The mediating effect of altruism and affect on resilience and preventative

health behaviour

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ABSTRACT

Introduction: There has been notable paucity and little consensus in the research regarding factors in health behavior outcomes. This is particularly apparent for concepts such as affect and, in particular, altruism which have been noted to impact resilience – a strongly supported predictor of health, recovery and well-being. **Method**: A cross-sectional online survey was utilised to target an international sample (*N*=199). The survey was compiled utilising *The Positive and Negative Affect Scale* to measure affect*; GRIT short form scale* to measure resilience*; Adapted Self-report Altruism scale* to measure altruistic behaviour and the *International Health and Behaviour Survey* to measure health behaviours categorized as Support-seeking and Self-management behaviours. **Results**: The results revealed that high affect played a role in the presence of negative health behaviours such as increased smoking and decreased exercise. Higher resilience was associated with improved hygiene, and higher altruism was associated with increased cancer avoidance strategies. Mediation analysis revealed that the relationship between resilience and eating behaviour was significantly mediated by altruism. Higher altruism was also seen to be associated with more positive health beliefs and higher affect. Other exploratory analyses significantly linked intention to behaviour for smoking and alcohol intake. **Discussion**: The impact of altruism opens several novel avenues for practice and research and could potentially form the basis of a more comprehensive model of health behaviour and effective health promotion campaigns.

Key words: Health, Altruism, Resilience, Affect, Mediation

INTRODUCTION

Health has become an area of increasing concern over the last decade, particularly with public health statistics suggesting that 25 000 people die in Europe each year as a result of increased antibiotic resistance, and 42% of common cancer cases in the UK are a result of lifestyle factors (Public Health England, 2016). As a result of this growing concern, there has been a focus on manners by which to improve general health. One such component of health research is preventative health behaviours. Preventative health behaviours are defined as 'any activity or behaviour undertaken by a person who believes himself to be healthy for the purpose of preventing disease or detecting disease in an asymptomatic stage' (Kasl & Cobb, 1966, p246). This definition constitutes a plethora of behaviours, from smoking habits to wearing a seatbelt whilst in a car, and can be compiled into two broad categories set out in literature; Support-seeking Behaviours and Self-Management Behaviours (Steptoe, 2001, Wardle & Steptoe, 1991; Kasl & Cobb, 1966). Support-seeking Behaviours consists of Illness Awareness and Cancer Avoidance strategies whereas Self-Management Behaviours is compiled from Sleep, Eating Behaviour, Alcohol Intake, Smoking Habits, Exercise and Travel Habits. As these noted behaviours imply, an individual's health is often strongly influenced by the manner in which they care for themselves. Therefore, in the current state of global health where chronically ill adults do not seek medical attention due to cost and access, self-care is imperative for prevention (Fried et al., 2012, Cohn, 2014).

Health Behaviours have often been categorised into Preventative Health Behaviour, Illness Behaviour and Sick-Role Behaviour. Preventative Health

Behaviours, being the behaviour that maintains health, is of considerable research importance. Initial research into health behaviours has revealed that they have the ability to significantly mediate lifestyle, resilience and, importantly, an individual's overall health (Matarazzo, 1983; Belloc & Breslow, 1972; Shin et al., 2006). This research, however, is still a relatively new area with many confounding and mediating factors that have yet to be investigated outside components such as demographics, psychosocial and structural variables. This area therefore, particularly with its effect on recovery and health, still requires considerable research attention. Without understanding and knowledge of the mediating factors in these behaviours, it is not possible to address the extent to which intervention responses may be limited by intra or interpersonal factors. It is, therefore, vital to investigate the predictors and mediators of health behaviours in order improve health status.

Health behaviours have been suggested to be predicted by the extent to which a person's environment appeals to their motivation and knowledge (Glanz et al., 2015). The Health Beliefs Model suggests that this knowledge and motivation – or beliefs – about health; the perceived benefits of action and barriers in the environment as well as their self-efficacy explain their health behaviours (Rosenstock et al., 1952; Green & Murphy, 2014). This model has become one of the most widely referenced and influential predictors of a variety of health-related behaviours in public health. These predictions have developed from screening for early detection of asymptomatic illness and maintaining immunisation injections, to more complex behaviours such as compliance with medical advice, chronic illness response and general lifestyle choices (Janz & Becker, 1984; Carpenter, 2010; Glanz et al., 2008). Predictions of this magnitude and impact encouraged the necessity of making the model generalizable to all populations and, by association,

potential modifying factors. It was suggested that modifying factors were confined to individual characteristics such as demographics, psychosocial and structural variables that altered their perception of health altogether (Rosenstock, 1974; Glanz et al., 2008). Whilst this suggestion may be largely supported and well integrated, these modifying factors are broad as well as limited and do not necessarily account for other factors influencing health that are independent of conscious choice. Examples of this are often seen in habitual behaviours such as seat-belt wearing or engagement in behaviour based upon others or emotions, such as maintaining a level of health for the sake of loved ones or for fear of dying (Glanz et al., 2015; Carpenter, 2010; Maiman et al., 1977). The Theory of Planned Behaviour (TPB), however, suggests a different approach.

