0.57	
4. Ergonomics/posture	80	5.56 (2.34)	81	6.19 (2.15)	−2.45	**0.01**	**−0.21**	33	6.42 (2.07)	−0.86	0.38	
5. Managing music performance anxiety	80	4.47 (2.58)	81	6.86 (1.85)	−4.97	**<0.001**	**−0.42**	32	5.93 (2.44)	−1.69	0.09	
6. Life skills and behavior change techniques+	80	4.87 (2.67)	81	6.39 (2.05)	−3.12	**0.002**	**−0.24**	33	5.42 (2.54)	−1.54	0.12	
7. Presentation skills+	79	5.64 (2.35)	81	6.28 (2.29)	−2.31	**0.02**	**−0.19**	33	6.45 (2.29)	−0.24	0.80	
PERCEIVED IMPORTANCE OF:												
1. Effective practizing strategies+	77	8.74 (1.49)	80	8.76 (1.72)	−0.15	0.87		32	8.62 (2.05)	−0.48	0.62	
2. Effective rehearsing strategies	77	8.63 (1.47)	80	8.48 (1.85)	−1.11	0.26		32	8.28 (2.06)	−0.62	0.52	
3. Learning and memorizing strategies	77	7.97 (1.85)	80	8.21 (1.79)	−1.30	0.19		32	7.68 (1.59)	−2.07	**0.03**	0.04
4. Ergonomics/posture+	77	8.36 (1.60)	80	8.33 (1.87)	0	1.00		32	7.78 (1.87)	−1.80	0.07	
5. Managing music performance anxiety+	76	8.42 (2.06)	80	8.17 (1.68)	−1.71	0.08		32	8.18 (2.62)	−0.86	0.38	
6. Life skills and behavior change techniques	77	7.64 (2.28)	80	7.61 (2.25)	−0.34	0.73		32	7.21 (2.63)	−0.99	0.31	
7. Presentation skills+	75	6.06 (1.83)	80	7.48 (2.27)	−0.91	0.35		32	7.31 (2.62)	−0.32	0.74	
AWARENESS OF POTENTIAL RISKS												
As a future professional musician, are you aware of any performance factors that are related to muscubskeletal injuries associated with learning and playing an instrument/singing?	80	5.36 (2.66)	80	6.62 (2.34)	−3.09	**0.002**	**−0.26**	33	6.67 (2.67)	−1.19	0.23	
Learning and performing music may involve hazards that have a negative impact on health.	81	5.77 (3.22)	81	6.03 (3.12)	−0.90	0.36		33	6.63 (3.21)	−1.20	0.22	
The way an individual plays a musical instrument/sings influences his/her level of risk of injury or health problems.	81	7.20 (2.57)	79	7.31 (2.60)	−0.32	0.74		33	8.06 (2.27)	−1.75	0.07	

(Continued)

TABLE 2 | Continued

	N	T1 (mean, SD)	N	T2 (mean, SD)	Z value	p	Effect size (r)	N	Control (mean, SD)	Z value (comparison with intervention group at T2)	p	Effect size (η^2)
KNOWLEDGE OF POTENTIAL RISKS												
Do you know what sound intensity levels are associated with hearing loss?	80	5.50 (2.98)	79	6.22 (2.78)	−2.09	**0.03**	**−0.17**	33	5.03 (3.82)	−1.83	0.06	
As a future professional musician, do you feel you have the resources, understanding, and knowledge to deal with the health and safety issues associated with learning and performing music?+	81	5.60 (2.30)	80	7.15 (1.92)	−5.03	**<0.001**	**−0.39**	33	6.51 (1.97)	−1.80	0.10	

+Results based on the Sign Test analysis (within-subjects).

Knowledge of Potential Risks

There were significant increases from baseline to post-intervention in ratings for both items: knowledge of sound intensity levels associated with hearing loss ($Z = -2.09$, $p = 0.03$, $r = 0.17$) and how to deal with the health and safety issues associated with learning and playing a musical instrument ($Z = -5.03$, $p < 0.001$, $r = 0.39$). There were no significant differences between the ratings of respondents, post-intervention, and controls. There was, however, a trend such that the former rated their knowledge of sound intensity levels higher than the latter ($Z = -1.83$, $p = 0.06$), although the difference between means did not reach significance.

Other Primary Outcomes

As shown in **Table 3**, there were no significant increases from baseline to post-intervention in ratings for responsibility for self-education and prevention of ill-health, or competence to implement recommendations for healthy performance. Nor, for these outcomes, were there any significant differences between the ratings of respondents, post-intervention, and controls.

Secondary Outcomes

Descriptive and inferential statistics are shown in **Table 4**.

General Health

Means at both baseline and post-intervention were comparable to those obtained previously among musicians, but much lower than values among university students in the UK (Araujo et al., 2017). There were no significant mean differences from baseline to post-intervention, nor between intervention group and controls.

HRQoL

While means at baseline and post-intervention were low, there were nevertheless significant increases in ratings representing sleep problems ($Z = -2.77$, $p = 0.005$, $r = 0.21$), distress ($Z = -2.63$, $p = 0.009$, $r = 0.20$), and lack of vitality ($Z = -2.02$, $p = 0.04$, $r = 0.15$). In comparison with respondents post-intervention, controls experienced more severe depression ($Z = -3.58$, $p < 0.001$, $\eta^2 = 0.11$), distress ($Z = -2.18$, $p = 0.02$, $\eta^2 = 0.04$), and lack of vitality ($Z = -3.49$, $p < 0.001$, $\eta^2 = 0.10$).

Health-Promoting Behaviors

The HPLPII showed acceptable to good internal reliability for the whole scale (Cronbach's alpha = 0.77) and subscales at T1 with the following alphas: HR = 0.83; PA = 0.81; NU = 0.73; SG = 0.84; IR = 0.78; SM = 0.67) and at T2 for the entire scale (alpha = 0.79) and subscales: HR = 0.81; PA = 0.80; NU = 0.75; SG = 0.87; IR = 0.82; SM = 0.72). The grand mean of all scores on HPLPII was 2.53 (SD = 0.36), indicating that respondents reported engaging in health-promoting behaviors "sometimes" or "often" (Kreutz et al., 2008; Panebianco-Warrens et al., 2015; Araujo et al., 2017). Means for the subscales representing health responsibility, physical activity and stress management were lower, and means for the subscales representing nutrition, spiritual growth and interpersonal relations were higher than the grand mean. There were no significant differences in ratings at baseline and post-intervention, nor between those of

TABLE 3 | Perceived responsibility and competence.

	N	T1 (mean, SD)	N	T2 (mean, SD)	Z value	p	N	Control (mean, SD)	Z value (comparison with intervention group at T2)	p
RESPONSIBILITY FOR SELF-EDUCATION AND PREVENTION OF ILL-HEALTH										
As a future professional musician, do you feel responsible for being informed and educated about health and safety issues related to learning and performing music?+	81	7.38 (2.11)	80	7.63 (1.89)	−0.90	0.36	33	7.15 (1.97)	−1.16	0.24
Do you feel personally responsible for preventing health problems that may occur?	81	7.81 (1.78)	80	8.05 (1.82)	−0.71	0.47	33	7.51 (1.88)	−1.27	0.20
COMPETENCE TO IMPLEMENT RECOMMENDATIONS FOR HEALTHY PERFORMANCE										
As a future professional musician, are you prepared to address the current recommendations launched by relevant international organizations to aid in the prevention of health and safety concerns that may arise through the learning and performance of musical instruments/singing?+	81	7.92 (1.94)	80	7.53 (2.00)	−1.65	0.09	33	7.03 (1.97)	−1.04	0.29

+*Results based on the Sign Test analysis (within-subjects).*

respondents, post-intervention, and controls (see **Table 4** for mean ratings and standard deviations).

Self-Efficacy

The SES scale showed good internal reliabilities at T1 and T2 (Cronbach's alphas = 0.86 and 0.89 respectively). Ratings increased significantly from baseline to post-intervention ($Z = -2.52$, $p < 0.01$, $r = 0.20$), although the grand mean at baseline was only 3.0 ($SD = 0.41$), lower than found in previous research in the UK ($M = 3.57$; $SD = 0.63$: Kreutz et al., 2008) and South Africa ($M = 3.89$; $SD = 0.59$: Panebianco-Warrens et al., 2015). There were no significant differences between the ratings of respondents, post-intervention, and controls.

Emotional States

The PANAS scale showed good internal reliabilities at T1 (PA Cronbach's alpha = 0.87; NA = 0.83) and T2 (PA = 0.90; NA = 0.88). Ratings for positive affect decreased significantly from baseline to post-intervention ($Z = -4.02$, $p < 0.001$, $r = 0.32$), although the mean at baseline was 3.89 ($SD = 0.65$), higher than those reported by Kreutz et al. (2008) and Panebianco-Warrens et al. (2015), which were 3.43 ($SD = 0.75$) and 3.51 ($SD = 0.74$) respectively. There was a trend such that ratings for negative affect increased ($Z = -1.64$, $p = 0.09$), although significance was not reached; once again, the mean at baseline was 1.77 ($SD = 0.59$), lower than the means reported in the UK and South African research, which were 2.09 ($SD = 0.73$) and 2.40 ($SD = 0.81$) respectively. In comparison with respondents post-intervention, controls experienced lower positive affect ($Z = -2.30$, $p = 0.02$, $\eta^2 = 0.04$) and higher negative affect ($Z = -2.68$, $p < 01$, $\eta^2 = 0.06$).

