The benefits of prescribed physical exercise for people with severe mental illness

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Abstract

Prescribed physical exercise programmes are provided by the Physical Awareness Department (PAD) within an NHS trust for people with severe mental illness (SMI). There is a requirement for a consistent and reliable measure of the effectiveness of the service based on the perceptions of its patients. This study reports the qualitative development of the Physical Awareness Service Evaluation (PASE) questionnaire by a focus group composed of clinical staff, service managers and patients. Four thematically derived themes identified by the focus group independently mirrored findings of current, evidence based research. The questionnaire was administered to a sample population of patients suffering from severe mental illness enrolled on a prescribed physical activity programme (n=36). Five statistically derived themes (components) were calculated from the results using principle component analysis (PCA) which showed moderate to strong associations between the themes identified by the focus group and the PCA components. Cronbach's α tests revealed acceptable to good reliability in each component. Data collected longitudinally identified that people showed a statistically significant increase in contemplating positive lifestyle changes after engaging in prescribed physical exercise over a period of approximately four weeks. This study provided a questionnaire that enables collection of data with a fair amount of statistical rigor that may enable PAD to conduct further evaluations based on patient perception of the service. The findings also provide some statistically significant evidence to suggest that PAD is successful in achieving its primary role of promoting positive lifestyle change for people with serious mental illness.

KEY WORDS:	MENTAL ILLNESS	PHYSICAL EXERCISE	LIFESTYLE CHANGE	QUESTIONNAIRE DEVELOPMENT	NHS

LIST OF TABLES

LIST OF FIGURES	
	Page No.

Background

This study was performed as part of a review into the effectiveness of a service provided to patients with severe mental illness (SMI) by a NHS mental health trust in the north of England. The main aims of the Physical Awareness Department (PAD) within the trust are to improve patient treatment outcomes by increasing their awareness of beneficial lifestyle changes. The department aims to promote such positive lifestyle change by administration of prescribed physical activity programmes such as swimming and gym based workout sessions. These sessions also offer access to information on lifestyle aspects like diet and smoking cessation and provide support mechanisms that may complement co-existing clinical treatment interventions. An annual review of the service has been conducted by the department. However, no formal assessment tool exists to enable measurement of the effectiveness of physical activity in promoting positive lifestyle change of patients within the department. The present study was composed of two principle components. The first, a qualitative development of a questionnaire which would enable collection of information on patient related experiences and perceptions concerning the quality of their treatment and their attitudes towards the use of the facility. The second quantitative component included consistency and reliability testing of the newly developed questionnaire as well as an initial comparison of data collected longitudinally.

In conducting this study evidence based themes were identified in a way that enabled development of the questionnaire to be patient focused. Data collected using the questionnaire were later statistically scrutinised in order to test its validity. It was hoped these efforts would provide an effective, non biased tool enabling the effectiveness of PAD to be evaluated in the long term. Opinion expressed by Gorczynski and Faulkner (2010) agreed with much of the literature reviewed in this study by suggesting that people with serious mental health problems are vulnerable to adopting unhealthy lifestyles that may contribute to their condition. The study hoped to identify themes consistent with current research that both; related to the health service requirements of PAD and allowed feedback on perceived costs and benefits by patients.

The Department of Health (2012) suggests that as many as one in four people in the UK experience some form of mental illness over the period of a lifetime. The National Institute for Clinical Excellence (2011) provides guidance and assessment criteria used within the UK health service that allows severity of mental illness to be gauged using the stepped care system. This framework provides a four tier, bidirectional set of criteria for ensuring relevant treatment of mental health disorders (Bower & Gilbody, 2005). For example, people with mild to moderate depression may experience symptoms such as irregular sleep patterns, which may respond to low intensity interventions applicable to the first and second tier. At these levels treatment may for example include regular physical exercise or some therapeutic interventions such as cognitive behaviour therapy. Lack of response to these interventions may require more intensive forms of treatment and so a patient may access a higher level of care. More severe symptoms experienced by people may include high levels of self-neglect and physical self-harm. Treatment in these cases is more likely to include combined complex forms of medication or inpatient care that correspond to the third and fourth levels of the system (NICE, 2011, guideline 123).

Experiencing mental illness over an extended period of time, commonly results in an erosion of general day to day functioning that promotes unhealthy lifestyles often associated with severe forms of mental illness (Tosh, Clifton & Bachner, 2011). These factors were supported in reports by the Department of Health (2012) that claimed mental illness is the largest single cause of disability in the UK (http://www.dh.gov.uk/health/category/policy-areas/social-care/mental-health/).

The benefits of physical exercise on well-being for people with SMI are reported by the Department of Health (2004), suggesting that physical activity incorporated into lifestyles on a long term basis provides benefit for people suffering with depression, anxiety disorders and schizophrenia. A systematic review also suggested that for people diagnosed with life-long mental illness; such as schizophrenia and bipolar disorder, interventions including physical activity provide more effective long term treatment outcomes (Faulker, Soundy & Lloyd, 2003). This view was also shared by Callaghan (2004), who reviewed evidence suggesting that physical exercise reduced symptoms of conditions comorbid with SMI; such as anxiety and depression, and in addition improved aspects of cognitive functioning. Callaghan also provided a case study of a person suffering with schizophrenia that highlighted prescribed exercise as a method of preventing negative behaviours associated with relapse. Thus the author claimed, physical activity may be used to foster resilience against the tendency for social exclusion and sedentary lifestyle behaviours in people with SMI (Callaghan, 2004).

There are several focal points for research regarding the effects of physical activity on people with SMI. Firstly, the well documented associations between physical well-being and exercise are particularly relevant (Gorczynski & Faulkner, 2010). People may often show little regard for physical well-being (Callaghan, 2004), and there is a large body of evidence suggesting people with SMI may lead a sedentary lifestyle, have higher than average rates of obesity, poor diet, abuse drugs, alcohol, and have increased instances of smoking (Barr-Taylor, Sallis, & Needle, 1995; Fox, 1999; Richardson et al., 2005). All of these factors relate strongly with an increased the risk of poor physical health. Further examples of these relationships were provided by Richardson et al. (2005) who reviewed substantial evidence to suggest people suffering with SMI may have higher than average mortality rates and chronic health conditions associated with sedentary lifestyles. Coronary heart disease, type 2 diabetes and hypertension all correspond with high levels of morbidity and mortality within populations suffering from some form of mental illness. (Fagiolini & Goracci, 2009; Knowler et al., 2002; Robson & Grey, 2007; Vuori, 2010).