TPB suggests that the interaction between health beliefs and behaviour needs to acknowledge the presence of perceived behavioural control (Azjen, 1985). Attitude towards the behaviour, subjective norms and perceived behavioural control, through the definition of TPB, are thought to influence and predict an individual's intentions and behaviour. As with the Health Belief Model, this theory has also been widely referenced and largely successful in health care predictions as well as broader behaviour changes in the general population (Sheppard et al., 1988; Fishbein & Cappella, 2006; Amjad & Wood, 2009). There are limitations, however, outside of the mediation in this model as a result of circumstantial limitations. These limitations do not necessarily allow for intention to consistently result in the follow-through of the corresponding behaviour (Norberg et al., 2007; Sniehotta, 2009). This theory, however, is limited in its acknowledgement of potential mediating factors as there is restricted consensus on the predictors themselves. In furthering the knowledge on what may influence the predictors suggested by any model, the

understanding of the interactions between an individual and their health can be expanded and utilised to improve intervention and practice.

Preventative health behaviours, however, have been strongly linked to other mediating factors such as resilience or grit (Chan et al., 2006; Shin et al., 2006; Wu et al., 2013; Duckworth et al., 2007). Resilience and grit, for the purpose of this study, have been investigated as one trait according Duckworth et al. (2007; 2009). This trait is considered to be an individual's capacity and dynamic process of adaptively prevailing over stressful and adverse circumstances, whilst maintaining a normal standard of physiological and psychological functioning (Russo et al., 2012; Rutter, 2012; Southwick & Charney, 2012; Wu et al., 2013). Over the past decade, resilience has been noted to promote the benefits that are taken from recovery interventions for chronic illness as well as cardiac complications such as myocardial infarction and coronary heart disease (Chan et al., 2006; Shin et al., 2006; Edward, 2013; Johnston et al., 2015). This suggests that resilience may be a considerable mediating factor for preventative and recovery health behaviours. As a result, there is increased interest in the notion of identifying various factors that are able to mediate the strength of resilience and, in turn, alter health behaviours. Genetics, epigenetics, developmental environment and psychosocial factors have all been implicated within research to have an effect on resilience levels throughout an individual's life (Wu et al., 2013).

Genetics have been suggested to contribute to the stability of personal resilience as a trait in response to stress and trauma, particularly with the presence of the neuropeptide NPY and regulatory genes in the hypothalamic-pituitary-adrenal axis such as the FK506-binding protein 5 gene which promote a protective response in adversity (Russo et al., 2012; Wu et al., 2013; Gillespie et al., 2008). This, often, is

in combination with epigenetic factors such as decreased levels of GR promotors in the hippocampus as a result of poor maternal care and child abuse which results in higher susceptibility to psychological disorders and lower resilience (Dudley et al., 2011; McGowan et al., 2009; Weaver et al., 2004). Therefore, when children grow into adulthood, the aforementioned combinations become apparent in an individual's resilience and consequent behaviour.

Genetics and epigenetics, although contributing factors, cannot sustain a constant level of resilience due to the interactive nature of the characteristic. Developmental environment can potentially counteract genes that promote resilient traits. Trauma or adverse stress in childhood can potentially impair the development of stress-response systems. Evidence for this has been found in both rodent and primate studies showing that abused young illustrate delayed stress-management skills and independence in maturity (Rende, 2012; Feder et al., 2011). In human beings, adverse childhood environments are seen to reduce hippocampal volume, amygdala responsiveness to negative facial expression, and shorter telomeres which have all been linked to susceptibility to physiological and psychological disorders (Dannlowski et al., 2012; Blackburn & Epel, 2012; Price et al., 2013). Adverse childhoods, however, do not necessarily guarantee whether or not an adult will be vulnerable or resilient. A large degree of the lasting effects of adverse childhood experiences can be mediated by psychological interpretation and psychosocial support and result in resilience in adult life.