Perceived Stress

The PSS scale showed good internal reliability at T1 and T2 (Cronbach's alphas = 0.86 and 0.87 respectively). There was no significant difference between mean ratings at baseline and post-intervention, but in comparison with respondents, post-intervention, controls reported higher levels of stress ($Z = -2.28$, $p < 0.02$, $\eta^2 = 0.04$).

PRMDs

There were no significant differences between mean ratings representing the frequency and severity of PRMDs at baseline and post-intervention, nor between the ratings of respondents, post-intervention, and controls. Both frequency and severity were comparatively low.

Perceived Exertion

There was a significant decrease from baseline to post-intervention ($Z = -3.05$, $p = 0.002$, $r = 0.24$), although controls reported their daily practice routine to require more (albeit "very light") effort ($Z = -3.22$, $p < 0.001$).

Student Assignments

A total of 103 essays was submitted. Just over half the students chose to write about managing MPA or life skills and behavior change techniques (see **Table 5**). Less popular topics included injury prevention (including hearing loss), vocal health, practice and memorization strategies and the psychophysical mechanisms of performance and Alexander Technique. Three students wrote about public speaking, and a small minority chose to discuss the health and wellbeing component of the module as a whole.

TABLE 4 | Secondary outcomes.

	N	*T1 (mean, SD)*	*N*	*T2 (mean, SD)*	*Z value*	*p*	Effect size *(r)*	*N*	Control *(mean, SD)*	*Z value (comparison with T2)*	*p*	Effect size *(η^2)*
General health	80	67.81 (18.73)	81	66.04 (19.46)	−0.81	0.41		33	59.64 (22.48)	−1.53	0.12	
HRQoL												
Sleeping	81	1.69 (0.70)	81	1.91 (0.77)	−2.77	**0.005**	**−0.21**	33	2.09 (0.91)	−0.96	0.33	
Depression	81	1.53 (0.76)	81	1.60 (0.83)	−1.13	0.25		33	2.36 (1.08)	−3.58	**<0.001**	0.11
Distress	81	1.95 (0.86)	81	2.20 (0.95)	−2.63	**0.009**	**−0.20**	33	2.70 (1.18)	−2.18	**0.02**	0.04
Vitality	81	1.49 (0.63)	81	1.65 (0.79)	−2.02	**0.04**	**−0.15**	33	2.30 (0.95)	−3.49	**<0.001**	0.10
HPLP II												
Health Responsibility (HR)++	79	1.91 (0.53)	81	1.94 (0.56)	−0.12	0.90		32	2.01 (0.46)	−1.13	0.25	
Physical Activity (PA)	74	2.28 (0.62)	79	2.38 (0.64)	−1.12	0.25		32	2.28 (0.62)	−0.77	0.44	
Nutrition (NU)	80	2.57 (0.52)	78	2.63 (0.56)	−0.96	0.33		32	2.67 (0.50)	−0.22	0.82	
Spiritual Growth (SG)++	77	2.90 (0.54)	79	2.87 (0.60)	−0.07	0.93		33	2.70 (0.54)	1.37	0.17	
Interpersonal Relations (IR)	78	3.06 (0.46)	79	3.04 (0.50)	−0.32	0.74		30	2.92 (0.54)	−1.37	0.17	
Stress Management (SM)++	80	2.33 (0.43)	80	2.42 (0.51)	−1.25	0.21		33	2.33 (0.41)	0.91	0.36	
Self-efficacy	79	3.00 (0.41)	80	3.09 (0.48)	−2.52	**0.01**	**−0.20**	33	3.13 (0.45)	−0.71	0.47	
PANAS												
Positive Affect (PA)	76	3.89 (0.65)	80	3.56 (0.70)	−4.02	**<0.001**	**−0.32**	32	3.21 (0.83)	−2.30	**0.02**	0.04
Negative Affect (NA)	78	1.77 (0.59)	81	1.94 (0.72)	−1.84	0.09		32	2.33 (0.72)	−2.88	**<0.01**	0.08
Perceived stress	81	17.19 (6.49)	77	17.85 (7.20)	−0.50	0.57		29	21.10 (5.32)	−2.28	**<0.02**	0.04
PRMDs												
How often do you suffer from a PRMD?	80	1.42 (2.09)	81	1.66 (2.43)	−0.64	0.51		32	2.56 (2.68)	−1.76	0.77	
Average severity of PRMD	80	1.30 (1.97)	80	1.55 (2.03)	−1.12	0.26		32	2.43 (2.44)	−1.78	0.75	
Perceived exertion	78	7.32 (2.37)	80	6.40 (2.51)	−3.05	**0.002**	**−0.24**	32	8.16 (2.71)	−3.22	**0.001**	0.09

+Results based on the Sign Test analysis (within-group).
++Results based on independent t-tests (between-group).

TABLE 5 | Course topics covered in student assignments.

	N (%)
Managing MPA	36 (34.9%)
Life skills and behavior change techniques	21 (20.3%)
Injury prevention (including hearing loss)	10 (9.7%)
Vocal health	9 (8.7%)
Practice and memorisation strategies	9 (8.7%)
The psychophysical mechanisms of performance and Alexander Technique	6 (5.8%)
Public speaking	3 (2.9%)
Variety of topics or about the module as a whole	9 (8.7%)
Total	103 (100%)

DISCUSSION

The present intervention study investigated the effects of a compulsory health education course on a range of health-related outcomes for undergraduate music students. The course covered not only physical and mental health, but also effective strategies for practicing, memorizing and rehearsing, and life skills and behavior-change tools inspired by health psychology. It is the first such course to be designed and evaluated at a British conservatoire. Within-subject data were gathered at the beginning and end of the intervention in September 2016 and February 2017, and control data were gathered for the purposes of the between-group analysis in March–April 2018.

Hearing and Use of Hearing Protection

Tinnitus and hyperacusis were reported by both groups of respondents, with a higher incidence in the (third-year) control group than in the (first-year) intervention group. Ten percent of the intervention group had been diagnosed with hearing loss, although minorities of respondents in both groups reported having had hearing tests in the previous 10 years.

Although respondents were more likely to use hearing protection when rehearsing with others and attending concerts, comparatively few members of either group used hearing protection, or, if appropriate, the mute on their instrument, while practicing alone. This could affect hearing, since private practice can cause over-exposure to risky levels of sound: O'Brien et al. (2013), for example, estimated that recommended limits may be reached after less than half the practice time reported by participants in their study.

The majority of users preferred reusable soft ear plugs to single-use soft plugs and the much more expensive custom-made versions; over half the intervention group users and a third of control group users reported getting used to them immediately while the remainder needed more time, persisted despite discomfort, or gave up using them. Typical problems with ear plugs included decreased ability to hear others, hindrance to own performance, difficulties with insertion and the sensation of pressure in the ear.

These findings support the results of recent research investigating the perceived advantages and disadvantages of using ear plugs, how they are used and musicians' strategies for wearing them (Beach and O'Brien, 2017). The authors of that study carried out in-depth interviews with 23 musicians in Australia and found that they felt comfortable using them, appreciated their discreetness, and enjoyed an enhanced clarity of sound. They did not find communicating with other people any more difficult, although they were concerned that other people might have a negative opinion of them. Perceived disadvantages included the occlusion effect, which could have contributed to their experience of reduced sound quality; they also reported an impaired ability to judge sound balance, intonation, tone, and timbre.

Primary Outcomes

Reassuringly, respondents reported increased knowledge of the topics covered in the course, including the sound intensity levels associated with hearing loss, and how to deal with the health and safety issues associated with learning and playing a musical instrument. They also reported increased awareness of performance factors related to potential musculoskeletal injuries. The ratings of students who had taken the course and those who had not did not differ significantly, perhaps because the control group had had informal exposure to the other topics covered in the course, with the possible exception of life skills and behavior change techniques, which were introduced in the context of an innovative lecture on preventative health, tools for the initiation and maintenance of healthy habits, and cognitive strategies for addressing thinking errors. Students who had taken the course also rated their ability to deal with relevant health and safety issues significantly higher than controls, but these issues are likely to have been reinforced throughout the period of the intervention by instrumental and vocal tutors and through health and safety briefings provided by the conservatoire.