The tendency to lead a sedentary lifestyle has some other close relationships with symptoms associated with mental illness. Factors of personal well-being such as low levels of self-worth and self-efficacy may contribute to these behaviour styles (Biddle & Mutrie, 2008). Recent research supported this point by showing that overweight people with schizophrenia lacked confidence in their physical ability to undertake and achieve physical exercise goals when compared to people who were overweight but did not have a mental illness (Vancampfort et al., 2011). Furthermore, this effect increased in clinically obese patients, thus the more overweight a person became, the more they lost confidence in their ability to perform physical exercise. This scenario suggests a propensity for a negative spiralling of decreasing self-worth and increasing tendency for sedentary lifestyle which in turn may lead to an increase in

weight. This type of cyclical relationship may also be attributed to the effects of some anti-psychotic drugs used to treat illnesses like schizophrenia. Olanzapine for example, may be associated with weight gain that may persist even if administration of the drug medication is stopped (British Medical Association, & Royal Pharmaceutical Society of Great Britain, 2006; Wirshing et al., 1999). Although more recently developed drugs including Ariprazole appear less associated with weight gain (Reynolds & Kirk, 2010). The side effect of weight gain may compound the patient's lack of self-belief when, in spite of exercising, they gain weight and as such may quickly lose faith in any potential benefit. Adherence to medication regimes may also be compromised as they see the costs outweighing the benefits (Allison, 1999; Perkins, 1999). A recent systematic review and meta-analysis suggested that psychological treatment including cognitive behavioural therapy (CBT), nutritional counselling or group based activity, may be effective in reducing medication induced weight gain if introduced during the early stages of treatment (Alvarez-Jimenez et al., 2008). In spite of these pitfalls, perceived benefits of physical exercise have been noted by several studies that gathered evidence qualitatively in the form of interviews with patients. For example, Crone and Guy (2008) reported that patient opinions about exercise grew more positive over time; some came to rely on exercise programmes to provide personal motivation (Crone & Guy, 2008). Their report did not make clear whether positive opinions were due to the effects of exercise or merely routine. However, the study did mirror earlier extensive reviews that suggested people with SMI may use exercise as a positive form of coping strategy for their illness (Faulkner & Biddle 1999; Faulkner & Sparkes, 1999).

Corrigan and Watson (2002) highlighted that low self-efficacy and self-esteem are factors that are common in mental illness which may be compounded by societal opinion regarding mental illness, thus impacting on perceptions of those suffering from it. The authors suggested an increased likelihood of self-stigmatisation; promoting a negative spiralling of personal cognitive appraisals that may support poor mental well-being. Perhaps then, it is of little surprise that depression is highly comorbid with most other forms of serious mental illness (NICE, 2010, guideline 90; WHO, 2010, http://apps.who.int/classifications/icd10/browse/2010/en#/V). Thus people suffering from disorders like schizophrenia may show a tendency to be socially withdrawn (Hafner, 2005). Convincing research by Salmon (2000) provided good evidence to suggest that physical exercise improves mood in people with depression.

The idea that engaging in physical activity encourages social interaction due to the nature of the surroundings, in which it generally takes place, was supported by a review that also noted physical activity may combat symptoms of depression (Salmon, 2000). These findings were further substantiated by a recent study that used a broad array of established measures for aspects such as self-esteem, physical self-perception and self-efficacy and compared the effects of physical activity over time (White, Kendrick & Yardley, 2009). Not only did they find a significant and rapid improvement in the measured outcomes, patients also started to take on more physical activity without being prompted to do so. This has important implications, as it suggested that if people may have been seeing perceivable benefits of engaging in exercise in the form of enjoyment. This in turn may provide evidence to suggest contemplation of positive lifestyle change in those who willingly engage in physical activity. More recently, opinions of patients engaged

in a group based physical activity treatment program within the NHS were reported by a qualitative study that interviewed people with SMI; including schizophrenia (Hodgson, McCulloch & Fox, 2011). The authors, like those discussed, earlier found a rapid positive improvement in patient self-efficacy and self-esteem.

Whether or not a patient adheres to prescribed physical activity as part of a comprehensive treatment program for SMI is a complex matter. It not only impacts on the issues discussed earlier in this review, but also on the potential for lifestyle changes that may help people with SMI combat some of the associated quality of life problems (Schmitz, Kruse & Kugler, 2004). People with mental illness are often thought to be dismissive of advice on lifestyle changes such as smoking cessation, perhaps because they see such aspects as less important or are not "ready to quit" (Sutherland, 2003). This claim is supported by research suggesting lifestyle behaviours such as smoking may be extremely high in those people with Schizophrenia (Osbourn, Nazereth & King, 2006). Promoting aspects of well-being such as healthy eating and smoking cessation within an existing treatment plan may increase the possibility of positive long term lifestyle changes (Bradshaw, 2012). These in turn may help adherence to therapeutic programmes and provide an opportunity for a degree of self-management and improved quality of life.

There are surprisingly few studies investigating barriers to both developing and adhering to lifestyle changes that include physical activity in those people with SMI. A large and recent meta-analytical study suggested increasing self-efficacy via physical activity was found to be an effective way of promoting long term lifestyle change in a general population (Ashford, Edmunds & French, 2010). These finding have even more recently been supported by a qualitative study that interviewed 10 people with SMI who engaged in an NHS physical activity programme (Hodgson, McCulloch, & Fox, 2011). Hodgson and colleagues conducted their study within a clinical setting and accounted for several patient identified benefits including increases in confidence, sociability and cognitive functioning. One of the most crucial improvements demonstrated by increased self-efficacy was the willingness to try new activities; attributed to regular attendance and a sense of social support (Hodgson, McCulloch, & Fox, 2011). Criticism of this study may be attributed in part to the choice of participants which despite being varied in age, gender and diagnosis all expressed an interest in taking part. This provides the possibility that participants were contemplating change anyway or alternatively, already identified with the benefits of physical activity. An important observation regarding the way in which the idea of lifestyle change can be introduced to patients was demonstrated by Roberts & Bailey (2011). They noted the ability of healthcare professionals to establish an alliance with patients can have a positive impact on perceived barriers of those who suffer from mental illness. In addition to this they may be in a position to identify when a patient is open to positive suggestions, thus increasing the possibility of successful interventions.

Callaghan (2004) posited that exercise as an intervention may be underutilised within the health service. This view is supported by inspection of the NICE guidance on the treatment of SMI's such as schizophrenia (NICE, 2010, guideline 82). Treatment guidance includes elaboration on the likelihood of poor physical health, but no exercise recommendations (NICE, 2010, guideline 82, 2.12). Guidance on methods of increasing uptake of physical activity is available separately, but still

gives no recommendations specific to interventions with a mental health setting (NICE, 2006, guideline 2). Until recently, the guidance for depression only briefly mentioned the possibility of inclusion of exercise (NICE, 2009, guideline 23, 1.4.2.4). This guidance has now been replaced by a report detailing extensive evidence suggesting that people with major depression benefited from physical activity (NICE, 2010, guideline 90). Furthermore, the group context in which the programmes took place was seen as a key factor in their effectiveness (NICE, 2010, guideline 90, 7.3.8). This supports evidence discussed earlier in this section by Salmon (2000).

Evidence based practice adopted by the NHS and current research suggests the inclusion of physical activity as part of the treatment regime for SMI should benefit both patient physical and mental health; so promoting recovery (Department of Health, 2006; Schmitz, Kruse & Kugler, 2004). The NHS Outcomes Framework 2011/12 issued by the Department of Health (2010) is a key component current NHS policy and highlights justification for this study. The key focus of the framework rests on improving services based on the quality of treatment outcomes at the level of individual people. The policy states this should be addressed by gaining feedback directly from people regarding the experiences they had as patients. It is therefore important that the service provided by PAD is reviewed in a way that reflects this framework. This may help identify opportunities for improvement in patient treatment outcomes in the long term and also allow comparison between like facilities within the trust and across the NHS.

Currently a quality and effectiveness evaluation is carried out annually as part of a larger review by the mental health care trust that helps to justify health service requirements that continually improve patient treatment. Recently, opinions of patients using PAD within the trust have been gathered using a range of internally produced questionnaires. These have been developed without due regard to current research, broad balanced opinion from patients or experts with vested interest in the service; such as managers within the trust. There is a general view within the department that the current measures of patient satisfaction may be inconsistent and subject to bias. In addition, existing measures may not reflect the focus noted in the NHS Outcomes Framework 2011/12 issued by the Department of Health (2010).