External influences are not exclusive in their mediation, however. Resilience has been strongly associated with the ability to cognitively reappraise a negative event as more positive (McRae et al., 2012). Cognitive appraisal is strongly associated with emotional regulation will alter the manner by which an individual

handles stress (Gross, 2002). Resilience is seen to significantly increase when cognitive appraisal is accompanied by or potentially including active coping mechanisms. Active coping is defined as an individual's use of their own resources to deal with a stressor (Zeidner & Endler, 1996). It is seen in several different populations, including normal and chronic pain groups, reduce psychological depression and distress whilst increasing resilience (Feder et al., 2009; Moos and Schaefer, 1993; Snow-Turek et al., 1996). Passive and avoidant opting, however, can be seen to have opposite effects suggesting that a resilient state can be manipulated by the individual which further suggests it may not be a stable trait as suggested by genetic factors (Chesney et al., 2006; Holahan and Moos, 1987; Wu et al., 2013). Similarly, social support has been found to significantly increase resilience and more positive cognitive reappraisal (Ozbay et al., 2008). Further evidence of this can be seen in clinical groups: depressed patients consistently report a lack of social support from those around them and this lack of support is also frequently associated with other psychological disorders such as Post-Traumatic Stress Disorder (Tsai et al., 2012; Grassi et al., 1997). These mediators of cognitive appraisal have also been seen to closely relate to the individual's optimism. Optimism, whilst promoting active coping strategies considerably effects resilience by creating subjective well-being and thus creating positive affect and mood (Stewart and Yuen, 2011; Gonzalez-Herero and Garcia-Martin, 2012; Colby and Shifren, 2013).

The relationship between resilience and affect, in particular, has been strongly established in literature (Wu et al., 2013; Smith et al., 2008; Warner et al., 2012). Resilience has been found to be negatively related to anxiety, negative affect, and physical symptoms when other resilience measures such as optimism, social

support, and high negative affect personality were controlled (Smith et al., 2008; Wu et al., 2013). Positive affect also promotes more rapid recovery rates in illness and overall physical health, and provides protective responses to stressful stimuli by decreasing autonomic arousal (Folkman and Moskowitz, 2000; Scheier et al., 1989; Warner et al., 2012). This effect is particularly pertinent in immigrant and refugee populations where negative affect largely apparent. Adults, in this population in the United States, with higher positive affect reported healthier eating habits, higher self-efficacy and physical well-being. Those with more negative affect were associated with poor health habits such as low physical activity and poor diet (Morrison et al., 2016). Ill populations further illustrate this pattern. In the population of patients with Developmental Coordination Disorder (DCD), those will severe symptoms indicated higher levels of depression and anxiety as well as lower life satisfaction overall (Kirby et al., 2013). This research evidence whilst establishing the relationship at a conceptual level, has not taken into account the mediating factors of affect and, in turn, their effects on resilience. This gap suggests that resilience, in being mediated by changes in affect, may be susceptible to change should alterations occur in the mediating factors of affect.

A notable mediating factor is that of altruism. Altruism has been noted in literature, although limited, to considerably mediate an individual's affect and research suggest this mediating effect is bidirectional. The effects of mood state on altruism are similar to that of the effect on self-gratification; low mood tends to lower altruistic activity where as a higher mood tends to increase altruistic activity and promote personal healing (Baumann et al., 1981; Leontopoulou, 2010; Hernández-Wolfe, 2010). Research on this relationship, however, is still very limited. Affect, however, has a significant effect on resilience and, with altruism suggested to have

considerable influence over affect there may be reason to suggest that is an important mediating relationship between altruism and resilience.

The relationship between altruism and resilience, however, has not been explored in detail. There is, nevertheless, an interesting potential for mediating effect. Altruism had been suggested to increase well-being during stress and thus increase resilience significantly (McGonigal, 2015). This research also had predictions that resilience may, in turn, increase altruism but this has not yet been investigated. Altruism has also been suggested to promote recovery from post-traumatic events and resilience through "altruism born of suffering" and the healing process (Staub and Vollhardt, 2008; Leontopoulo, 2010; Hernández-Wolfe, 2010). As a result of the limited investigation into this relationship, however, it has not been researched in detail with regard to health settings – regardless of the suspected notion that individual's may maintain their health for the sake of others. This notion suggests that altruism may play a role health maintenance and is, therefore, crucial for a broader perspective on health behaviour and motivation.

Resilience, irrespective of the above suggestion, has often been argued to be a stable trait (Tugade, 2004; Wu et al., 2013). In other recent research, however, there has been little consensus (Fredrickson et al., 2005; Ong et al., 2006; Duckworth, 2007). This lack of consensus has provided a necessity for research into factors that may mediate the impact of resilience on health behaviour. This research, therefore, will attempt an exploratory analysis of the potential mediation of resilience through the relationship between altruism and affect. This research may have important implications for health psychology if there are significant mediating effects of the relationship between altruism and affect on resilience and health behaviour. With a focus on mediating effects, it could allow for interventions and practice to

target more variables for healthy outcomes and potentially allow for a broader understanding for factors concerning health behaviour.

Through investigating the variables of affect, altruism, resilience and health behaviour through a compiled questionnaire online and based upon the above literature, it is hypothesised that higher scores in altruism will related to higher scores in affect and that these scores, in turn, will have an impact on resilience. All together is hypothesised that higher scores in altruism, affect and resilience will influence individual health behaviours in both the Self-Management category and Support-Seeking Category.