The results support those of Laursen and Chesky (2014) in relation to their health education programme; their respondents also reported significantly increased knowledge post-intervention, and Laursen and Chesky argue that even minimal intervention can produce positive effects. While we asked respondents to rate the importance (i.e., the value) they attached to each of the topics covered in the course, we found only one significant difference between intervention and control groups: the latter attached less importance to effective learning and memorizing strategies than the former, perhaps because, as current third-year students, they were more confident in their ability to meet the demands being made on them to learn and memorize. There were no changes in perceived importance between baseline and post-intervention. This can be attributed to a ceiling effect: means ranged from 7.64 to 8.74 at baseline and from 7.48 to 8.76 at post-intervention, suggesting that students find these topics highly relevant to their studies.

Secondary Outcomes

The only desired secondary outcome to increase significantly from baseline to post-intervention was self-efficacy, which may or may not have been the result of the course. Other significant increases were in the wrong direction: sleep problems, distress and lack of vitality all increased significantly from baseline to post-intervention, and controls experienced more severe

depression, distress and lack of vitality. Positive affect decreased significantly and there was a trend toward an increase in negative affect, while controls experienced lower positive and higher negative affect. Controls also reported higher levels of perceived stress.

We attribute these negative findings to the cumulative pressure on students over time. The first time the intervention group completed the questionnaire, they were in their second week at the conservatoire; post-intervention, they were facing deadlines for assignments to be submitted and recitals to be given. They may, however, have fared better than the control group simply by virtue of being a year younger. What we cannot know is the extent to which the health education course may have mitigated the demands perceived by the students in the intervention group. What we do know is that it might take longer for behavioral than cognitive changes to be made (Barton and Feinberg, 2008).

The mean ratings for reported perceived exertion (RPE) decreased significantly from baseline to post-intervention, and were higher for controls. Means were so low, representing "very very" to "very" light, although not surprisingly low, given that perceived exertion measures the level of physical effort and that scores for both frequency and severity of PRMDs were also low. For example, some exercise-based interventions have been associated with a positive impact on both PRMDs and RPE in the past (Ackermann et al., 2002; Kava et al., 2010; Chan et al., 2014a). However, the result is hard to interpret, given that perceived exertion may be influenced by both physiological and psychological factors (McCrary et al., 2016).

Finally, the categorization of student assignments to the topics covered in the course indicated those that respondents found of most interest or direct relevance to them, at this point in their studies: predominantly managing MPA and life skills and behavior change techniques.

The strengths of the study include the design and evaluation of the course, which was more rigorous than the majority of those reviewed above. First, the content of the course was based on a critical appraisal of the available literature on interventions to improve the health of musicians, theories from health psychology, and a clear conceptualization of health education, according to the WHO definition, as opposed to health promotion. Second, the course was compulsory. This partially explains the low attrition rate and reduces the likelihood of selection bias, although completion of questionnaires was not itself mandatory. The findings are therefore likely to be both more realistic and generalizable than evaluations of optional courses. Indeed, Spahn et al. (2001) suggest that compulsory courses may be more effective. Third, lectures were delivered and seminars facilitated by tutors who were all performing musicians, which may have helped to promote more intimate and informed interaction with students; in addition, three of the tutors specialized also in health psychology, performing arts medicine, and psychology respectively. Fourth, seminars were conducted in an informal, relaxed manner, enabling students to ask questions freely and tutors to tailor content to the needs of particular groups of students. Fifth, assignments were set in such a way as to bridge the gap between theory and practice: students were asked to reflect on what they had learned and how they implemented it in their music-making. Sixth, it was helpful to compare the experiences of the students who took the course with those of a control group (albeit a year older, with a further year's experience of conservatoire training), so as to contextualize learning within the broader context of undergraduate studies in music performance.

The limitations of the study must also be acknowledged. First, we would have increased the rigor of our approach by consulting a wider variety of health professionals when we designed the course, given its high level of interdisciplinarity. Second, the authors did not have the final say on the content of all the lectures and sessions delivered, other than those we delivered ourselves, and could not therefore monitor the extent to which the course as a whole was evidence-based. Our impression from reading the materials with which we were provided by tutors, and the students' essays, suggests that, on the whole, the evidence base was satisfactory. As a general point, we would nevertheless argue that justification is needed to include popular practices with little research evidence to support their use, such as the Alexander Technique (Klein et al., 2014; Baggoley, 2015; Aetna, 2016), in health education courses for musicians. Music students and their tutors have such full schedules (Clark and Williamon, 2011) that they should not be exposed to interventions unless there is evidence that they are likely to be effective. Third, the set of questionnaires we used was lengthy, and response fatigue might have affected students' responses. Fourth, we used measures of perceived rather than actual knowledge. Fifth, it was not possible, for ethical reasons, to recruit a control group of first-year students at the conservatoire who would have been deprived of taking the course, and because the course was deliberately designed to take over two terms it was not possible to deliver it twice, once in each term, so as to use a wait-list design. We should have recruited a control group of second-year students in 2016 but, due to changes of personnel at the institution, we could not obtain permission; it was not possible until 2017, by which time we had begun to report findings to colleagues, that we were able to run the course again (it is now part of the curriculum) and administer questionnaires to the control group. This solution does not, therefore, permit us to ascertain the extent to which differences between groups were pre-existing or the result of the control group's additional experience. Sixth, using assignments as a way of evaluating the course is potentially problematic in that students' choices of sessions to write about may have been guided less by interest in the topic or its relevance to them and more by the lecturer's clarity, communication and/or charisma, how informative the slides were and whether an easily-accessible list of references had been provided: such factors could have made certain topics more memorable or attractive for the purposes of fulfilling an assignment. Essay content may not have been entirely reliable, as students are likely to have been motivated by the wish to pass the course. Some students did not refer explicitly to the title of the relevant lecture or seminar/workshop, or the name of the tutor, so their essays had to be categorized on the basis of our knowledge of the content delivered; others referred to the course as a whole.

In the absence of a national curriculum for health, all institutions of higher education must develop their own approaches to health education, as do many university music

departments and music conservatoires. The questions posed by Ralph Manchester in 2006 remain pertinent: "Who will develop this course? What topics will be included in the syllabus? Who will teach it? Will it be offered to freshmen or seniors, or can it be taken during any year? Can one course meet the needs of performance majors, music education majors, and others? Should we develop some minimal national requirements?" (Manchester, 2006, p. 95–96). Further questions could be asked, such as: When can a course be considered successful? What are its desired outcomes? How should they be measured? Once the content and delivery of a course have been evaluated, how should they be adjusted, if necessary? To what extent should students' requirements and feedback be taken into consideration, given the available evidence and the need, on occasion, to challenge their beliefs? Very few health courses have been formally evaluated to date, and reports of those that have been evaluated do not say how the course was improved as a result.

Although it has been argued for the last 25 years that health education for musicians should be evidence-based (Zaza, 1993) and one of the four HPSM recommendations endorses the use of a health promotion framework, the declarations and recommendations fail to mention the importance of evidence-based *teaching*. Indeed the first HPSM declaration includes the unsubstantiated claim that performance injuries are preventable (Manchester, 2006). There is now a wealth of research on musicians' playing-related health problems, and their management, but unless this is disseminated effectively to senior managers and educators, instrumental and vocal tutors, and students, there is a risk that conservatoires will maintain traditional practices rather than responding systematically to the best evidence available.

The topic of how music students, too, can be convinced that health education is a vital part of their training remains largely unexplored. Framing the objectives of health education courses as "performance-enhancing" rather than "preventative" is likely to be more attractive to students. After all, from the musician's perspective, performance quality is an outcome worth pursuing, and such a strategy could even be self-reinforcing, leading to greater self-efficacy and reduced anxiety (Kenny, 2005). It remains unclear, however, whether improved wellbeing necessarily leads to better performance (Osborne et al., 2014).

Researchers carrying out similar studies in future should consult the best available literature when designing courses and make more use of iterative processes. They should employ rigorous approaches to investigate the effectiveness of complex programmes, including exploring the acceptability of a course; piloting it; recruiting active control groups; and using a range of measures such as validated questionnaires, objective measures and qualitative data. They should conduct follow-up studies after longer periods, given that physical and psychological health are determined, at least in part, by health-promoting behaviors that individuals take time to establish (Barton and Feinberg, 2008; Zander et al., 2010). Finally, they should disseminate the findings of their evaluations to relevant stakeholders, examine, discuss, and ultimately implement the course as part of the curriculum, in the interests of providing high-quality evidence-based health education for music students.

Although the course described in the present study did not have the hoped-for impact on secondary outcomes including reported health-related behaviors, reduced PRMDs and stress, it was associated with improvements in primary outcomes relevant to health education, namely the perceived knowledge of topics covered in the course and awareness of health risks. Furthermore, the study itself is the first evaluation of a health education course for musicians that documents the process of designing the course on the basis of a rigorous assessment of the available evidence, and its incorporation in the "real world" context of a music conservatoire.

ETHICS STATEMENT

This study was carried out in accordance with the recommendations of the Conservatoires UK research ethics committee. The protocol was approved by the Conservatoires UK research ethics committee. All participants gave written informed consent in accordance with the Declaration of Helsinki.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this manuscript will be made available by the authors, without undue reservation, to any qualified researcher.