The aim of this study was to gather evidence based empirical research and expert opinion to establish a foundation on which to develop a questionnaire that may be used by PAD in the future in order to collect meaningful, non-biased and consistent patient feedback that can be fed into the annual service evaluation of PAD. The development of the questionnaire therefore took into account a review of relevant current research, prior to being thematically developed using the input of a range of expert and patient opinion. Data collected from application of the questionnaire were scrutinised statistically and the findings discussed in terms of reliability and validity.

Research questions

The nature of this study prevents the generation of specific hypotheses. However it was clear from the reviewed evidence base that a number of research questions could be formulated. The research questions broadly reflect four main subject areas and are detailed below:

- Do patients with SMI perceive positive benefits with regard to their physical well-being when taking part on a physical activity programme, such as weight loss or leading a less sedentary lifestyle?
- Do patients with SMI perceive positive benefits with regard to their mental well-being when taking part on a physical activity programme, such as improved self efficacy or mood?
- Do patients with SMI perceive positive benefits with regard to their social environment when taking part on a physical activity programme, such as interaction with other people?
- Do patients with SMI perceive positive benefits with regard to their general lifestyle when taking part on a physical activity programme, such as a wish to improve their diet or stop smoking?
- What time period elapses before patients perceive changes in these factors?
- Is PAD successful in its goal of promoting positive lifestyle change?

Method and results part one

Development of the questionnaire

Due to the nature of this study the method and results detailed here have been split into sections; firstly detailing the thematic development of the questionnaire and subsequent statistical tests of the questionnaires content for internal validity and reliability. Following these tests further analyses scrutinised questionnaire data collected longitudinally. The methods are therefore presented for each aspect in turn in relation to the relevant results which are presented in the same manner.

Participants

A focus group was established by approaching members of staff from within the mental health trust including ward managers and exercise coaches from the physical awareness department (PAD). In addition to this, a selection of existing patients as well as people with long term serious mental illness currently in remission were also invited to participate. The objective of the group was to meet periodically over a period of approximately one month in order to develop a questionnaire relevant to this study. The establishment of a focus group is this manner was considered a viable way in which to obtain non biased expert knowledge from people with a variety of vested interests in the service as a whole (Wilkinson, 2004). The approach has also been used by other information gathering studies within the NHS (Travess, Newton, Sandy & Williams, 2004). The final group consisted of six people included: Managers from within the trust; one based on a mental health ward the other from a physical awareness facility, members of the exercise coaching staff; each working as part of PAD but from different locations within the trust providing the same service, an existing service user, and an ex-patient; considered as in remission. The author acted as moderator by posing questions, collecting and disseminating information, and facilitating in the interaction of the group as a whole (Wilkinson, 2004).

Post development questionnaire tests for reliability (detailed in the procedure section) were carried out by recruiting patients within the PAD. An HNS system of referral is currently used to prescribe the use of the facilities to patients, providing a cohort on which to administer the questionnaire. However, the use of this facility meant that the number of participants was limited to the through put of people to the service from within the mental health department. A total of 36 patients newly referred to the service were recruited during a routine induction process carried out on their first attendance at either one of the two sites dedicated to the Physical Awareness Department within the trust. All participants were asked to provide their age and gender but many did not respond. NHS policy prevents the release of such patient data, and as such no reliable record of gender and age range was made available. New admissions to the physical awareness program combined over the two sites were estimated by the department manager to be approximately twenty per month. It was thought that combining data in this way may provide a sample of sufficient size to produce meaningful data. All participants took part within the confines of British Psychological Society Code of Human Research Ethics (2010) and permission for the study was granted by the NHS trust board of ethics.

Materials

Focus group meetings were held in the office of the PAD manager. Meeting agendas and minutes were disseminated via email. Printouts of relevant information were provided for group members and coloured highlighters were used during the theme identification process. Microsoft word was used to compile information, generate item lists and in the design process of the questionnaire; details of which will appear in the procedure section. Adobe software was used to format the finalised questionnaire which was printed by facilities at a university in the north west of England. Printed copies of the information sheet, consent forms and blank Questionnaires were stored in locked filing cabinets at both of the PAD facilities. A printed blank matrix was created to record patient details and the date of issue of the questionnaires. Details on all documentation, appears in the following sections. Data were stored in locked filing cabinets within the administrative offices of the two facilities. Participants were supplied with a pen to fill in the relevant information. Results were collated using Microsoft Excel and statistical analyses performed using IBM SPSS V19.

Procedure

The members of the focus group met as a group once a week for a period of approximately one hour. There were a total of four meetings, during which time discussions took place with regard to the development and content of the questionnaire. The work generated as a result of the discussions was collected by the moderator and taken away for completion, to be approved during the following meeting. Each member of the group was contacted prior to the initial meeting and asked to provide a list of as many items as possible, which in their experience, were critical to effectiveness of the service provided by PAD. The first meeting involved establishing a working relationship by discussing the requirements and each members list of critical factors. The moderator compiled a total of 84 items noted by the group. During the second meeting any items considered as duplicated were eliminated. The remaining list was discussed by the group, resulting in the establishment of 3 themes representing commonalities within the items. Each member of the group then anonymously and independently attributed items from the list to each of the categories. The results were compared by the moderator who then compiled a list of discrepancies and presented the findings in the third meeting. The value and relevance of the discrepancies were evaluated by group discussion during the third meeting. As a consequence a fourth category was then established which accommodated those items considered meaningful. The same process was used within each category to produce questions that summarized the items from within that particular theme. This procedure produced a final list of thirteen items which were compiled into a single page to form a questionnaire under the title of Physical Awareness Service Evaluation (PASE). A five point Likert scale was completed for each of the questions. The available options to measure feedback were: “not at all”; “sometimes”; “about half the time”; “most of the time”; “nearly always”. These items were attributed values of 1 to 5; higher scores were to be considered as more positive feedback. Three of the questions were reverse scored by carefully phrasing the question. An instruction sheet was also composed and attached to the front of

the questionnaire. Full details of the questions used are detailed in the results section that follows.

Patients newly referred to PAD were offered the opportunity to contribute to the study by completing the questionnaire. In all, 36 patients agreed to take part in the review, of these; 4 did not complete the questionnaire on the second occasion; a further 2 repeated the questionnaire after approximately 8 weeks and were considered outliers. These two groups were omitted from the study. Participants who agreed to take part were asked to complete an informed consent form prior to completing the questionnaires. An information sheet including an explanation of the study and the contact details of the department manager was also provided, should they wish to discuss any aspect of the study at a future date. The consent forms were dated, in order that a re-test be performed at a future date standard to all participants. More details concerning re testing will appear in the sections to follow. Pseudo-anonymity of data was achieved by numbering the consent forms and questionnaires with a number specific to individual participants. The participant's names, date of consent and participant number were then entered into a printed matrix. The consent forms and the matrix were then stored separately in a locked filing cabinet within the department. This method not only allowed comparisons to be made in data sets but also enabled data to be identified and destroyed if a person wished to withdraw from the study.

Participants were given reasonable time, resources and privacy to complete the task and no specific time limit was set. The completed forms were collected with due concern to anonymity by providing a sealed collection box in which the participants placed their responses. The box was emptied on a daily basis and the completed forms store securely in a locked filing cabinet.