In health psychology, a majority of focus has been on intentions or attitudes towards behaviour. This research will attempt to provide more focus on overt behaviours in health and factors that directly effect behaviour and as a result can feed broader interventions such as eating changes for obesity, promote safer sex and possibly make an audience more receptive to warnings or suggestions for positive lifestyle.

METHOD

Design

This study employs a cross-sectional, questionnaire-based design. The secondary outcome variables were altruism scores, affect scores and resilience scores and the primary outcome variable was preventative health behaviour.

Participants

The G*Power calculation, $r = 0.72$ taken from Haase et al. (2004), indicated this study required 167 participants to have $\alpha = 0.8$. A total of 199 participants were

opportunistically sampled through social media platforms such as Facebook, Instagram, Snapchat and WhatsApp as well as University of Buckingham email resources. All participants were 18 years old and older (mean age = 30.8 SD = 13.83) of which 153 were female (81.8%), 31 were male (16.6%) and 3 were non-binary (1.6%). The predominant ethnicity of this sample was white (n = 133, 71.9%) with other ethnicities forming a considerably smaller percentage of the overall responses; black (n= 13, 6.5%), Asian (n = 22, 11.9%), Mixed (n =13, 7.03%) and Other (n = 5, 2.7%).

<ins>Materials</ins>

The variables were assessed utilising four questionnaires:

*The Positive and Negative Affect Scale (*PANAS; Waston et al., 1988); which consists of 20 words ranging from "Interested" to "Jittery" and participants rate the extent to which they felt this way over a period of time on a 5-point Likert Scale. This scale is shown to have high reliability and validity in a General adult UK population (Crawford et al., 2004; PA Cronbach's Alpha = .89; NA Cronbach's Alpha = .85).

GRIT short form scale (Duckworth, 2009); The GRIT consists of 8 statements such as "I finish whatever I begin" and "I am diligent" which are rated based on relatability to the participant on a 5-point Likert Scale. This scale is shown to have high internal reliability in a student population (Pozzebon et al., 2013; Overall Grit α = .08).

Adapted Self-report Altruism scale (Witt & Boleman, 2009) ; The Adapted Self-report Altruism scale consists of 14 statements such as "I would make changes

for someone I did not know" and "I would help an acquaintance move houses" that assess altruistic behaviour. The statements are rated based upon applicability to the participant on a 4-point Likert Scale. This scale is shown to have a reliability of .84 (Witt & Boleman, 2009) and high validity among young adults (Rushton et al., 1981)

International Health and Behaviour Survey (Revised from Wardle & Steptoe, 1991) which consists of 3 sections. The first consisting of 22 items, the second section consisting of 31 items and the last section consisting of 8 items. The health behaviours broadly fit into two categories; Medical & Support-Seeking Behaviours (Illness Awareness, Cancer Avoidance) and Self-Management Behaviours (Alcohol, Smoking, Travel, Exercise, Sleep, Hygiene and Eating & Weight Consciousness). The items require a mixture of quantitative answers varying from Likert Scale (5-point and 10-point) to statements of hours a week of certain behaviours. This survey is seen to be reliable across international adult populations (Steptoe, 2001, Wardle & Steptoe, 1991; G = 0.91-0.99, L = 0.60-0.96).

Procedure

The survey was compiled on Survey Monkey, targeting an international sample. The survey was also made anonymous through the removal of IP address tracking. Once compiled, the link was sent out through social media platforms such as Facebook, Instagram and WhatsApp. The survey was also sent out through e-mail platforms at the University of Buckingham. The participants, in clicking through the survey were provided with information outlining the study and were asked to provide their own four digit identity code for withdrawal purposes. Following this, they were taken to a consent page in order to ensure informed consent was given before

partaking. Once the surveys were complete and data collection was closed, the data was exported in to SPSS for analysis.

Ethics

This study was approved the Ethics committee at the University of Buckingham and adheres to the ethical guidelines provided by the British Psychological society. In order to ensure this, all participants were required to give informed consent prior to taking part. Following the completion of the survey, participants were fully debriefed to ensure they were informed at all points on the nature of the study. All of the data provided was made anonymous on Survey Monkey by preventing IP tracking as well as by asking the participants to create their own 4 digit identity code. In creating their own code the participant is able to withdraw at any point during the process until the data has been aggregated. Should a participant have withdrawn, all data and consent was destroyed.

The information sheet provided for informed consent also asked for the permission from the participant for the data to be kept for possible publishing and future research for a minimum of 5 years.

The questionnaires, too, referred to preventative health behaviours such as smoking, weight and genital self-checks which may have been uncomfortable for the participants. As a result, contact details of relevant organisations such as Mind and The Samaritans were provided should the participants require further support.