AUTHOR CONTRIBUTIONS

RM and JGi contributed to the design of the course, delivered some of the course sessions, and designed the study and procedures. RM collected the data, and analyzed the quantitative data. RM and JGi drafted the manuscript. All authors edited the manuscript, read and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2018.01137/full#supplementary-material

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THEMATIC PAPER

Music performance anxiety in classical musicians – what we know about what works

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When pursued professionally, the demands of musical training and performance can interfere with musicians' well-being and health. Music performance anxiety, while energising at optimal levels, impairs performance quality when excessive. A range of interventions has been explored to address it. However, the poor methodological quality of such studies and the complexity of this issue should mobilise further research resources in this direction.

Music performance anxiety

Might the mere presence of an audience be enough to turn music making, so often therapeutic, into an anxiety-enhancing activity? Fancourt *et al* (2015) found higher levels of glucocorticoids (cortisol and cortisone) in singers performing in public than when they were singing without an audience. Furthermore, research using a virtual reality performance simulator demonstrated that the audience does not even have to be 'real' for anxiety to be triggered or heart rate raised (Aufegger *et al*, 2016).

Those who succeed in entering the highly competitive field of classical music must not only possess personal attributes such as determination and resilience but also acquire cognitive and social skills, instrument-specific motor skills, coping skills adequate to the psychological demands of public performance, and the ability to manage their time and be responsible for their physical and mental health. While musicians report the highest level of job satisfaction, they are also among the five occupational groups most likely to report mental illness (Brodsky, 1996).

Performance anxiety has been investigated in a variety of contexts, including test-taking, public speaking, writing, sexual performance, sport and the performing arts (dance, music and acting). Music performance anxiety (MPA) is a complex phenomenon caused by the interaction of many factors, including genetics, environmental stimuli and the individual's experience, emotions, cognitions and behaviours (Kenny, 2011). It manifests via three elements, independent to varying extents: cognitions, autonomic arousal and behaviours (Kenny, 2005). While a certain degree of performance anxiety is facilitative and normal, it can sometimes become debilitating and even qualify as a mental disorder. According to DSM-5 (American Psychiatric Association, 2013), performance anxiety is a subtype of social anxiety disorder (SAD). In order for someone to qualify as having SAD, they need to have suffered from persistent fear, anxiety or avoidance for at least 6 months, and to have considerably impaired social, occupational or general functioning. Although there are correlations between MPA and certain aspects of SAD, such as fear of negative evaluations and the perceived exaggerated consequences of such evaluations, particularly in solo performance, their interactions remain unclear (Goren, 2014).

According to the Yerkes–Dodson law, optimal performance is associated with a moderate level of arousal. A more nuanced extension of this law has been proposed, however, identifying three sources of stress that interact differently in individuals: trait anxiety (a personality characteristic), situational stress (in public performance, auditions, etc.) and task mastery (in the context of both undemanding, rehearsed material and complex, largely unknown works) (Wilson & Roland, 2002). Thus, performers' anxiety is likely to be reduced as they engage in task mastery, transforming a difficult work into one that is both more familiar and easier to play.

We know that memory can be affected by anxiety. Sport psychologists and researchers studying test anxiety have proposed two attentional processes to explain 'choking' (performance impairment caused by excessive psychological pressure): distraction and explicit monitoring. Distraction depletes attentional resources as working memory is occupied by interfering worries and the individual is unable to focus on the task at hand. Conversely, monitoring can have a counterproductive effect because it disrupts the performance of a well practised skill that would otherwise be automatic. Still, it remains unclear whether such distinctions are clear enough, whether they can meaningfully inform different interventions and whether choking and underperformance are conceptually distinguishable (Mesagno *et al*, 2015).

According to a survey of more than 2000 professional musicians conducted by the International Conference of Symphony and Opera Musicians (ICSOM), the largest sample to date, 24% suffered from stage fright, 13% reported acute anxiety and 17% reported depression (Fishbein *et al*, 1988). The highest levels of MPA are generally triggered by solo performances (Spahn *et al*, 2016), while orchestral players rated auditions as the most likely to produce MPA and practising alone the least. Musicians playing in pit orchestras (e.g. in opera, ballet and theatre productions) experience more severe MPA than musicians who combine playing in pit orchestras with performing on stage (Kenny *et al*, 2016).

The three causes of MPA most commonly cited by musicians are 'pressure from self', 'excessive arousal' and 'inadequate preparation for performance' (Kenny *et al*, 2014). Orchestral players might well find inadequate preparation a general and persistent stressor, since they tour and perform extensively with too little time to rehearse and digest the repertoire, often relying on their ability to sight-read. Coping strategies reported by musicians include increasing practice, recommended by 91% of respondents to Kenny *et al*'s 2014 survey; deep breathing; positive self-talk; mock performance practice; familiarising themselves with the performance venue; relaxation methods; discussions; and the use of medication.

Of the musicians from American orchestras who responded to the ICSOM survey (Fishbein *et al*, 1988), 27% took propranolol or another beta-blocker, most of them without a doctor's prescription, and 96% of these respondents reported these effective in reducing MPA. Of the Australian musicians who responded to Kenny *et al*'s (2014) survey, 31% reported taking beta-blockers to alleviate MPA, while 12% used alcohol, 5% anxiolytics and 4% antidepressants. Recent data from 1500 Norwegian musicians suggest higher use of psychotropic medication (e.g. sedatives, antidepressants, hypnotics and medication for attention-deficit hyperactivity disorder), especially among string players and particularly when compared with managers and technicians. Similarly, musicians were three times more likely to use psychotherapy than the general workforce (Vaag *et al*, 2016).

Treatment and prevention

Three systematic reviews of interventions aimed to reduce MPA (McGinnis & Milling, 2005; Kenny, 2005; Brugués, 2011) and an unpublished meta-analysis (Goren, 2014) have been conducted to date. McGinnis & Milling (2005) included nine studies and suggested that the most effective treatments incorporate cognitive restructuring and exposure therapy. The other two incorporated the same 21 studies, with Brugués (2005) reviewing an additional five and concluding that cognitive–behavioural therapy (CBT) might be particularly effective. Brugués also concluded that, although the use of beta-blockers might reduce some physiological manifestations of MPA, they also increase salivation. As they can thereby interfere with singers' and wind players' performance, Brugués recommended that beta-blockers be used cautiously, generally alongside psychological techniques. Goren (2014) conducted a meta-analysis of 29 studies and concluded that four therapies (behavioural, complementary and alternative,

cognitive, and combined) were moderately effective, with a mean effect size of 0.64. Most effective was a combination of two or more types of therapy.

More recent research has explored the effectiveness of multimodal interventions. Spahn *et al* (2016) evaluated the combination of behavioural exposure (via mock orchestral auditions and recorded performances) with group discussion, expert feedback and cognitive strategies; Steyn *et al* (2016) added mindfulness training to an array of cognitive–behavioural elements. In both cases interventions produced lower scores for both MPA and state anxiety. Virtual reality exposure training also reduced performance anxiety and improved performance quality, especially among anxiety-prone musicians (Bissonnette *et al*, 2015).

Juncos & Markman (2015) were the first to report an investigation of the effects of acceptance and commitment therapy (ACT). An undergraduate violinist with debilitating MPA showed both clinically significant improvements in MPA and better performance quality after ten sessions.

Psychological skills training (e.g. goal setting, concentration, imagery, self-talk, arousal regulation) has been used successfully in sports for the last five decades, but rarely with musicians (Hatfield, 2016). Some data on the thoughts of musicians under pressure suggest that unproductive coping strategies might be positively correlated with both MPA (Thomas & Nettlebeck, 2014) and performance quality. The relationship between performance quality and performance anxiety is indeed complex and there might be scope for studying them separately. However, it is difficult to assess performance quality other than subjectively. Furthermore, although reframing performance anxiety as excitement might not reduce levels of anxiety (Brooks, 2014), performance quality might nevertheless improve.

Conclusions

Although many interventions aimed at reducing or preventing MPA in both professional musicians and music students have been implemented and evaluated, it is difficult to draw firm conclusions since so many reported studies are methodologically weak; limitations acknowledged by their authors include design, participants, intervention characteristics and outcome measures. Several studies were conducted over short periods with small samples and/or no control group. Given that anxiety can also be enhancing and facilitating, and that compliance is likely to influence therapeutic outcomes, it is perhaps surprising that these are so rarely considered in research. Although it is hard to isolate active ingredients in complex interventions, these – particularly when they involve cognitive–behavioural elements – hold more promise in terms of managing MPA. More rigorous investigations, however, are warranted.

