An exploration of factors that may influence the subjective well-being of students

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Dedication

To all my family and friends, I would not have got here without your love and support. Goku and Gohan you are a constant inspiration to keep going no matter how hard the road gets.

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Firstly thank you to everyone who participated it would not have been possible without you. I would like to say thank you to all my supervisors. Thank you Pierce O'Carroll for helping me develop a new project after my first project fell through. Thank you James McGuire for taking over the mantle after Pierce retired, and all your help and support with the systematic review. Finally thank you Peter Kinderman for your enthusiasm reading the report, and thank you to all the staff at the Doctorate of Clinical Psychology for all of your support.

James Le Couteur

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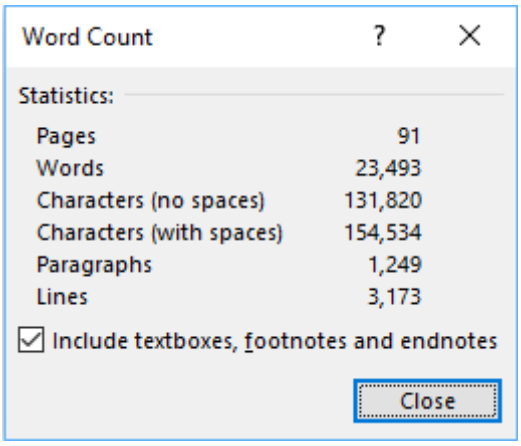
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Chapter 1: Thesis Overview

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Chapter 1: Thesis Overview

This research dissertation examines factors that may influence the subjective well-being of students. Students have been reported to show a greater level of stress and psychological distress than the general population (Roberts et al., 2000; Stewart-Brown et al., 2000). For example Bayran and Bilgel (2008), in a sample of University students, identified that 27.1% reported moderate depression, 47.1% reported anxiety, and 27.1% reported stress. The degree of psychological distress found in student populations has been identified as a cause for concern (Adlaf, Gliksman, Demers, & Newton-Taylor, 2001; Bewick, Gill, Mulhearn, Barkham, & Hill, 2008; Cotton, Dollard, & De Jonge, 2002; Jessop, Herberts, & Solomon, 2005; Monk, 1999; Rosal et al., 1997; Stewart-Brown et al., 2000). One such study by Chen, Wong, Ran and Gilson (2009), investigated the relationship between university stress and subjective well-being, and found a negative relationship between the two. Subjective well-being is an umbrella term used to describe the level of well-being people experience according to their subjective evaluations of their lives (Diener & Ryan, 2009). It is considered to be a dynamic state in which people appraise how fulfilled their lives are, through their interactions with their circumstances, activities and psychological resources (Aked, Marks, Cordon, & Thompson, 2009). This complex concept relates to optimal experience and functioning (Ryan & Deci, 2001).

In the light of these findings, investigating what factors might promote and enhance the subjective well-being of students is an urgent priority. Boosting student subjective well-being may have a protective function which may in turn reduce psychological distress in these at-risk populations. This thesis will consider both the literature on the use of mindfulness based interventions (MBIs) in student populations and report the findings of an empirical study investigating two relevant aspects of cognitive functioning in a group of medical students- a student population at especial risk of increased levels of stress compared to other student groups.

Chapter one is a systematic literature review which examines whether mindfulness based interventions (MBIs) can improve student subjective well-being. The specific question, and inclusion and exclusion criteria, of this literature review were designed to assess robust reliable evidence that

used specific subjective well-being measures to investigate the effectiveness of MBI studies on student subjective well-being. The review only included randomised controlled trails (RCTs).