Statistics and analysis

Data was analysed using SPSS (v.23). All questionnaires, as seen above, achieved high internal consistency ($\alpha > 0.8$) for all scales. Data collected from the *International Health and Behaviour Survey* was grouped according to the broad

categories of 'Support-seeking Behaviour' and 'Self-Management Behaviour' in order to build health behaviour variables. This process resulted in nine Health Behaviours (See Table 1). Data was quality checked through normality testing to ensure valid analysis which revealed that all data was normally distributed apart from the variables of Smoking, Alcohol, Travel, Exercise and Illness Awareness (Shapiro Wilk; $p < .05$). In order to avoid error as a result of these normality violations, bootstrapping was used in the analysis based on 1000 replications for these variables in particular (Field, 2016). In the analysis of Health Behaviour, bivariate correlations were run between Affect, Altruism, Resilience and all nine Health Behaviours in order to find variables that were viable for mediation analysis. For exploratory analyses, the impact of altruism was further explored using it as a between-groups variable (High Altruism v Low Altruism) following the median split methodology as recommended by Batson et al. (1983) and Rand et al. (2016). Significance was set at $p = .05$ with confidence intervals of 95% for all outcome measures.

RESULTS

Health Behaviour Analyses

Bivariate correlations were run on all nine health behaviours with affect, altruism and resilience. Several significant relationships were found. As an individual's smoking habits increased, their overall positive Affect was seen to increase r(147) = .238, p = .004; 95% CI [0.08; 0.382] based on 1000 bootstraps, indicating that the correlation coefficient is different than 0 at a p level of 99%.

See table below for the descriptive statistics.

Table 1. *Descriptive Statistics for Health Behaviours Analysed*

	N	Min	Max	Mean	SD
Smoking	154	5	18	13.44	2.29
Alcohol	155	7	16	12.32	1.98
Travel	135	20	38	33.23	3.81
Exercise	142	2	41	14.59	6.53
Sleep	157	8	25	15.14	2.88
Hygiene	157	5	14	10.05	1.61
Eating Behaviour	154	27	76	55.89	9.68
Cancer Avoidance	41	18	60	42.09	9.47
Illness Awareness	162	2	5	3.62	1.07

Similarly, as an individual's exercise habits decreased, their overall positive Affect increased r(134)= -.212, *p* = .014; 95% Confidence Intervals based on 1000 bootstraps of [-0.39; -0.08] also indicating that the correlation coefficient is significantly different to 0. An increase in sleeping hours was seen to be associated with an overall positive Affect decrease r(148)= -.252, *p* = .002; 95% CI [-0.39; -0.09]; as hygienic habits increased, resilience scores were seen to increase r(154) =.185, *p*= .021; 95% CI [0.03; 0.33] and as Altruism scores increased, cancer avoidance checks were more frequent r(38) = .336, *p* = .036; 95% CI [0.02;0.59]. The findings from cancer avoidance and altruism suggest a moderate effect size according to Cohen's (1988) Guidelines, whereas all other relationships indicated a small effect size.

One health behaviour qualified for Mediation analysis; Eating Behaviour significantly correlated with altruism r(145) = .177, *p* =.033; 95% CI[0.01; 0.33] and

resilience r(153)= .202, *p* = .012; 95% CI [0.05; 0.35]. There was a direct relationship

between Resilience and Eating Behaviour (β = .01; *p* = .017) and a direct association

between Altruism and Eating Behaviour (β = .15; *p* = .033). The significance of the

indirect effect between the variable was calculated through the Sobel test which

illustrated that the relationship between Resilience and Eating Behaviour is

significantly mediated by Altruism (z'= 1.97, *p* = .048). As illustrated in Figure 1

below, the standardised regression coefficient between Resilience and Altruism was

statistically significant, as was the standardised regression coefficient between

Altruism and Eating Behaviour. This suggests that as Resilience increases, so does

healthy Eating Behaviour but that Altruism level affects this increase.
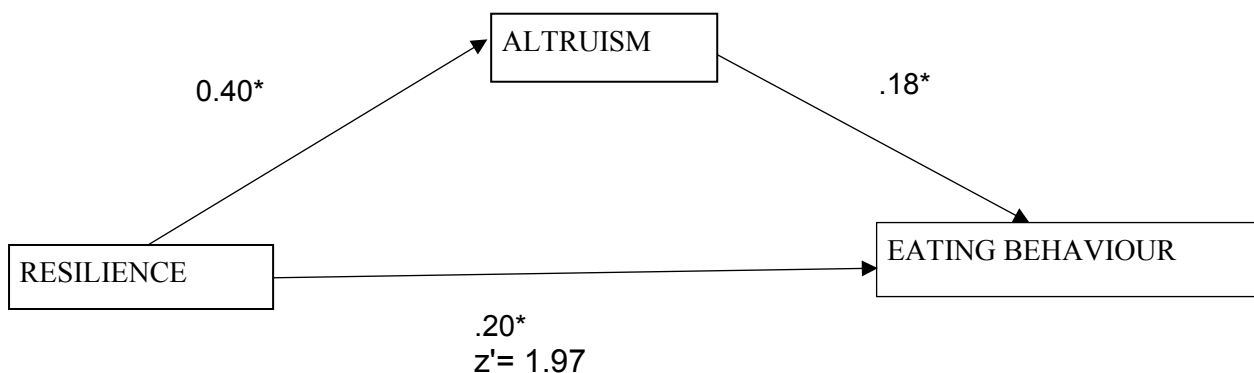

Figure 1. Standardised regression coefficients for the relationship between
Resilience and Eating & Weight Consciousness as mediated by Altruism. *p<.05.