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Promoting health in music education: Better practice

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ABSTRACT

The physical and psychological demands of the training and practice that musicians must achieve to perform to a high standard on their instruments can produce deleterious effects on health and wellbeing, arising mostly from musculoskeletal and neurological causes. The available evidence on promoting musicians' health has been reviewed. Musical Impact, an AHRC-funded research project involving all nine UK conservatoires (2013-2017) seeks to enhance the health and wellbeing of musicians in Britain. Better Practice, one of three sub-projects, asks 1) What can be learned from existing approaches to promoting musicians' health? 2) How can such approaches be adapted, applied and evaluated across educational and professional contexts in the UK and internationally? Given the complexity and context specificity of the interventions and programmes, a realist synthesis approach was applied. Published full-text quantitative and qualitative studies in English were included. Databases were searched for interventions and health programmes targeting musculoskeletal and music performance anxiety issues among musicians. Quality and validity are enhanced by continuous discussion among the reviewers. Few taught courses on health and wellbeing have been evaluated systematically. Zander et al. (2010), using pre-post, longitudinal testing of one programme in Germany, reported a stabilising effect on psychological health, but no effect on physical symptoms. Purpose-designed interventions based on endurance exercises reduced levels of perceived exertion, pain and fatigue (Kava et al., 2010). Current approaches vary widely and present substantial methodological flaws. This project is intended to inform the development and implementation of a new evidence-based programme for promoting health, behaviour change and managing ill-health in musicians.

I. INTRODUCTION

According to the ICSOM survey conducted among more than 2,000 respondents, 76% of American orchestral players reported at least one medical condition that affected their performances while 36% mentioned they suffered from up to four independent problems. Problems of the lower back, neck, shoulder and upper back were the most prevalent. In addition, a quarter suffered from stage fright (Fishbein, Middlestadt, Ottati, Straus, & Ellis, 1988). Prevalence and incidence of playing-related musculoskeletal disorders of musicians range widely between 26% and 93% (Bragge, Bialocerkowski, & McMeeken, 2006; Zaza, 1997; de Souza Moraes & Antunes, 2012; Ackermann, Kenny, O'Brien & Driscoll, 2014; Leaver Harris & Palmer, 2011). Up to 87% of college music students reported having experienced playing-related injuries at some point in their lives (Guptill, Zaza & Paul, 2000) while 25% of music students in Freiburg said they already had playing-related symptoms in their first academic semester (Spahn, Strukely & Lehmann, 2004). Risk factors include excessive repetition, awkward postures and heavy lifting (da Costa & Vieira, 2010). Moreover, younger musicians (<30 years) tend to be significantly more anxious than older musicians (51+) (Kenny, Driscoll & Ackermann, 2012). Students of music performance from two major UK conservatoires seemed to neglect health responsibility and showed lower scores for physical activity and stress management compared to interpersonal relations and spiritual growth (measured using subscales of the Health-Promoting Lifestyle Profile (HPLPII) as well as the Positive-and-Negative Affect-Schedule (PANAS) scales) (Kreutz, Ginsborg & Williamon, 2008). Considering some performance injuries are preventable, performing arts medicine specialists and musicians have been encouraged to make inter-disciplinary efforts to facilitate the development of conservatoire-based health programs (Manchester, 2006). Health education aimed at teachers has also been proposed since music students are inclined to approach their instrumental teachers for health related advice before consulting relevant medical professionals (Williamon & Thompson, 2006). An array of complex health courses have been implemented in a few music institutions (Manchester, 2007a, 2007b, 2007c) and some specific preventative interventions have been conducted among music students and professionals. Such endeavours are certainly in line with the consensus-based recommendations suggested by the authors of a report on the Health Promotion in Schools of Music (HPSM) project. These are that the promotion of health and prevention among music students should incorporate: a holistic approach supporting wellness and encouraging personal responsibility; the assimilation of the idea of prevention within the values and beliefs of music schools; and preparing teachers and educators to be more health-conscious (Chesky, Dawson & Manchester, 2006). We reviewed the current approaches and concluded that most conservatoire-based courses have not been evaluated systematically while other intervention studies reveal considerable methodological flaws.

Musical Impact, an AHRC-funded research project involving all nine UK conservatoires (2013-2017) seeks to enhance the health and wellbeing of musicians in Britain and has emerged as a proposed solution to musicians' current needs. Better Practice, one of three sub-projects, asks 1) What can be learned from existing educational and professional approaches to promoting musicians' health? 2) How can such approaches be adapted, applied and evaluated across educational and

professional contexts in the UK and internationally, from the earliest years of study into the profession? While the present project is in its infancy, this paper attempts to describe the main findings and limitations of the available evidence, based on the specific interventions and more general health promotion courses among music students and professionals that have been evaluated to date. In addition, it suggests some pathways with the potential to be considered for further work.

The present review was based on a realist synthesis approach. Unlike traditional systematic review methods, which are very specific and focus mainly on whether interventions work or not, the realist synthesis approach starts from the premise that an intervention does not work *per se*, and thus aims to unpack the mechanisms by which it works and its facilitating context; it offers an explanation and not necessarily a judgement (Durham & Bains, 2015). The approach can be summarized as an attempt to answer 'what is it about this kind of intervention that works, for whom, in what circumstances, in what respects and why?' (Pawson, Greenhalgh, Harvey & Walshe, 2004). Realist synthesis is an interpretive approach that can be applied to qualitative, quantitative and mixed-methods research. It is particularly relevant for assessing complex health implementation interventions and the context specificity in which these occur (Rycroft-Malone et al., 2012). The research question was formulated according to the four elements that make up PICO (population, patient groups studied; intervention, treatment, test, or exposure for the population; comparison, alternative intervention or control; and outcome, intervention results (Wright, Brand, Dunn & Spindler, 2007). The objectives of the current review were to examine 1) health promotion courses among music students/musicians/music teachers and 2) specific, non-pharmacological interventions on music performance anxiety (MPA) and performance-related musculoskeletal disorders (PRMDs) among music students/musicians. The first stage of concept mining was conducted via 'digging through' the literature and identifying keywords, relevant concepts and explanatory theories. It was modelled after a series of questions developed by Rycroft-Malone et al. (2012): 1) What is the impact of the various characteristics of the intervention? 2) What is the overall impact of the intervention? 3) What is the impact of the interaction between the intervention and the specific context in which it is employed? Next, a preliminary computerized search was conducted on MEDLINE, Embase, and PsychINFO using a purposive list of keywords and their truncations such as: musician ('musician*', 'music student*', 'music major*', 'orchestral play*'), MPA ('music-related performance anxiety'), PRMDs ('musculoskeletal disorder*', 'injury prevention', 'pain', 'exert*', 'fatigue'), 'health promotion', 'prevent*' and 'intervention or study or trial or program or course'. The search was limited for studies published in the last 20 years (1995-2015). Full-text papers were retrieved and evaluated for related terms. Relevant search terms were also drawn from similar reviews. Terms were searched in titles, abstracts and keywords, they were combined using the Boolean operators 'OR' and 'NOT' and search strings were linked using 'AND'. A manual search of the reference lists of the papers included was also conducted. The screening was intentionally inclusive so that all relevant articles could be captured. Studies were considered eligible if: written in English to ensure that they could be adequately evaluated and reviewed; they included samples made up of music students, music teachers and/or professionals as well as both females and males; samples were from non-disordered populations and apparently healthy; they were quantitative and/or qualitative; the full text was available; they included any intervention designs (pre-post, quasi-experimental, controlled or randomized); they looked at objective and/or self-reported measurements as primary and/or secondary outcomes. Studies were excluded if: they could not be accessed through the London University Research Libraries Services, or the libraries of Manchester Metropolitan University or the Royal Northern College of Music; they were not published in peer-reviewed journals. In terms of MPA assessment, papers were excluded if they used psychological tests such as the Spielberger State/Trait Anxiety Inventory (STAI) on their own, without specifically measuring MPA, considering the two measurements might be quantifying different phenomena (Kenny, 2004). Consistent with Pawson's suggestions, quality appraisal was conducted based on the following question (Rycroft-Malone et al., 2012): 'is the evidence good and relevant enough?'