Participants completed a questionnaire at the administration phase and subsequently at approximately four week intervals or until their final attendance (due to being discharged), in a rolling program that ran for approximately three months. The timing for re-issuing of the questionnaire was controlled by daily checking of the matrix containing patient name, date of completion of the first questionnaire and their participant number. It was necessary for some participants to complete their second round questionnaire via return of post due to the rapid nature of their discharge from care and their inability to travel the distance from home to the facility as an outpatient. In these cases it was ensured that data were collected from people who had experienced a minimum of four weeks attendance to PAD.

Tests for validity and reliability

Data collected from the first round of questions (n=30) enabled the construction of a matrix containing statistically derived component loadings and the themes derived by the focus group for each of the questions by using principle component analysis (PCA), orthogonally rotated (varimax). PCA statistically derives common themes within data and groups them together labelled as components; providing a means by which validity can be evaluated. Correlational values of under 0.3 were considered weak and so omitted from the findings noted in this study. In addition, Cronbach's α was used to determine reliability of all the questions within each of the components determined by the PCA.

Results for validity and reliability

A focus group composed of individuals with relevant expertise and a vested interest in PAD was established. Together they thematically identified 4 themes (components) considered of key importance to the effectiveness of the service and positive patient experience. A total of thirteen questions were thematically derived from the four themes and used to develop the Physical Awareness Service Evaluation (PASE) questionnaire.

Descriptions of the overarching themes are detailed below in Table1.

Table1: Table detailing the four key themes identified by the focus group.

Theme Identified	Description	n	Question as it appears on the form
Mental Well-Being (Mwb)	Questions based around the patients personal perception of their own personal mental well-being and experiences of the service	1	In the past 4 weeks did you feel exercise improved your mood, focus or concentration or allowed you to feel less anxious about daily life?
		2	In the past 4 weeks whilst exercising, have you felt lacking in confidence, embarrassed or self-conscious?
		3	In the past 4 weeks did you feel that your mental health was suffering due to physical exercise?
		4	In the past 4 weeks have you felt that exercise was an important part of your treatment plan?
		5	In the past 4 weeks have you felt that exercise has helped improve your sleep patterns, or made you feel less restless?
		12	In the past 4 weeks have you considered exercising more often?
Physical Well-Being (Pwb)	Questions based around how a patient experiences aspects of physical well-being with regard to physical activity	9	In the past 4 weeks have you felt that exercise has hindered your everyday physical tasks such as climbing stairs or carrying heavy shopping bags?
Environment (Env)	Questions based around patients experience of and willingness to interact with the environment in which the activity takes place	6	In the past 4 weeks, whilst exercising, have the gym staff helped you with emotional support when you have needed encouragement, or were feeling low in energy or motivation?
		7	In the past 4 weeks have you felt that being around other gym users has helped you with emotional support when you have needed encouragement, or were feeling low in energy or motivation?
		8	In the last 4 weeks have you felt that you could talk to gym staff about your problems, either personal or exercise related if you wanted to?
		13	In the past 4 weeks have you felt that the service provided by the gym is something worth recommending to others?
Engagement (Eng)	Questions based around the patient perceptions of available support and their willingness to engage in positive lifestyle change	10	In the last 4 weeks have you considered reading the information leaflets on topics such as diet and smoking located around the gym?
		11	In the past 4 weeks, when you have visited the gym, have you considered talking to the staff about health related issues such as diet or stopping smoking?

n = the numerical order in which the questions appear in the questionnaire.

The themes were given the labels based around how a patient felt about their own personal "Mental well-being" (Mwb) and experiences of the service. "Physical well-being"(Pwb) reflected how a patient experienced aspects of physical well-being with regard to physical activity. The "Environment" (Env) was based around patient experience of, and willingness to interact with the social environment in which the activity took place. The theme of "Engagement" (Eng) was considered to be patient attitude and perceptions with regard to their willingness to engage in the overall objective of PAD, which is positive lifestyle change.

Principle component analysis carried out on data collected from 30 completed questionnaires identified five components within the analysed data.

Table2. Table detailing five key themes (components) identified by principle component Analysis displayed orthogonally rotated (varimax).

		Groupings identified by principle component analysis				
Theme identified by focus group	**Question Number**	**Component 1**	**Component 2**	**Component 3**	**Component 4**	**Component 5**
Mwb	4	0.857*				
Mwb	5	0.809*			0.324	
Mwb	1	0.806*				
Eng	10		0.900*			
Eng	11	0.304	0.651*	0.304		
Env	7	0.321	0.591*	0.391		
Env	8			0.844*		
Env	13			0.775*		
Env	6	0.339	0.373	0.599*		
Pwb	9				0.908*	
Mwb	3	0.369			0.771*	
Mwb	2				0.347	-0.858*
Mwb	12					0.717*

*denotes values of items with strongest relationship with each component extracted for inclusion in Cronbach's α test for reliability.

The results of the principle component analysis are consistent with the themes identified by the focus group in all but 2 instances. There is a strong relationship between component 1 and the theme of mental well-being. There is a strong relationship between component 2 and the theme of engagement, although there is a moderate relationship between the themes of engagement and environment within this component. There is a fairly strong relationship between component 3 and the theme of environment. There is a strong relationship between component 4 and Physical well-being, although there is also a strong relationship with the theme of mental-well being. Finally there is a strong relationship between component 5 and the theme of mental well-being. The table below shows correlation values of the components identified by the analysis compared to themes identified thematically by the focus group. Items with correlation values less than 0.3 have been omitted from the table.

The strongest statistically derived values were compared to the themes identified by the focus group and extracted to enable tests for reliability (Cronbach's α) to be performed on the subscales.

Table3. Results for Cronbach's alpha analysis conducted on variables with the strongest correlational values extracted from principle component analysis.

	n	Questions as they appear on the questionnaire	*Mean (SD)*	Cronbach's α
Component 1	1	In the past 4 weeks did you feel exercise improved your mood, focus or concentration or allowed you to feel less anxious about daily life?	4.00(1.17)	
	4	In the past four weeks have you felt that exercise was an important part of your treatment plan?	4.60(0.56)	.79
	5	In the last 4 weeks have you felt that exercise has improved your sleep patterns, or made you feel less restless?	3.60(1.52)	
Component 2	7	In the past 4 weeks have you felt that being around other gym users has helped you with emotional support when you have needed encouragement, or were feeling low in energy or motivation?	2.93(1.61)	
	10	In the last 4 weeks have you considered reading the information leaflets on topics such as diet and smoking located around the gym?	2.10(1.09)	.72
	11	In the past 4 weeks, when you have visited the gym, have you considered talking to the staff about health related issues such as diet or stopping smoking?	2.03(1.47)	
Component 3	6	In the past 4 weeks, whilst exercising, have the gym staff helped you with emotional support when you have needed encouragement, or were feeling low in energy or motivation?	3.43(1.94)	
	8	In the last 4 weeks have you felt that you could talk to gym staff about your problems, either personal or exercise related if you wanted to?	4.10(1.21)	.62
	13	In the past 4 weeks have you felt that the service provided by the gym is something worth recommending to others?	4.70(0.70)	
Component 4	3	In the past 4 weeks did you feel that your mental health was suffering due to physical exercise?	4.86(0.34)	
	9	In the past 4 weeks have you felt that exercise has hindered your everyday physical tasks such as climbing stairs or carrying heavy shopping bags?	4.70(0.79)	.61
Component 5	2	In the past 4 weeks whilst exercising, have you felt lacking in confidence, embarrassed or self-conscious?	4.10(1.06)	
	12	In the past 4 weeks have you considered exercising more often?	3.03(1.51)	-.87

n= the numerical order in which the questions appear in the questionnaire

The results show that questions 1, 4 and 5 had a reliability reflected by a Cronbach's α of .79. Questions 7, 10 and 11 had a reliability reflected by a Cronbach's α of .72. Questions 6, 8 and 13 had a reliability reflected by a Cronbach's α of .62. Questions 3 and 9 had a reliability reflected by a Cronbach's α of .61 and questions 2 and 12 had a reliability reflected by a Cronbach's α of -.87. These results represent acceptable to good reliability within each component.