The increase in resilience, with a mediation effect from an increase in

altruism, results in an increase in a preventative health behaviour; Eating Behaviour.

There was, however, no impact of affect on the above variables which has resulted

in the limited acceptance of the initial hypothesis.

Exploratory Analyses

A one-way between subjects ANOVA was computed, using the between-subjects variable of Altruism (2 levels; high and low), to compare the effect of Altruism score on Health Beliefs and it was found that there is a significant effect of Altruism levels on Health Beliefs $F(1, 119)= 11.61$, *p* =.001; 95% CI [142.25; 150.46], with a greater number of health beliefs associated with higher altruism levels. This association showed a small effect size according to the Eta Squared = .089 (Cohen, 1988). Altruism Level was also explored with regard to Affect scores $F(1, 160)= 4.75$, *p* =.031; 95% CI [60,28; 65.58], where altruism level was high, a more positive was evidenced with a medium effect size (Eta Squared = .144).

A further one-way between subjects ANOVA was computed to compare the effect of Intention to Smoke on Smoking Behaviour. It was found that as Intention to smoke increased, smoking behaviour increased significantly $F(2, 151)= 4.30$, *p* =.015; 95% CI based on 1000 bootstraps of [13.07; 13.80], indicating that the correlation coefficient is significantly different to 0 at a *p* level of 99%. A comparable result was found for Intention to Drink and Drinking Behaviour with intentions associated with behavioural activation $F(2, 152)= 12.77$, *p* <.001, 95% CI based on 1000 bootstraps of [12.02; 12.64] also illustrating that the correlation coefficient is significantly different to 0. There was no further impact of altruism, affect or resilience on health behaviours or relationships between health behaviours themselves.

DISCUSSION

The current research investigated the effects of altruism and affect on resilience and health behaviours. The findings indicated that affect had a significant

role in altering the prevalence of the following health behaviours: Smoking, Exercise and Sleep – all of which were not predicted by the literature regarding affect (Warner et al., 2012). Altruism also had interesting effects on health which is seen in its association with increased cancer avoidance behaviour, and increased positive health beliefs. Affirming one of the initial hypotheses, both affect and altruism were seen to be directly proportionate in their increase. Mediation analysis indicated that altruism has a mediating effect on the relationship between resilience and eating behaviours, which suggests that altruism is an important factor in health behaviours, and partially confirms the initial hypothesis concerning altruism, resilience and health behaviour. Further exploratory analysis revealed that intention and behaviour were significantly linked for drinking and smoking, suggesting that an intention to follow through with these behaviours will most likely result in the behaviour itself, which for smoking and alcohol intake, is strongly supported (Azjen, 1985; Fishbein & Cappella, 2006; Gibbons & Gerrard, 1995).

In the initial analyses, some negative health behaviours were found to provide mood enhancement. An increase in smoking habits and a decrease in exercise habits were seen to both be associated with higher mood scores. This result does not correspond with a multitude of sources, particularly with regard to the relationship between exercise and low affect (Morrison et al., 2016; Byrne & Byrne, 1993; Peluso & Andrade, 2005). The behaviours in particular; smoking and decreased exercise; are often utilised in order to have short-term benefits and, as a result, have been reflected in the outcome of the analysis (Heishman et al., 2010). Smoking lapses, in particular, often occur in response to negative affect for short-term benefit (Shiffman & Waters, 2004). This may explain the association to positive affect should a relapse have occurred in order to compensate negative emotion

(Vinci et al., 2017). The action of smoking itself is argued to imitate the sucking action from infancy, which elicits a naturally soothing and positive response through the relaxation of the mouth muscles, and – in turn - reduces the density of neural firing that maintains negative affect by innately evoking the smile and enjoyment response (Tomkins, 1966). This positive enjoyment may also be elicited as a result of the environments in which people smoke, such as following a meal or with friends. This finding, although unusual, is able to contribute to the considerably smaller body of research pertaining to positive affect in smoking and, as a result assist in revealing mechanisms in models for successful cessation of the habit.

The result pertaining to increased affect associated with decreased exercise also contributes to research on mood modifiers. Although unpopular, this finding is not unsupported with research indicating that associations between increased exercise and positive affect were not significant when daily occurrences were controlled for (Giacobbi et al.,2005). This result may have also been skewed by students within the sample as affect within this population is significantly mediated by self-esteem and self-efficacy, suggesting that a decrease in exercise may be as a result of poor self-efficacy but when mediated by self-esteem results in an overall positive affect (Joseph et al., 2013).