Retrieved papers included six health courses conducted in the USA (Indianapolis), Spain, Taiwan, Switzerland and Germany (Barton & Feinberg, 2008; Lopez & Martinez, 2013; Su et al., 2012; Hildebrandt & Nubling, 2004; Spahn, Hildebrandt & Seidenglanz, 2001; Zander, Voltmer & Spahn, 2010); seven interventions aimed at reducing PRMDs, fatigue, pain or exertion and conducted in Australia, the USA (Florida), Australia and the Netherlands (Ackermann, Adams & Marshall, 2012; Lee, Carey, Dubey, & Matz, 2012; Kava, Larson, Stiller & Maher, 2010; Brandfonbrener, 1997; Chan, Driscoll & Ackermann, 2012, 2014; de Greef, van Wijck, Reynders, Toussaint & Hesseling, 2003); eight interventions aimed at reducing MPA and run in the USA (Boston, New York), Canada and Australia (Chang, Midlarski & Lin, 2003; Kim, 2008; Esplen & Hodnett, 1999; Osborne, Greene & Immel, 2014; Braden, Osborne & Wilson, 2015; Stern, Khalsa & Hofmann, 2012; Lin, Chang, Zemon & Midlarsky, 2008; Wells, Outhred, Heathers, Quintana & Kemp, 2012); and three studies conducted in the USA (Massachusetts) that looked at both PRMDs and MPA (Khalsa, Shorter, Cope, Wyshak & Sklar, 2009; Khalsa & Cope, 2006; Khalsa, Butzer, Shorter, Reinhardt & Cope, 2013). Participant characteristics included wide ranges across the above-mentioned studies in terms of age (from 13 to 67 years), type of musician (professionals, music teachers, orchestral players, conservatoire students as well as teenage musicians; all instruments and singers included). Sample sizes ranged from 15 to 167 in all interventions and from 15 to 247 in the course-based studies. In terms of length, interventions ranged from a one-off session to one year (the majority ranging between six and 12 weeks) while courses varied between eight weeks to one semester and one year respectively. One of them was a longitudinal study (Zander et al., 2010). Most studies used a pre-post and repeated measurement designs respectively.

Only four studies incorporated objective measurements (i.e. endurance via a Cybex dynamometer and time measurement; heart rate variability via the Polar RS800CX watch and chest-strap; finger temperature as an MPA measurement) that added to the reliability of their findings. Self-report measures for MPA included the Performance Anxiety Inventory (PAI), the Performance Anxiety Questionnaire (PAQ), the Music Performance Anxiety Inventory for Adolescents (MPAI-A) and the Music Performance Anxiety Questionnaire (MPAQ). Self-report measures for PRMD included the Performance-Related Musculoskeletal Disorders (PRMD) Questionnaire, the Health-Pain-Injury Inventory (HPI), the Performance Skills Inventory (PSI), Physical Competence Scale (PCS) and the Giessen Symptom Questionnaire (GBB). All interventions were focused on measuring PRMDs or MPA as primary or secondary outcomes, while courses looked at a variety of outcomes including psychological and physical health, overall knowledge of prevention and health, health and lifestyle issues, practice and performance issues, confidence on stage, total symptom severity and frequency and the ability to cope with work.

II. CURRENT EVIDENCE

1) Interventions aimed at music performance anxiety (MPA)

A pre-post study involving 19 music students suggested that meditation training over eight weeks led to decreased performance anxiety and less mind-wandering in contrast to a control group that received no intervention (Chang et al., 2003). Stern et al. (2012) found that a nine-week hatha yoga intervention consisting of fourteen 60-minute classes twice a week and daily home practice led to large decreases in MPA among 17 students. The positive effects were maintained at 7- to 14-month follow-up. Also, Zen meditation training across eight weeks including group discussions, instruction for daily practice and performance visualization showed significant reductions in performance anxiety post-intervention, but no differences in musical performance quality as evaluated by two independent jurors. In fact, a positive correlation between performance quality and performance anxiety was found in the meditation group. This could have been due to increased awareness of autonomic effects of anxiety without the adverse psychological reactions, although it remains unclear (Lin et al., 2008). A very recent psychological intervention aimed at reducing performance anxiety among high school students and based on cognitive behavioural elements (such as cognitive restructuring and relaxation techniques) and elements of positive psychology (such as identification of strengths, goal-setting, imagery and visualization techniques) showed significant reductions in MPA which were maintained at two months post-intervention (Braden et al., 2015). An eight-week group training programme in performance psychology including channelling performance energy, developing confidence, mental rehearsal and dealing with adversity showed significant reductions in MPA (maintained at 2-months follow-up), as well as improvements in confidence and in the ability to focus on music preparation and performance tasks among 30 adolescent female students who had studied their instrument for an average of four years (Osborne et al., 2014). Consistent with other similar previous findings, no significant improvements in judge-rated performance quality was found. Kim (2008) looked at two six-week music therapy approaches among a group of 30 college pianists and found reduced MPA scores for both the improvised music-assisted desensitization group and the one which combined imagery with music-assisted progressive muscle relaxation. Measurements included finger temperature and were taken following lab performances pre- and post-intervention. A randomized controlled trial among 46 trained adult musicians compared the effects of a session of slow breathing with a session of slow breathing with biofeedback and found that slow breathing, regardless of biofeedback, was sufficient for controlling physiological arousal when anticipating music performing related stress (Wells et al., 2012).

2) Interventions aimed at playing-related musculoskeletal disorders (PRMDs)

A randomized controlled trial conducted among 45 orchestral musicians found reduced PRMD incidence and severity in the experimental group after a 15-week programme based on warming-up, general and specialized exercising and cooling down (de Greef et al., 2003). Two other studies looked at the effects of exercise programmes among 18 and 14 university students respectively. They included generic strength, postural and aerobic exercises and showed improvements in playing posture as well as reductions in frequency and intensity of PRMDs (Ackermann et al., 2002; Kava et al., 2010). When compared with a strength training programme, endurance training significantly reduced perceived exertion of playing. The endurance training might have been perceived as more relevant due to its similarity with the highly repetitious action with light load of playing a musical instrument. However, neither the six-week endurance training nor the six-week strength training reduced the frequency or intensity of PRMDs significantly (although there was a decreasing pattern) (Ackermann et al., 2002). Nevertheless, both Pilates and a series of conventional trunk and upper extremity endurance exercises across six weeks each proved equally effective in decreasing pain, fatigue and perceived level of exertion while playing an instrument (Kava et al., 2010). One specific programme for orchestral players including neck, shoulder, spinal, abdominal and hip series as well as warm up and cool down exercises, demonstrated and supervised by a physical therapist and accompanied by booklets with detailed instruction and pictures showed significant reductions in frequency and severity of PRMDs as well as improvements in perceived exertion (Chan et al., 2014). The study found that a DVD-based exercise programme run among 50 orchestral players also showed significant reductions in PRMD frequency and severity as well as moderate increases in strengthening muscles that support playing. Approximately 55% reported that they

preferred the DVD version of the exercise programme as compared to a previously tried face-to-face equivalent of the same intervention.

3) Mixed interventions (both MPA and PRMDs)

Khalsa et al. (2013) investigated the effects of a controlled, six-week yoga intervention among 135 adolescent musicians and found significant reductions in MPA post-intervention in the experimental group while the results for PRMDs were inconclusive. Another yoga intervention incorporating a considerable amount of group interaction and socialization found greater improvements in performance anxiety relative to PRMDs. While pre-post reductions in performance anxiety scores (for practice, group and solo performance) were significant within the intervention group, the significance was maintained only for the solo condition when compared to the controls. This is consistent with the findings of Khalsa and Cope (2006) suggesting that anxiety is higher in solo than group and practice conditions, although the authors reported that those recruited to the intervention group were highly motivated to take part in the intervention, which could have influenced the results. Similarly, a three-arm, non-randomized study comparing a yoga plus meditation and a yoga lifestyle intervention with a control group over the course of two months found that both experimental groups showed a trend towards less music performance anxiety relative to the control group, but no changes in PRMDs. However, group differences did not last according to a one-year follow-up assessment (Khalsa et al., 2009). Qualitative data suggested that breath control techniques were perceived as helpful in managing pre-performance anxiety among the lifestyle participants while a number of participants reported better self-confidence.

4) Institution-based health promotion courses

A Spanish conservatoire-based one-year programme consisting of ergonomics and the prevention of musculoskeletal injuries, warm-up practical sessions and private lessons with personalized instruction showed improved body awareness by 91% and decreased injury frequency by 78% across all three time-points among 90 students relative to controls, although no validated questionnaires were used (Lopez & Martinez, 2013). A pre-post, non-randomized evaluation of a one-semester prophylactic course on 'Physiology of Music and Performing Arts Medicine' offered to 22 students at the Zurich Conservatoire suggested greater positive effects on playing-related symptom frequency, emotional disturbances and anxiety levels as well as coping with work and confidence on stage in the intervention group (Spahn et al., 2001). However, significantly more non-controls reported suffering from music-related symptoms and coping less well with their music-related work at baseline relative to controls. The course included weekly two-hour sessions combining practical physical exercises with lectures on preventative topics relevant for musicians. Another educational programme including modules on nutrition, fitness, sleep, performance anxiety, relaxation, deep breathing, injury prevention through improved postural awareness and stretching showed improvements in knowledge of covered topics, but not in occurrence or intensity of PRMDs (Barton & Feinberg, 2008). The longest and largest longitudinal, observational study in music students that has been conducted to date showed that a combination of physical, psychological and behavioural elements delivered during participants' first two semesters at the Freiburg Music University led to elevated ratings in psychological and physical health, but no reductions in physical symptoms (Zander et al., 2010). The sample involved 247 (non-randomized) students who were assessed during their first two years of training. Su et al. (2012) looked at the effectiveness of an e-learning curriculum on occupational health among 15 graduate-level students using a pre-post and one month follow-up design. Implemented over 14 weeks, weekly classes comprised a 60-minute prerecorded lecture followed by a 40-minute real-time interactive discussion. Student awareness of practice and performance issues increased significantly between pre-test and follow-up while awareness of health and lifestyle issues did not show significant increases. Only one intervention looked at a training programme aimed at instrumental teachers and their students. It combined elements of prevention and standard music psychology focusing mainly on the psycho- and sensorimotor problems of musicians and an appropriate instructional style. The intervention was run across 17 weeks and suggested that, compared to a control group, teachers from the test group had become more responsible for instructions while the students from the test group reported a change in their teachers' teaching style with respect to guidance on posture and playing-related movements (Hildebrandt & Nubling, 2004).