Method and results part two

Testing of data collected longitudinally

Following the testing for validity and reliability, a second suite of analyses were performed in order to assess the ability of the questionnaire to detect change over time.

Participants

Participants were recruited on induction to PAD to establish a base questionnaire scores and the re-tested after a period of approximately four week attendance as detailed in the first half of this section.

Procedure

Questionnaire results were matched using the individual participant numbers noted the matrix detailed in the first half of this section and which were also included on each questionnaire.

Design and analysis

This procedure allowed for a longitudinal repeated measures design to be used in order to compare scores of each of the components on the questionnaires (DV's) from two points in time (IV's). Paired samples t-tests were applied to the results with an alpha level of 0.05.

Results for data collected longitudinally

Table 4 below shows the paired sample two tailed t-test results comparing the mean scores for each component between completion of questionnaires at time 1 and then again after a four week interval at time 2.

Table 4. Results of paired sample repeated measures t-test for components 1 – 5.

	n	Questions as they appear on the questionnaire	*Mean (SD) time 1*	*Mean (SD) time 2*	Paired samples statistics
Component 1	1	In the past 4 weeks did you feel exercise improved your mood, focus or concentration or allowed you to feel less anxious about daily life?	12.17 (2.91)	12.10 (2.58)	t(29) = .20 p = .844
	4	In the past four weeks have you felt that exercise was an important part of your treatment plan?			
	5	In the last 4 weeks have you felt that exercise has improved your sleep patterns, or made you feel less restless?			
Component 2	7	In the past 4 weeks have you felt that being around other gym users has helped you with emotional support when you have needed encouragement, or were feeling low in energy or motivation?	7.07 (3.39)	7.93 (3.43)	t(29) = -2.80 p = .009
	10	In the last 4 weeks have you considered reading the information leaflets on topics such as diet and smoking located around the gym?			
	11	In the past 4 weeks, when you have visited the gym, have you considered talking to the staff about health related issues such as diet or stopping smoking?			
Component 3	6	In the past 4 weeks, whilst exercising, have the gym staff helped you with emotional support when you have needed encouragement, or were feeling low in energy or motivation?	12.23 (3.12)	12.13 (2.85)	t(29) = .25 p = .805
	8	In the last 4 weeks have you felt that you could talk to gym staff about your problems, either personal or exercise related if you wanted to?			
	13	In the past 4 weeks have you felt that the service provided by the gym is something worth recommending to others?			
Component 4	3	In the past 4 weeks did you feel that your mental health was suffering due to physical exercise?	9.57 (1.04)	9.73 (0.52)	t(29) = -1.04 p = .31
	9	In the past 4 weeks have you felt that exercise has hindered your everyday physical tasks such as climbing stairs or carrying heavy shopping bags?			
Component 5	2	In the past 4 weeks whilst exercising, have you felt lacking in confidence, embarrassed or self-conscious?	7.13 (1.55)	7.30 (2.10)	t(29) = -.46 p = .67
	12	In the past 4 weeks have you considered exercising more often?			

n= the numerical order in which the questions appear in the questionnaire.

Two tailed paired samples repeated measures t-test performed with an interval of approximately four weeks between tests showed no statistically significant differences in mean values for components 1, 3 and 4. The results for component 2 showed a significant increase in questionnaire score values between the first and second time of completion. On average, participants were more inclined to talk to the staff or read the information about health related issues such as diet or stopping smoking and draw emotional support from other gym users after attending a physical exercise program in the PAD for approximately 4 weeks (M = 7.07, SD = 3.39) than before commencing the program (M =7.93, SD = 3.43), t(29) = 2.80 p < .05. However, there is a moderate relationship between the themes of engagement and environment within this component. With this in mind a test for reliability was conducted on the strongly related items of component 2 that represented the theme of engagement.

Table 5. Results of Cronbach's α test for reliability on the statistically derived component 2 that excluded the moderately related environmental theme (question 7).

	n	Question as it appears on the questionnaire	*Mean (SD) time 1*	Cronbach's α
Component 2	10	In the last 4 weeks have you considered reading the information leaflets on topics such as diet and smoking located around the gym?	2.10 (1.09)	.66
	11	In the past 4 weeks, when you have visited the gym, have you considered talking to the staff about health related issues such as diet or stopping smoking?	2.00 (1.47)	

n= the numerical order in which the questions appear in the questionnaire

A Cronbach's α test for reliability that excluded the moderately related environmental theme showed a fairly strong reliability of .66.

These same variables were analysed using a two tailed paired samples repeated measures t-test.

Table 6. Results of Paired sample repeated measures t-test for component 2 after removal of question 7.

	n	Question as it appears on the questionnaire	*Mean (SD) time 1*	*Mean (SD) time 2*	Paired samples statistics
Component 2	10	In the last 4 weeks have you considered reading the information leaflets on topics such as diet and smoking located around the gym?	4.13 (2.24)	4.77 (2.51)	t(29) = -2.85 p = .008
	11	In the past 4 weeks, when you have visited the gym, have you considered talking to the staff about health related issues such as diet or stopping smoking?			

n= the numerical order in which the questions appear in the questionnaire

A two tailed paired samples repeated measures t-test that excluded the moderately related environmental themed question showed that on average, participants were more inclined to talk to the staff or read the information about health related issues such as diet or stopping smoking after attending a physical exercise program in the PAD for approximately 4 weeks (M =4.13, SD =2.24) than before commencing the program (M =4.77, SD =2.51), t(29) = 2.85 p < .05.

A bar chart showing the mean score values of the questionnaires taken when patients started at PAD and then administered again after approximately four weeks provided a visual representation of the scores which enables comparison of the statistically derived components.