Sleeping hours also did not correlate to affect as suggested by literature (Morin et al., 1998). As sleeping hours increased, positive affect was seen to decrease. This result, however, may be illustrating the effect of sleep quality rather than quantity in this population, which may be due to the proportion of participants that are likely to be students in this sample. Students often experience poor sleep quality regardless of its duration which may explain the poor affect, as there is a strong association between decreased sleep quality and negative emotion (Lund et

al., 2010; Pilcher et al., 1997). Sleep quality can also be effected by electronic device usage. It has been illustrated that increased use of electronic devices throughout the day and evening decreases the quality of sleep an individual will have which, in turn, will impact their overall affect (Hysing et al.,2015). This finding, although it has not considered external factors, still contributes to smaller areas of research pertaining to major health behaviours and, therefore, provides an important perspective in understanding these behaviours in action.

Other health behaviours, however, such as hygiene and cancer-avoidance behaviour illustrated interesting findings that can contribute to the general understanding of health behaviours. Hygiene, as noted above, improved with an increase in resilience. This supports literature on the effects of resilience in health settings as it promotes healthier behaviour, but this relationship may be bidirectional (Wu et al., 2013; Shin et al., 2006). Hygiene, whilst being a protective factor, may also promote well-being whilst it builds a resilience to potential pathogens. In building up pathogenic resilience, well-being and psychological resilience has more opportunity to be cultivated successfully (Keim, 2008; Davydov et al., 2010). In the promotion of general hygiene and its consequent physiological effects, the creation of one form of resilience, pathogenic, may be beneficial in fostering psychological resilience. This avenue, although unexplored, may be valuable to investigate in future research in order to gain insight into the nature of resilience and methods by which it can be strengthened. If hygiene is able to promote psychological resilience, it may be beneficial both financially and psychologically, to utilise it as a basic manner by which to promote the well-being in the wider population.

Cancer Avoidance strategies, similarly, revealed an interesting positive association with altruism. Importantly, this result suggests that altruism may play a

pivotal role in health behaviour based upon an individual's cognitions towards others. This suggestion is further supported by the current study's exploratory analyses which suggest that higher altruism promotes more positive health behaviours. These results suggest that the well-being and health gained from being altruistic may be as a result of the perceived impact on loved ones and the response they receive as a result of this behaviour (Post, 2005). This further implicates the role of social support structures in promoting healthy behaviours through the promotion of altruism which, as this study suggests, may play a role in the cognitive appraisal of health behaviour and thus the behaviour itself (Ozbay et al., 2008; Azjen, 1984; Fishbein & Cappella, 2006). Interventions utilising altruism have illustrated that its implementation in support groups significantly assists those with chronic low mood through providing socialization. This causes the participants to shift their thoughts whilst they feel valued and included – which is an explanation of positive health behaviors (Post, 2005; Young, 2014). In doing so, participants are often able to build their self-esteem and self-reliance which provides further support for the cognitive reappraisal of health behaviours and the consequent actions taken. Promotion of altruistic behaviour may, therefore, be an important predictor to take into account when designing health promotion interventions and practices as it promotes the aforementioned social support networking and – as illustrated by the current study – higher affect and well-being.

Other results in the initial analyses, however, partially confirm the hypothesis of a higher altruism mediating the effect of resilience on a given health behaviour. Results show that the relationship between resilience and eating behaviour in particular is significantly mediated by altruism. This further supports the importance of altruism in health behaviour settings as it is able to strengthen the effect of

resilient traits – a factor that has previously been thought to be one of the most substantial contributors to health behaviour (Shin et al., 2006; Edward, 2013; Johnston et al., 2015). Eating behaviour, in particular, is a substantial health behaviour that is often linked to many other behaviours through providing healthy nutrients to the body and promoting well-being (Braet et al., 2004; Niva, 2007). This behaviour is also of considerable importance with regard to executive functioning which may explain the role of altruism as a mediator. In order to control what an individual ingests, they must have the capacity of self-regulation – an ability closely linked to executive functioning (Dohle et al., 2017). Executive functions are often utilised in order to appraise circumstances and act accordingly. Altruism, as indicated by this study, is highly involved in behaviour based upon appraisal which may suggest why it is involved in mediating the effect of resilience on eating behaviour. For example, if an individual is resilient and adheres to an eating programme they have set, their thoughts on this programme and likelihood to follow may be influenced by how it effects their loved ones. Findings such as this are pivotal to building effective intervention strategies for obesity – particularly when the model research is scarce (Dohle et al., 2017).