The review recognised that student populations are reported to experience a higher degree of stress than the general population samples (see above) and that there is a large volume of research that has investigated mindfulness based therapies. However the majority of studies report changes in rates of psychopathology and extrapolate this to an impact on subjective well-being (Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Cusens, Duggan, Thorne, & Burch, 2010; Frank, Reibel, Broderick, Cantrell, & Metz, 2015; Kingston, Chadwick, Meron, & Skinner, 2007). Subjective well-being is not the same as nor equivalent to a reduction or absence of psychiatric symptoms (Bech, Olsen, Kjoller, & Rasmussen, 2003). Therefore the review included only studies that employed a specific subjective well-being measure to investigate the efficacy of MBIs in student populations. The review identified nine RCTs. The data from these studies were extracted, quality assessed and reviewed. The findings are discussed in detail and suggestions made for future research. This review found that although many of the studies reported findings in the same direction - an increase in the subjective well-being of female students, the quality of the studies was poor. Most studies recruited mainly female students and few reported treatment effect sizes.

Mindfulness as a concept is not easily defined and there is no clear widely accepted definition. A recent article identified 33 different definitions extracted from a pool of 308 articles (Nilsson and Kazemi, 2016). For the purposes of this thesis several definitions will be provided to give a sense of the concept.

Baer et al (2009, p191): "Mindfulness [. . .] is generally defined to include focusing one's attention in a non-judgmental or accepting way on the experience occurring in the present moment [and] can be contrasted with states of mind in which attention is focused elsewhere, including preoccupation with memories, fantasies, plans, or worries, and behaving automatically without awareness of one's actions."

Rosch (2007, p.259): "A simple mental factor that can be present or absent in a moment of consciousness. It means to adhere, in that moment, to object of consciousness with a clear mental focus."

Mindfulness has also been defined as the quality of conscious experience or awareness which comes about through intentionally attending to present moment experience in an accepting and non-judgemental way (Kabat-Zinn, 2004).

Through the process of maintaining this focused and intentional awareness a person practices through formal meditations and informal exercises, the ability to identify when their mind has wandered and learns to non-judgementally bring their attention back to the intended object (e.g. their breath). This process of identifying thoughts, disengaging from them and then focusing on a desired object may provide a form of training that aids in the process of disengaging from one cognitive process and increases another one. These processes are perseverative negative thinking (e.g. rumination and worry) and attention control (the ability to be aware of and choose to control attention) (Chambers, Lo, & Allen, 2008; Englert & Bertrams, 2015). Mindfulness meditation has been reported to be particularly effective at reducing repetitive and persistent thinking (Jain et al., 2007). In this way, mindfulness may help people disengage from perseverative thinking and increase their ability to control the focus of their attention.

Chapter two is an empirical study examining whether these two processes - perseverative negative thinking and attention control - have an impact on the relationship between threatening experiences and subjective well-being (SWB). Research has identified that the greater the frequency and severity of threatening experiences, the lower the reported experience of SWB in the following months (Suh, Diener, & Fujita, 1996). This quantitative study investigated whether perseverative negative thinking and attention control mediate and moderate respectively the relationship between threatening life experiences and subjective well-being. The findings suggest firstly that the effect of threatening experiences (using the List of Threatening Experiences Scale (LTE)) (Brugha & Cragg, 1990) on subjective well-being (as measured by the Modified BBC Subjective Well-Being Scale (BBC-SWB) (Pontin, Schwannauer, Tai, & Kinderman, 2013) is partially mediated by perseverating

negative thinking (Perseverative Thinking Questionnaire (PTQ)) (Ehring et al., 2011); and secondly that attention control (Attention Control Scale (ACS)) (Derryberry & Reed, 2002) moderates the relationship between threatening experiences and subjective well-being. These relationships imply that the effects of threatening experiences on subjective well-being could be decreased by reducing perseverative negative thinking and increasing attention control. Investigating whether interventions designed to modify these thinking processes can reduce the detrimental impact on subjective well-being from threatening experiences, could potentially benefit both students and wider populations.