III. LIMITATIONS

The above-mentioned studies reveal an array of methodological weaknesses such as: small sample sizes, over-representation of female participants, short duration of interventions, and often, the lack of a control group to evaluate a potential placebo effect. Moreover, health promotion courses encompass a range of potentially active ingredients that cannot precisely be separated from each other. This is particularly relevant in yoga-based interventions, where factors such as the social environment and community interactions could have made it hard to isolate the components specific to yoga (Khalsa et al., 2009). Also, it is particularly important, in the context of such complex interventions, to amass sufficient data from diaries to determine the extent to which participants followed instructions and practised specific techniques, as well as differentiating the effects of participation from those arising from mere exposure to the intervention itself (Osborne et al., 2014). In addition, it has been suggested that training programmes should be specific and adapted to each instrument (Wilke, Priebus, Biallas & Frobose, 2011). The self-report method provides responses potentially affected by social desirability (i.e. over-reporting of physical activity and under-reporting of anxiety) and recall bias, although it remains the quickest, easiest and least expensive method of

measurement. However, the use of objective data such as psychophysiological measures including respiratory rate, measures of performance quality and checklists of anxious behaviours relevant to musicians (i.e. hand tremble) are recommended (Stern et al., 2012). One important issue associated with intervention studies is attrition bias (Stern et al., 2012; Lee et al., 2012); the main reason students report for dropping out of such studies is lack of time. To address this, Stern et al. (2012) recommend increasing the pool of participants by recruiting students from more than one conservatoire, offering a wide range of options regarding the day and time of the intervention sessions, keeping the intervention sessions as brief as possible, and providing immediate and reasonable incentive/remuneration. Also, a flexible delivery approach such as using a DVD-exercise which participants could use at home might be effective. Increasing adherence and reducing drop-out rates could also be addressed through extrinsic motivators in the form of management involvement and encouragement particularly in the case of orchestral players (Chan et al., 2014). Not blinding participants to the intervention could be problematic as they might feel encouraged to report more positive experiences in order to please the researcher. Most intervention studies reported to date do not involve long-term follow-up measures, which raises the question of whether any positive changes are sustainable after the intervention ceases. This is especially relevant considering behavioural changes take longer than cognitive adjustments to be implemented and that periodic reinforcement throughout an educational curriculum might be important for maintaining behavioural changes (Barton & Feinberg, 2008). The importance of a control group is emphasized by Brandfonbrener (1997), who noticed a significant improvement in musculoskeletal symptoms in the intervention-free group. She suggested that simply drawing the musicians' attention on such issues might in itself have a positive effect. This is supported by the mere measurement effect whereby simply asking questions could trigger behaviour change by increasing the availability of the behaviour in the momentary focus of the respondent and could, thus, in itself, be used as an effective way of promoting adherence to the desired behaviour (Fitzsimons & Williams, 2000; Morwitz & Fitzsimons, 2004). Also, a comparison group could reduce the likelihood of producing a Hawthorne effect (adjusting one's behaviour in response to the awareness of being observed) (Chan et al., 2014). In addition, most of the intervention studies reported to date use a waiting list approach or simply a no-intervention comparison group. A better, more relevant comparison would be a different therapy/technique which has demonstrated some positive effect in the past. Thus, there might be more scope in comparing two active treatments/interventions rather than treatment vs. waiting list, non-treatment or placebo groups, as this could help identify active ingredients in each group and then compare them under the same methods/experimental conditions (Brodsky, 1996). Cross-over designs have also been recommended. Also, the use of heterogenous participants who were not selected according to a specific level of MPA, and who did not report problematic levels thereof, might influence intervention outcomes due to floor effects (Kenny, 2006). Another limitation in some studies could be the low ecological validity of incorporating public performance tasks that are not officially assessed as part of the curriculum when looking at the effects of an intervention on MPA, as performances given only for research purposes might not evoke such high levels of MPA (Braden et al., 2015). Lack of randomization could impair the results of an intervention through selection bias. For example, Chan et al. (2014) found that at baseline, their intervention group had higher PRMDs frequency and severity compared to the control group while the control group was more physically active. Given the significant decrease in PRMDs frequency and severity among the intervention participants and the lack of randomization, it is therefore hard to tease out 'regression to the mean' or the effect of generic physical activity on the lower baseline PRMDs symptoms. However, it is likely that exercises specifically tailored to the individual and his or her instrument are required for injury prevention, considering that the benefit reported by participants most often was strengthening the muscles that support playing (Chan et al., 2014, Chan et al., 2012).

IV. CONCLUSIONS AND FUTURE DIRECTIONS

Despite all their limitations, the intervention studies reviewed above are important attempts to increase insight into issues of importance for future research. Moreover, they focus on a population somewhat under-represented in research on health, namely musicians. Small studies designed to help establish whether an intervention deserves further testing involve relatively low costs. They facilitate the estimation of parameters such as adherence and response to questionnaire rates (Arain, Campbell, Cooper & Lancaster, 2010) and could be a precursor in addressing some barriers to participation in subsequent studies, such as musicians' busy schedules. The importance of physical activity could hardly be overestimated. Physically active musicians have significantly lower levels of MPA than inactive ones, independent of gender (Rocha, Marocolo, Correa, Morato & da Mota, 2014) and show less anxiety after giving a musical performance (Wasley, Taylor, Backx, & Williamon, 2012). Similarly, a recent correlational study among 225 young Polish music students suggested that not meeting the criteria for minimal physical activity levels was associated with increased pain frequency and intensity in the neck, shoulders and back (Nawrocka, 2014). Moreover, it has been suggested that in helping improve executive function, physical activity could indirectly improve other health related behaviours, making it a 'best buy in medicine' (Loprinzi, 2015). Despite the work of Baumeister, Bratslavsky, Muraven and Tice (1998) on ego-depletion, which states that self-control is an expensive and finite resource and that its glucose-dependent use would impair performance on subsequent occasions, emerging studies show the 'mindset' might play a key role. Thus, when people believe willpower is an abundant resource (rather than finite), they present better self-regulation after demanding tasks (Job, Walton, Bernecker & Dweck, 2015). On the other hand, other