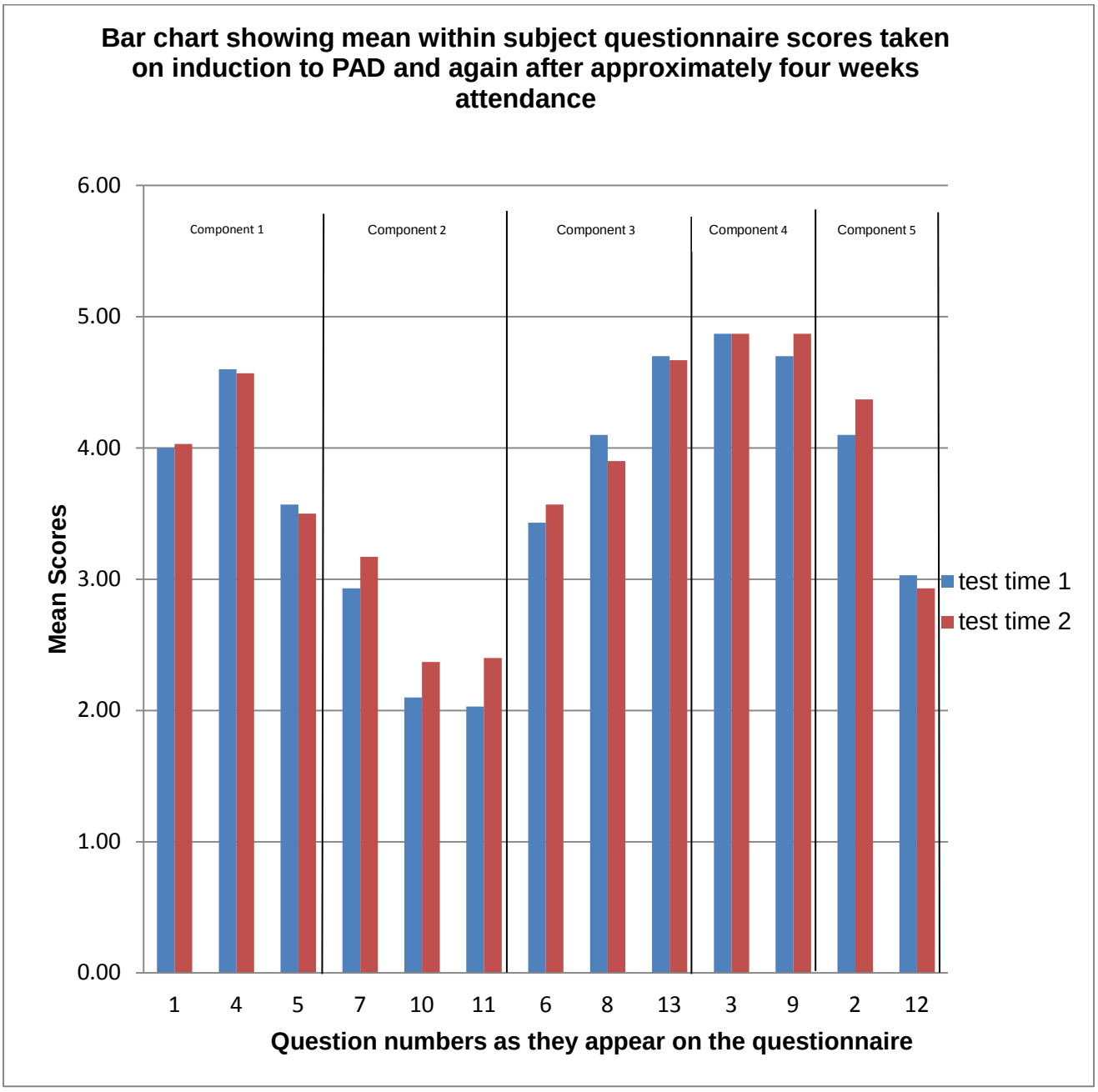

Figure 1. Bar chart showing mean questionnaire scores within their component groups.

Discussion

Discussing the outcomes

This study focused on the development and testing of a questionnaire to help gauge the effectiveness of physical activity programmes for people with severe mental illness (SMI). A literature review, detailed in the introduction of this report, found evidence based research in this area to be somewhat limited and some of the research surveyed in this area was methodologically unconvincing. For example, systematic review studies compared findings from a mixture of qualitative and quantitative sources (Ellis, Crone, Davey & Grogan, 2007; Mutrie, 2003). This makes direct comparisons in research difficult to interpret. This may offer explanation as to why there was little in the way of detailed support for interventions involving physical exercise within current NICE guidance.

The evidence gathered suggested that physical and mental well-being, social and lifestyle factors were affected by participation in (or lack of) physical exercise for people with mental illness.
It is worth noting that the focus group, which collectively identified the thematically derived criterion on which the questionnaire was based, did so independently of the evidence-based findings identified in the literature review. Excitingly, in doing so they identified four themes that were directly comparable to those identified within the evidence based literature. These included both physical and mental health related themes, as well as the role of the social environment in which the activity took place, and finally the idea that the aim of PAD was the promotion of positive lifestyle change. As mentioned in the introduction section, the generation of specific hypotheses was not possible prior to the development of the questionnaire, due to the qualitative nature of its development. Nevertheless formulation generalised research questions based on the reviewed evidence was possible. Thus, given that themes identified by the focus group mirrored that of the reviewed research it is suggested that the qualitative aspect of the questionnaire development agreed with these research questions.

The idea of forming a focus group was taken from work commissioned by the Health Technologies Assessment Program (HTA), which is directed by research and development within the NHS (Whiting et al., 2004). Findings from such research directly influences bodies such as National Institute for Clinical Excellence (NICE) thus the principles for developing methods of assessment of the quality of services provided by the NHS suggested by Whiting and colleges have been used within other areas of NHS research (Travess, Newton, Sandy & Williams, 2004). It was thought that adopting this approach would enable one avenue on which to introduce robustness that was missing from previous service evaluations within PAD. Additionally, this study improved on the method suggested by Travess and colleagues, by statistically assessing the findings of the focus group and employing tests for internal validity and reliability in the form of principle component analysis (PCA) and Cronbach's α.

The components identified by the PCA broadly reflect the themes derived by the focus group. A recap of how the themes mapped onto the PCA results is shown in the table below.

Table 7. Components identified by Principle Component Analysis in comparison with Themes derived by the focus group.

Themes and Components				
Identified theme	Mental well being	Engagement	Physical well being	Environmental
Identified PCA component	Component 1 & 5	Component 2	Component 3	Component 4

The inclusion of only one question from the theme of physical well-being may have provided inaccuracy in its component loading. However, the limited overlapping of the other themes and the components in the PCA results were considered to be of limited consequence due to their low correlational values of less than 0.4. In addition to this the moderate to good level of reliability suggested by the results of Cronbach's α analyses lend further credibility to these findings.

There is some debate as to whether sample size plays a part in the accuracy of these findings. The diversity of the constructs that make up the components makes low values a little more acceptable, but the low population size does suggest that results may be overly influenced by even small variations in data. Sample size and the level at which the correlational values were disregarded had a direct affect on the outcome. Research has identified that elimination of type I and type II errors were most likely achieved with a sample size of 100 and component loadings were greater than 0.6; below which associations between components would be disregarded (Guadagnoli & Velicer, 1988; Rouquette & Falissard, 2011). The limited sample size in the present study suggests it may be prudent to exercise a degree of caution in the interpretation of the PCA results. However, it should also be noted that the PCA data with this study was purely exploratory in order to add robustness to the qualitative findings of the focus group. In general the results of the PCA and the themes developed by the focus group were in agreement, which added a degree of credibility to the results.

The repeated measures design of the post qualitative aspect of this study had the aim of testing the ability of the PASE questionnaire to provide data that showed changes in patient attitude over time. The significant results of the questionnaire component measuring engagement, suggested a rapid change in peoples attitude toward the prospect of beneficial lifestyle changes. In addition this result provided evidence to suggest that PAD has been successful in its overall aim of encouraging positive lifestyle change in people with severe mental illness (SMI). Other themes did not show statistically significant differences when the results were compared to those taken after a four week period. However, mean values did show trends of improved physical and mental well- being as well as a positive change in attitude toward the social environment. A number of factors may have been responsible for the lack of

statistical significance within themes other than engagement. Firstly, a test re-test period of approximately 4 weeks was necessary due to time constraints imposed by the fact that this study was part of a dissertation project may have been a factor in the lack of statistically significant portion of the results. Secondly, the nature of severe mental illness may mean referral to PAD is initiated when a person is admitted to hospital. Anecdotal evidence suggests that when people are subsequently discharged after a short period, lack of funds or transport may result in poor attendance to PAD. This not only poses an obvious problem when attempting to collect data over an extended period but also suggests that a lack of resources within the trust means that there may be a lack of continuity in care for people with severe mental illness.