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Chapter 2: Systematic Literature Review

Do mindfulness based interventions improve subjective well-being in students? A systematic review of randomised controlled trials

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Prepared in accordance with guidelines for submission to Mindfulness (Appendix A)

Do mindfulness based interventions improve subjective well-being in students? A systematic review of randomised controlled trials

Abstract

Purpose

There is a growing amount of literature on the utility of mindfulness based interventions (MBIs), for a wide range of difficulties and populations. Although a large number of studies report that MBIs are effective at improving subjective well-being, there is a surprising shortage of studies that have used subjective well-being measures. Previous research has argued that a reduction in psychiatric symptomology (such as anxiety or depression) or in negative mood states implies improvement in subjective well-being. However, this assumption is becoming increasingly challenged in the literature. This study aims to investigate, in a review of randomised controlled trials, whether MBIs significantly increase subjective well-being, when measured using a subjective well-being measure, in an adult student (undergraduate and/or postgraduate) population. It will also assess the methodological and intervention quality of the RCTs.

Methods

A systematic review was carried out to identify RCTs examining the efficacy of MBIs in improving students' subjective well-being using the following databases: Scopus, Web of knowledge, PsycINFO, PubMed and CINAHL. The methodological quality of the identified RCTs was assessed using the bias assessment tool for RCTs recommended by Boland, Cherry, and Dickson (2013) and intervention quality assessment recommended by Chambless & Hollon (1998). Only RCTs were included in this review. RCTs are considered the 'gold standard' for clinical trials as the risk of selection bias is minimised, a control group is included in the design and trials have the potential to be statistically combined. However, for most RCTs the timescale is short and the design stipulates the investigation of one variable (efficacy) which is unlikely to reflect the true clinical picture.

Results

The initial search strategy identified 135 studies, of which nine met the inclusion criteria. Findings indicated the potential benefits of MBIs for increasing the subjective well-being of female students. The majority of the effects demonstrated were compared to wait-list control conditions. For all studies the quality was assessed to be low due to lack of consistent blinding.

Conclusions

The number of studies that have investigated the effects of MBIs specifically on subjective well-being, using a subjective well-being measure, is low. However, these studies indicate that MBIs may have the potential to improve subjective well-being in the female student population. Further research using studies of high methodological quality and a low risk of bias are needed to investigate MBIs in equally balanced male and female student populations.

Keywords: Mindfulness - subjective well-being – mindfulness based interventions – students – interventions – systematic review

Introduction

There is a growing amount of literature on the utility of mindfulness-based interventions (MBIs) for a wide range of difficulties and populations. Randomised controlled trials (RCTs) have indicated that MBIs are effective in treating a number of psychological difficulties including; anxiety (Green & Bieling, 2012; Hofmann, Sawyer, Witt, & Oh, 2010), depression (Strauss, Cavanagh, Oliver, & Pettman, 2014), recurrence of depression (Kuyken et al., 2008; Teasdale et al., 2000), and stress (Chiesa & Serretti, 2009). In addition to treating psychological distress, there is also evidence that MBIs can bolster health by improving quality-of-life (Kabat-Zinn, 2005) and subjective well-being (Goyal et al., 2014).

Students have been reported to show a greater level of stress and psychological distress than the general population (Roberts et al., 2000; Stewart-Brown et al., 2000). Bayran and Bilgel (2008) identified in a sample of university students that 27.1% reported moderate depression, 47.1% anxiety,

and 27.1% stress. The degree of psychological distress found in the student population has been identified as a cause for concern (Adlaf, Gliksman, Demers, & Newton-Taylor, 2001; Bewick, Gill, Mulhearn, Barkham, & Hill, 2008; Cotton, Dollard, & De Jonge, 2002; Jessop, Herberts, & Solomon, 2005; Monk, 1999; Rosal et al., 1997; Stewart-Brown et al., 2000).

Chen, Wong, Ran and Gilson (2009) conducted a study investigating the relationship between university stress and subjective well-being, and found that subjective well-being had a negative relationship with university stress. Therefore one next step for research would be to investigate whether MBIs can increase the subjective well-being of students, as interventions designed to boost student subjective well-being may have a protective function and reduce psychological distress in this population.