novel, theory-based models provide an alternative to the long-term use of willpower. The habit formation theory (Lally & Gardner, 2012) is based on the notion that forming habits (through the repetition of a behaviour in the same situation in which it occurs) could free some of the mental energy required by effortful deliberation, since the subject can instead rely on automatic responses (Gardner, Lally & Wardle, 2012). This has potential for the maintenance of desired behaviours over time (Gardner, 2012). Health psychology theories and behaviour change techniques conducive to habit formation, such as action planning and self-monitoring (Lally & Gardner, 2013; Michie, Fixsen, Grimshaw & Eccles, 2009; Michie et al., 2013), could come into play and establish an innovative approach to musicians' health. Future research could perhaps also aim to incorporate elements into performance and practice such as 'flow', described by Csikszentmihalyi (1990) as being experienced when one or more of the following conditions is met: challenge matching current skill level, being totally absorbed in the task, clarity of goals, the presence of immediate feedback, sense of control, loss of self-consciousness and altered sense of time. Performance anxiety has been shown to correlate negatively with proneness to flow (Kirchner, Bloom & Skutnick-Henley, 2008). Some 'active ingredients' of proneness to flow might, thus, be worth encouraging: self-confidence while performing, desire to experience and express feelings through music, having goals related to experience, maintaining focus on the music and playing without self-criticism (Bloom & Skutnick-Henley, 2005). Cognitive reappraisal strategies have been shown to be more effective in moderating the subjective feeling of anxiety than the suppression or acceptance of anxiety (Hofmann, Heering, Sawyer & Asnaani, 2009). These have not yet been investigated with the participation of musicians, although an early study of cognitive restructuring techniques conducted with musicians produced large effect sizes in reduced anxiety and MPA, and improvements in performance quality and heart rate compared to controls (Sweeney & Horan, 1982). Unlike other components of cognitive behavioural therapy (CBT), such as mindfulness meditation, reappraisal is aimed at reshaping the perception of arousal rather than diminishing it. This is in line with the recommendation already made that future interventions should take into consideration the specificity of MPA by encouraging sufficient relaxation to counteract excessive activity of the sympathetic nervous system while maintaining the levels of arousal necessary for optimal performance (Kenny, 2004). Jamieson, Nock and Mendes (2012) found that reappraisal is associated with more adaptive cardiovascular stress response and decreased attentional bias although they warn that there might have been other variables confounding their results. Nevertheless, it has the potential to be explored further, especially considering that a simple reappraisal instruction might be sufficient to trigger both physiological and cognitive responses (Jamieson et al., 2012). For example, students improved their performance on a maths exam when they interpreted stress as 'challenging' rather than 'threatening' (Jamieson, Mendes, Blackstock & Schmader, 2010), and Brooks (2014) similarly showed that individuals who reappraise anxious arousal as excitement perform better than those who attempt to calm down. The 'challenge' and 'threat' responses are linked to different physiological responses and are based on the biopsychosocial (BPS) model, a theoretical framework connecting cognitive (i.e. stress appraisals), physiological (i.e. autonomic nervous system (ANS) reactivity) and behavioural (i.e. performance) responses to stress (Rith-Najarian, McLaughlin, Sheridan & Nock, 2014). A challenge response elicits the activation of the sympathetic-adrenal-medullary (SAM) axis, an increased cardiac efficiency and vasodilation. A threat response also activates the SAM axis, but, unlike the challenge response, is associated with reduced cardiac efficiency and vasoconstriction, which could lead to poor decision-making in the short term, as well as cardiovascular disease and cognitive decline in the long term (Jamieson et al., 2012). Although CBT might be more effective than some beta-adrenergic-blocking agents in treating MPA (Clark & Agras, 1991; Kenny, 2004) and more supportive of a self-management approach, it seems that 40% of musicians who experienced MPA as a severe problem had used a 'prescribed medication' while only 25% had sought 'psychological counseling' (Fishbein et al., 1988). Similarly, counseling and psychotherapy were not even mentioned among the coping strategies employed to reduce anxiety among Canadian musicians (Bartel & Thompson, 1995). A more recent Australian study suggests that among 377 orchestral musicians, 6% had consulted a psychologist while 31% had taken beta-blockers to control their anxiety (Kenny et al., 2012). Among other reasons, this could be because taking medication requires less effort and is more accessible financially compared to psychotherapy. Thus, it has been suggested that more effort should be put into adapting current effective interventions for musicians (e.g. enhancing traditional forms of psychotherapy with music) (Brodsky, 1996). A systematic review of MPA treatments (Kenny, 2006) suggested a 12-week music therapy intervention including musical improvisation, performing in front of an audience, awareness techniques and verbal processing of anxiety responses led to less anxiety (as measured by the Spielberger State/Trait Anxiety scale) and increased confidence among ten freelance musicians suffering from MPA compared to a control group (Montello, Coons & Kantor, 1990). Moreover, interventions leading to better performance quality might boost self-confidence on their own, thus diminishing the need for further treatment. Effective techniques that showed positive effects on performance quality include behaviour rehearsal and cognitive restructuring (Kenny, 2006).

No intervention to date has attempted to decrease the prevalence of PRMDs by reducing sedentary behaviours. Prolonged sitting has been associated with all-cause mortality, cardiovascular disease, cancer and type 2 diabetes, however, independently of physical activity (Biswas et al. 2015). Public health guidelines recommend minimization of sitting time and constant interruption of sedentary behaviours by standing or taking light intensity activity breaks (Department of Health [DOH], 2011). Interrupted sitting has been shown to reduce the risk of unhealthy metabolic profiles (Healy et al., 2008), physical complaints (Roelofs & Straker, 2002) and fatigue

(Hasegawa, Inoue, Tsutsue & Kumashiro, 2001). Breaking up sitting time every 30 minutes was also associated with lower-back discomfort in overweight/obese adults (Thorp et al., 2014). Objectively assessed sitting time also seems to be positively correlated with lower-back pain intensity (Gupta et al., 2015), stiffness of the lumbar spine after only one hour of sitting and reduced strength of the back muscles (Beach et al., 2005). Reducing sitting correlates with improved outcomes for upper back, lower back and neck pain (Pronk, Katz, Lowry & Payfer, 2012), which correspond to the body regions most affected in instrumental musicians (Silva, Filipa & La, 2015). Interrupting sitting is in line with the importance of rest and recommendations such as interspersing practice sessions with breaks of 5-15 minutes every hour (Lopez & Martinez, 2013). This is highly relevant to musicians considering they might spend a considerable amount of time sitting during orchestral and chamber music rehearsals. One innovative study suggested right arm movements are more restricted and weight distribution more unbalanced while sitting in front of a stand compared to standing among violinists (Spahn, Wasmer, Eickhoff & Nusseck, 2014). Considering musicians' training is still largely based on tradition rather than empirical evidence (Clark & Lisboa, 2013), approaches such as the Alexander Technique and the Feldenkrais method, and the benefits of stretching, might need to be better defined and/or revisited. A systematic review of treatments for music performance anxiety found only very weak evidence that the Alexander Technique could improve performance quality and the mental state of the performer, because of methodological weaknesses in the studies reported (Kenny, 2006). The findings of a recent systematic review of controlled trials of Alexander Technique among musicians indicated that it may improve performance anxiety but its effects on music performance and respiratory function remain inconclusive. However, studies reviewed included a wide range of musical levels (amateur players, music students and professionals). When compared to physical activity, the latter also showed some reduction in performance anxiety. Again, the authors draw attention to the need for larger sample sizes as well as the use of objective outcomes (Klein, Bayard & Wolf, 2014). Further, a systematic review of randomized controlled trials of the Feldenkrais method concluded that the evidence for this method is encouraging but not compelling, again because of the methodological limitations evident in reports of the studies undertaken (Ernst & Canter, 2005). The evidence on stretching is not particularly clear either, due to conflicting research reports (Shrier & Gossal, 2000). In fact, it seems to vary widely depending on the type of sport, whether it is combined with warming-up (Taylor et al., 2009) and if it is static or dynamic (Behm & Chaouachi, 2011). In addition, the great majority of articles on stretching report studies that were conducted among sports players, rather than musicians. One study looked at four sets of stretches/exercises such as wrist, shoulder and neck rotations and rolls, oppositional finger-wrist presses and fist clenches, hand wringing and arm-bicep curls as well as handshakes, arm-triceps extension and fingers clenches among American teenage string players. Results suggested stretching exercises lowered students' perception of discomfort, regardless of whether they played lower (cello and bass) or upper string instruments (violin and viola), as compared to a control group. There was, however, also, an effect of instrument, regardless of whether the participant was in the intervention or control group, such that upper string students' perception of discomfort was slightly lower before rehearsals than after, whereas lower string players reported an increase in discomfort from before- to after-rehearsal (Cooper, Hamann & Frost, 2012). Further research on stretching is important, given that 75% of students in a sample of 45 respondents reported that they stretch prior to playing (Hagglund & Jacobs, 1996). The concept of 'warm-up' is also often poorly defined. Many music students might also refer to playing scales and technical exercises as 'warm-up' (Lopez & Martinez, 2013). In terms of conceptual clarity, Brodsky (1996) draws attention to the importance of having operational definitions of PRMDs in order to ensure the measurement of comparable severity levels (Bragge, Bialocerkowski & McMeeken, 2006) as well as to distinguish PRMDs from related terms such as 'stage fright' and 'performance anxiety', which have been used interchangeably in the past. He proposes the use of a conceptual framework which would help distinguish between a 'necessary' amount of anxiety that is inherent to the profession and a debilitating level thereof.

Finally, while the present paper is exploratory, by no means attempting to provide an exhaustive account of the available evidence and its limitations, it nevertheless captures the main issues of interventions aimed at health promotion. We believe that the limited, yet growing existing literature, indicates that further investigation may be fruitful; there is also potential in pursuing inter-disciplinary collaborations between performing arts medicine, sports medicine, physiotherapy, health psychology and behaviour change research. In addition, our present work is in line with the idea of implementation research aimed at improving health through the translation of 'proven' clinical treatments, practices, organizational and management interventions into routine practice (Clark & Lisboa, 2013). The actual practice of implementation research should guide the development and evaluation of future improved, better tailored, more sustainable interventions through a seven-step process: identifying gaps and need for change, identifying barriers, reviewing evidence and interventions, tailoring interventions to improve performance, implementing interventions, evaluating the process of implementation and evaluating outcomes (Bhattacharyya, Reeves & Zwarenstein, 2009). Although the present review is still preliminary, we think that evidence thus far could inspire two different approaches: 1) a health course aimed at raising awareness of the prevalence of music performance related health issues and the strategies currently known to be available to reduce and prevent them among musicians. We currently believe that the most urgent needs are to address both MPA and PRMDs since these seem to be most prevalent among musicians. We currently envisage aiming to enhance musicians' knowledge, building on their own stated concerns and requirements, by promoting less familiar or very new information/techniques, and undertaking a limited number

of intervention studies designed to reduce MPA (e.g. based on cognitive reappraisal) and PRMDs (e.g. reducing prolonged sitting and exercises targeting relevant muscle groups) through the use of behaviour change tools.

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