Another factor that may contribute uncertainty in the non significant results may be attributed to a degree of ambiguity in the wording of some of the PASE questions. Items 2 and 12, as they appear on the PASE questionnaire, were identified by the focus group as questions within the theme of mental well being and appear as a separate (fifth) component within the CPA results. It is thought that the wording of these two items may be somewhat ambiguous. For example, item 2 asks: In the past four weeks whilst exercising have you felt lacking in confidence, embarrassed or self conscious? Although the mean score for test time 2 is greater than test time 1 indicating a possible increase in self efficacy suggested by Crone and Guy (2008), a person may also be becoming increasingly self aware due to engagement in the exercise programme. Thus giving rise to the possibility of a person becoming self conscious or even embarrassed. This reflected the negative aspect of personal perception suggested by other research (Vancampfort et al., 2011; Wirshing et al., 1999). It is therefore, not clear whether this question is providing data with acceptable face validity or whether PCA has identified a legitimate component not identified as a theme by the focus group. Similarly with question 12 which asks: In the past four weeks have you considered exercising more often? It is thought that the lack of contextual clarity of this item may be confusing to, for example; patients who currently engage in physical activity on most days. This interpretation may account for the separation of these two items within the PCA results, as in spite of the overall means suggesting results that are in line with the overall assumptions gained from the review of the evidence based research, individual data may be inconsistent.

Benefits of the study and future research

The implications of this dissertation provide opportunity for both specific and indirect future research. Specific to this study it is thought that a further development may take into consideration sample size and wording ambiguity within the questions, both of which may improve the statistical reliability of principle component analyses. The possibility that an additional component may have been identified within the broad theme of “mental well-being” is a beneficial avenue for further research. Questions may be formulated accounting for the positive aspects of engaging in physical activity such as improved self-esteem and motivation suggested by recent research (Crone & Guy, 2008; Hodgson, McCulloch & Fox, 2011). Similarly, more negative aspects; like weight gain associated with medication; may also be targeted (Allison, 1999; Perkins, 1999).

Comparing age, gender and illness type may allow development of questionnaires for specific groups of patients, or help to identify activities more likely to promote positive change over time. Data gathered longitudinally on such aspects of patient experience may provide information on attitudes towards adherence to medication during prescribed physical activity programmes. Data collected over an extended period of time, may also provide the opportunity to assess whether promoting lifestyle changes provides mechanisms by which people with SMI may experience improved long term treatment outcomes and better quality of life. This study also provides scope for future, larger scale evaluation and improvement of similar services in other NHS trusts.

Limitations

In addition to the limitations detailed within the discussion of this study there are some, more general difficulties in conducting research within this field. The nature of mental illness makes collecting empirical data somewhat haphazard. People may experience a rapid change in outlook, as a consequence of the effects of medication; other forms of intervention or their individual diagnosis; which in turn may have an effect on their perception of their treatment. For example people with bipolar disorder experience dramatic and rapid shifts in mood between high euphoric and overly positive, to crushing despair and deeply negative (NICE guideline 38, 2006). This not only presents the possibility of inconsistent data, but may also influence attendance to PAD. People admitted to hospital with SMI may be recovering from physical injury as well as suffering from symptoms of severe mental trauma, thus may be considered too ill to leave the ward. Others may be too vulnerable to be discharged without consideration of external specialist support. This kind of scenario can make the prescription of the service offered by PAD unsuitable on a number of levels. Firstly, the degree of disinterest in physical activity by a patient with SMI may be high, even if the patient is physically able. Secondly, extreme vulnerability may require medical staff to accompany the patient on visits to PAD, which commands both time and resources that are often in short supply.

Conclusion

This study provides evidence to suggest that people with SMI may contemplate positive lifestyle change during engagement with a physical exercise programme. In spite of the small sample size there were moderate to good statistical association within the data that showed correspondence between the qualitatively derived themes and statically derived components. Further testing in the form of test re-test evaluation to test the ability of the questionnaire to detect change of patient opinion over time, showed statistically significant increases in scores in the component measuring the tendency for physical activity to promote positive lifestyle change. The aim of this study was to use an evidence based foundation to develop a questionnaire that enabled collection of robust non biased data that enabled PAD to conduct a service evaluation. Although further research is required, this study has exceeded this target by also providing some limited results that show PAD is successful in its goal of facilitating this attitude change in people with SMI.

References

Allison, D.B., Mentore, J.L., Heo, M., Chandler, L.P., Cappelleri, J.C., Infante, M.C., & Weilden, P.J. (1999). Antipsychotic-induced weight gain: a comprehensive research synthesis. *American Journal of Psychiatry, 156*, 1686-1696.

Alvarez-Jilmenez, M., Hetrick, S.E., Gonzalez-Blanch, C., Gleeson, J.F., & McGorry, P.D. (2008).The *British Journal of Psychiatry, 193*, 101-107.

Ashford, S., Edmunds, J., & French, D.P. (2010). What is the best way to change self-efficacy to promote physical activity? A systematic review with meta-analysis. *British Journal of Health Psychology 15*; 265-288.

Barr-Taylor, C., Sallis, J.F., Needle, R. (1995). The relation of physical activity and exercise to mental health. *Public Health Reports, 100*, 195-202.

Biddle, S.J.H., & Mutrie, N. (2008). *Psychology of psychical activity: determinants, well being and interventions* (2nd ed.). [MyiLibrary version]. Retrieved from MyiLibrary.

Bower, P., & Gilgoody, S. (2005). Stepped care in psychological therapies: access, effectiveness and efficiency. *British Journal of Psychiatry, 186*, 11-17.

Bradshaw, T. Wearden, A., Marshall, M., Warburton, J., Husain, N., Pedley, R., Escott, D., Swarbrick, C., & Lovell, K. (2012).Developing a healthy living intervention for people with early psychosis using the medical research council's guidelines on complex interventions: phase 1of the HELPER – Inter ACT programme. *International journal of Nursing Studies 49*, 398-406.

British Medical Association, & Royal Pharmaceutical Society of Great Britain. (2006). *British National Formulary*. (52nd ed.). London, United Kingdom: BMJ Publishing.

British Psychological Society. (2010). *Code of human research ethics*. Leicester, United Kingdom: Working Party on Ethical Guidelines.

Callaghan, P. (2004). Exercise: a neglected intervention in mental health care? *Journal of Psychiatric and Mental Health Nursing, 11*, 476-483.

Corrigan, P.W., & Watson, A.C. (2002). The paradox of self-stigma and mental illness. *Clinical Psychology Science and Practice, 9*, 35-53.

Crone, D., & Guy, H. (2008). "I know it is only exercise, but to me it is something that keeps me going": a qualitative approach to understanding mental health service users' experiences of sports therapy. (2008). *International Journal of Mental Health Nursing, 17*, 197-207.

Department of Health. (2006). *Choosing Health: Supporting the physical needs of people with severe mental illness* (Gateway Ref., 6757). London, United Kingdom: Department of Health/Mental Health.

Department of Health. (2010). *The NHS Outcomes Framework 2011/12.* (Gateway Ref., 15264). London, United Kingdom: Department of Health.

Department of Health. (2012). Mental Health. Sourced at :http:// www.dh.gov.uk /health/ category/ policy-areas/social-care/mental-health/

Department of Health, Physical Activity, Health Improvement and Prevention. (2004). *At least five a week: Evidence on the impact of physical activity and its relationship to health*. London, United Kingdom: Chief medical Officer.