The further analysis elaborated on the specificities in intention-behaviour relationships – particularly with regard to risk behaviours such as drinking and smoking. These results have expanded on the literature on risk behaviours, further suggesting that intention and following through with the behaviour is most likely to occur when the behaviour is risky (Sniehotta et al., 2005). These results have important implications for intervention focus – by illustrating the significance of risk intention and behaviour, public health plans can focus more specifically on strategies to shift intention through making the healthy choice the most suitable in various

environments (Nutbeam, 2000; Bauman & Nutbeam, 2013). This is most pertinent in their further support to the body of literature referring to implementation intentions, in particular. Whilst providing an illustration that intention leads to behaviour, these findings support the notion that if the intention is altered the implementation is also changed. Implementation intentions have been illustrated across a large sample to promote the cessation of habits such as smoking in ecologically valid settings (Armitage, 2016). The finding of this current study suggests, using the same intention-behaviour analysis, that this may be possible for alcohol intake should this intervention be utilised within a population with a high alcohol intake. The effect sizes of these results, however, need to be acknowledged prior to doing so as it may limit the generalisability of these suggestions.

There are several limitations to the current study. This current study has created two categories of health behaviour from a single questionnaire that may not reflect broader health theories and, as a result, may alter results in other studies should different groupings be utilised in forming the health behaviour variables. These health behaviour variables were also compiled from limited and directional questions from a broader questionnaire and were, therefore, compiled based upon the researcher's judgement of the sections in the *International Health and Behaviour Survey* (Revised from Wardle & Steptoe, 1991) and not based on individual questionnaires on each behaviour. These categories, however, are good basis from which to begin analysis as they provide –although basic – a comprehensive overview of all major preventative health behaviours. This also illustrates that there is a need to create concrete models by which to categorise the behaviours for ease of future research.

The second limitation to this study was the sample size utilised in the analysis. This study failed to meet the required number of viable responses to reach power once analysed and is, therefore, an underpowered study which may have impacted the some of the results. This may have been as a result of the length of the study with an online population as a majority of the incomplete questions were towards the end of the questionnaire. Had there been more complete and viable responses, the data may have reflected stronger significant results with larger effect sizes so that the results were more generalizable to the wider population. The third limitation of this study, was competency and scope of the research. Being an undergraduate project, the researcher was limited with regard to the depth and analysis of the questionnaires, data and interpretation which may have impacted the manner in which the data was analysed and, therefore, may reveal different emphases in other circumstances. This extends further to not being able to screen for clinical conditions which could have had an impact on the outcome of all of the above behaviours. (Kahler et al., 2008; O'Neal et al., 2000; Benca et al., 1997). This limitation, however, may provide the basis of future research to investigate whether or not the findings in this current study are mirrored in clinical population – which can further inform potential treatments and interventions such as pain clinics and support groups. Regardless of this, the findings here have use in the wider population – which is vital for establishing normality in responses for effective comparison in later research which further increases the value of these findings.

Some of the results effect can also be explained by the nature of this research. A cross-sectional design only illustrates an individual's behaviour as a 'snapshot' and, therefore, cannot account for long-term behavioural activity. The results, however, still illustrate the impact of intention on risky behaviours such as

smoking and alcohol intake and, therefore, need to be acknowledged as it does accurately depict short term behaviour. As a result, these findings can inform research on behaviour that elicits short term positive affect in order to further understanding and improve interventions – such as improving positive affect in order to reduce smoking lapses (Vinci et al., 2017).

There are, however, important future research avenues. As noted above, the cross-sectional nature of this study will have impacted the results of the analysis such as the relationships between affect and exercise as well as smoking. In conducting longitudinal research, the long-term impact of these variables can be illustrated, as well as the intricacies of the mediating variables. The potential suggestion that hygiene, in building pathological resistance, may build psychological resilience may be another potentially rewarding research path as this may reveal a manner by which resilience can be promoted in the general population utilising public health strategies. Another suggestion worth pursuing is the variable of altruism. In this study alone, it has been illustrated that it can be an integral part of health beliefs, behaviour and maintenance. The long-term effects of this variable, however, are valuable to investigate for deeper understanding and for the potential integration of altruism into an intervention or model in order to acknowledge its influence in health behaviours.

The above results begin to provide a broader understanding of the intricacies of health behaviours and what factors may be important to target in future interventions. As illustrated by altruism's impact in health beliefs, affect and behaviours such as cancer avoidance and eating behaviour, models and practice can be improved. The same can be seen in the results pertaining to resilience – in understanding further avenues through which it can be improved; public health campaigns are able to

vicariously promote well-being and improved recovery. Although these findings are limited by their effect size, the basis of what has been found with regard to altruism in particular, suggests that it is an important factor to take into account for future interventions. For the general public this could be done in order to promote behaviour such as cancer checks and healthy eating whilst simultaneously encouraging social support, positive affect and improved health beliefs. Perhaps, following the implementation in the general public and the creation of a strong model, this may be adapted in clinical populations in order to improve responsiveness in recovery and promote behavioural immunogens.

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