Ellis, N., Crone, D., Davey, R., Grogan, S. (2007). Exercise interventions as an adjunct therapy for psychosis: a critical review. *British Journal of Clinical Psychology, 46*, 95-111.

Fagiolini, A., & Goracci, A. (2009). The effects of undertreated chronic medical illnesses in patients with severe mental disorders. *Journal of Clinical Psychiatry, 70*(Supplement 3), 22-29.

Faulkner, G., & Biddle, S. (1999). Exercise as an adjunct treatment for schizophrenia: A review of the literature. *Journal of Mental Health, 8*, 441-457.

Faulkner, G., Soundy, A.A., & Lloyd, K. (2003). Schizophrenia and weight management: a systematic review of interventions to control weight. *Acta Psychiatrica Scandinavica, 108,* 244-332*.*

Faulkner, G., & Sparkes, A. (1999). Exercise as therapy for schizophrenia: An ethnographic study. *Journal of Sport & Exercise Psychology*, *21*(1), 52-69.

Fox, K.R. (1999). The influence of physical activity on mental well-being. *Public Health Nutrition, 2*(3a), 411-418.

Gorczynski, P., & Faulkner, G. (2010). Exercise therapy for schizophrenia (review). *The Cochrane Database of Systematic Reviews*, 5. doi: 10.1002 /14651858. CD004412.pub2.

Hafner, H., Maurer, K., Trendler, G., an der Heiden, W., Schmidt, M., & Konnecke, R. (2005). Schizophrenia and depression: challenging the paradigm of two separate diseases – a controlled study of schizophrenia, depression and healthy controls. *Schizophrenia Research, 77*, 11-24.

Hodgson, M. H., McCulloch, H. P., & Fox, K. R. (2011). The experiences of people with severe and enduring mental illness engaged in a physical activity programme integrated into the mental health service. *Mental Health and Physical Activity, 4*(1), 23-29.

Knowler, W.C., Barrett-Connor, E, Fowler, S.E., Hamman, R.F., Lachin, J.M., Walker, A.E., & Nathan, D.M. (2002) Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine, 346*, 393-403.

Mutrie, N. (2003). The relationship between physical activity and clinically defined depression. In S. Biddle, K.R. Fox, & S.H. Boutcher (Ed.), *Physical Activity and Psychological Well-being* (pp. 46-62). [EBSCO version]. Retrieved from EBSCO.

National Institute for Clinical Excellence. (2006).*Bipolar disorder: the management of bipolar in adults, children and adolescents, in primary and secondary care.* National Clinical Guideline 38. London, United Kingdom.

National Institute for Clinical Excellence. (2006). *Four commonly used methods to increase physical activity: brief interventions in primary care, exercise referral schemes, pedometers and community-based exercise programmes for walking and cycling.* Public Health Intervention Guideline 2. London, United Kingdom.

National Institute for Clinical Excellence. (2009).*Depression: The treatment and management of depression in adults.* National Clinical Guideline 23. London, United Kingdom.

National Institute for Clinical Excellence. (2010).*Depression: The treatment and management of depression in adults* (updated version)*.* National Clinical Guideline 90. London, United Kingdom.

National Institute for Clinical Excellence. (2010). *Schizophrenia: core interventions in the treatment and management of schizophrenia in adults in primary and secondary care.* National Clinical Guideline 82. London, United Kingdom.

National Institute for Clinical Excellence. (2011). *Common Mental Health Disorder.* National Clinical Guideline 123. London, United Kingdom.

Osbourn, D.P.J., Nazareth, I., & King, M.B. (2006). Risk for coronary heart disease in people with severe mental illness: cross-sectional comparative study in primary care. *The British Journal of Psychiatry, 188*, 271-277.

Perkins, D.O. (1999). Adherence to antipsychotic medications. *Journal of Clinical Psychiatry, 60* (supplement 21), 25-30.

Reynolds, G.P., & Kirk, S. L. (2010). Metabolic side effects of antipsychotic drug treatment: pharmacological mechanisms. *Pharmacology & Therapeutics, 125*, 169-179.

Richardson, C.R., Faulkner, G., McDevitt, J., Skrinar, G.S., Hutchinson, D.S., & Piette, J.D. (2005). Integrating physical activity into mental health services for persons with serious mental illness. *Psychiatric Services, 56*(3), 324-331.

Roberts, S., & Bailey, J. (2011). Incentives and barriers to lifestyle interventions for people with severe mental illness: A narrative synthesis of quantitative, qualitative and mixed methods studies. *Journal of Advanced Nursing, 67*(4), 690-708.

Robson, D., & Gray, R. (2007). Serious mental illness and physical health problems: A discussion paper. *International Journal of Nursing Studies, 44*, 457-466.

Rouquette, A., & Falissard, B. (2011). Sample size requirements for the internal validation of psychiatric scales. *International Journal of Methods in Psychiatric Research*, *20*(4), 235-249.

Salmon, P. (2000). Effects of physical exercise on anxiety, depression and sensitivity to stress: A unifying theory. *Clinical Psychology Review, 21*, 33-61.

Schmitz, N., Kruse, J., & Kugler, J. (2004). The association between physical exercises and healt related quality of life in subjects with mental disorders: Results from a cross-sectional survey. *Preventive Medicine, 39*, 1200-1207.

Sutherland, G. (2003). Smoking: can we really make a difference? *Heart, 89* (supplement 2), 25-27.

Tosh, G., Clifton, A., & Bachner, M. (2011). General physical health advice for people with serious mental illness. *Schizophrenia Bulletin*, *37*(4), 671-673.

Travess, H.C., Newton, J.T., Sandy, J.R., & Williams, A.C. (2004). The development of a patient centred measure of the process and outcome of combined orthodontic and orthognathic treatment. *Journal of Orthodontics, 31*, 220-234.

Vancampfort, D., Probst, M., Sweers, K., Maureissen, K., Knapen, J., & De Hert, M. (2011). Relationships between obesity, functional exercise capacity, physical activity participation and physical self perception in people with schizophrenia. *Acta Psychiatrica Scandinavica, 123,* 423-430*.*

Vuori, I. (2010). Physical activity and cardiovascular disease prevention in Europe: an update. *Kinesiology, 42*, 5-15.

White, K., Kendrick, T., & Yardley, L. (2009). Change in self esteem, self efficacy and mood dimensions of depression as potential mediators of the physical activity and depression relationship: Exploring the temporal relationship of change. *Mental Health and Physical Activity, 2*, 44-52.

Whiting, P., Rutjes, A.W.S., Dinnes, J., Reitsma, J.B., Bossuyt, P.M.M, & Kleijnen, J. (2004). Development and validation of methods for assessing the quality of diagnostic accuracy studies. *Health Technologies Assessment*, 8(25).

WHO. (2010). *Mental and Behavioural Disorders*. Retrieved from: http://apps.who.int/ classifications /icd10/browse/2010/en#/V

Wilkinson, S. (2004). Focus group research. In D Silverman (Ed.), *Qualitative research theory method and practice*, (pp. 177-221). London, UK: Sage Publications.

Wirshing, D. A., Wirshing, W. C., Kysar, L., Berisford, M., Goldstein, D., Pashdag, J., & ... Marder, S. R. (1999). Novel antipsychotics: Comparison of weight gain liabilities. *Journal of Clinical Psychiatry, 60*(6), 358-363.