There is a range of MBIs such as Mindfulness-Based Stress Reduction (MBSR) (Kabat-Zinn, 1982), Mindfulness-Based Cognitive Therapy (MBCT) (Segal, Williams, & Teasdale, 2002), and loving-kindness meditations, which differ to varying degrees in their aims and in the suggested amount of intervention they require (Goyal et al., 2014). The majority of these interventions promote the cultivation of an open-minded and non-judgemental present focused awareness. Mindfulness as a concept is not easily defined and there is no clear widely accepted definition. A recent article identified 33 different definitions extracted from a pool of 308 articles (Nilsson and Kazemi, 2016). Further it is still unclear if the differences between the various MBIs will have an impact on the effectiveness of their therapeutic outcomes (Chiesa & Malinowski, 2011; Sedlmeier et al., 2012).

In addition to this, there are a number of therapeutic interventions which incorporate mindfulness practices in their treatment, such as Acceptance and Commitment Therapy (ACT) (Hayes & Wilson, 1994), Dialectical Behaviour Therapy (DBT) (Linehan, 1987), and metacognitive therapy (Fisher & Wells, 2009). However, as these interventions incorporate a number of other therapeutic techniques, e.g. psychoeducation, skills training and formulation, it would be difficult to claim that any changes in subjective well-being observed were the direct result of mindfulness training and not the result of the other therapeutic techniques. Therefore these interventions will not be included in this review.

Although there is a large number of peer reviewed publications ranging from RCTs to reviews and meta-analyses which report that MBIs are effective at improving subjective well-being (Galante, Galante, Bekkers, & Gallacher, 2014; Goyal et al., 2014; Hoppes, Bryce, Hellman, & Finlay, 2012; Shonin, Van Gordon, Dunn, Singh, & Griffiths, 2014), there is a surprisingly low number of published articles that have included a specific subjective well-being measure to evaluate the effects of the intervention on subjective well-being. A number of studies indicate that a decrease in psychiatric symptomology, such as anxiety or depression, or negative mood states implies an increase in subjective well-being (Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Cusens, Duggan, Thorne, & Burch, 2010; Frank, Reibel, Broderick, Cantrell, & Metz, 2015; Kingston, Chadwick, Meron, & Skinner, 2007). However, this has been challenged and it has been argued that subjective well-being is not equivalent to the absence of psychiatric symptoms (Bech, Olsen, Kjoller, & Rasmussen, 2003). It has also been proposed in the 'two continua model' that mental illness and mental health are distinct but related dimensions (Westerhof and Keyes, 2010).

No systematic review has been identified by this author, which investigates the effects of MBI's on subjective well-being in a student population, using specific subjective well-being measures. This therefore is the aim of the current study - to undertake a systematic review of randomised controlled trials that include specific well-being measures to evaluate the use of MBIs in student populations. There are many MBI studies from a range of disciplines (Nilsson and Kazemi, 2016), and with this comes a range of methodological quality. This review only included RCTs (often reported as the 'gold standard' for intervention evaluation) as they minimise selection bias, include a control group and have the potential to be statistically combined. However, for most RCTs the timescale is short and the design stipulates the investigation of one variable (efficacy) which is unlikely to reflect the true clinical picture.

Method

Search strategy

A comprehensive search of published studies from database inception up to 09/09/2016 was conducted in the following electronic databases; Scopus, Web of knowledge, PsycINFO, PubMed and CINAHL. The search terms used were: (Mindfulness OR meditation) AND (wellbeing OR subjective well-being OR "well being" OR Happiness OR "quality of life" OR "satisfaction with life" OR flourishing OR resilience) AND (RCT OR "Randomised controlled trial" OR "randomized controlled trial") AND (student). Terms other than subjective well-being (such as happiness, quality of life, satisfaction with life or flourishing) were included in the search strategy to enable the location of studies that may have had subjective well-being as a secondary outcome.

Eligibility Criteria

The inclusion criteria of the study were:

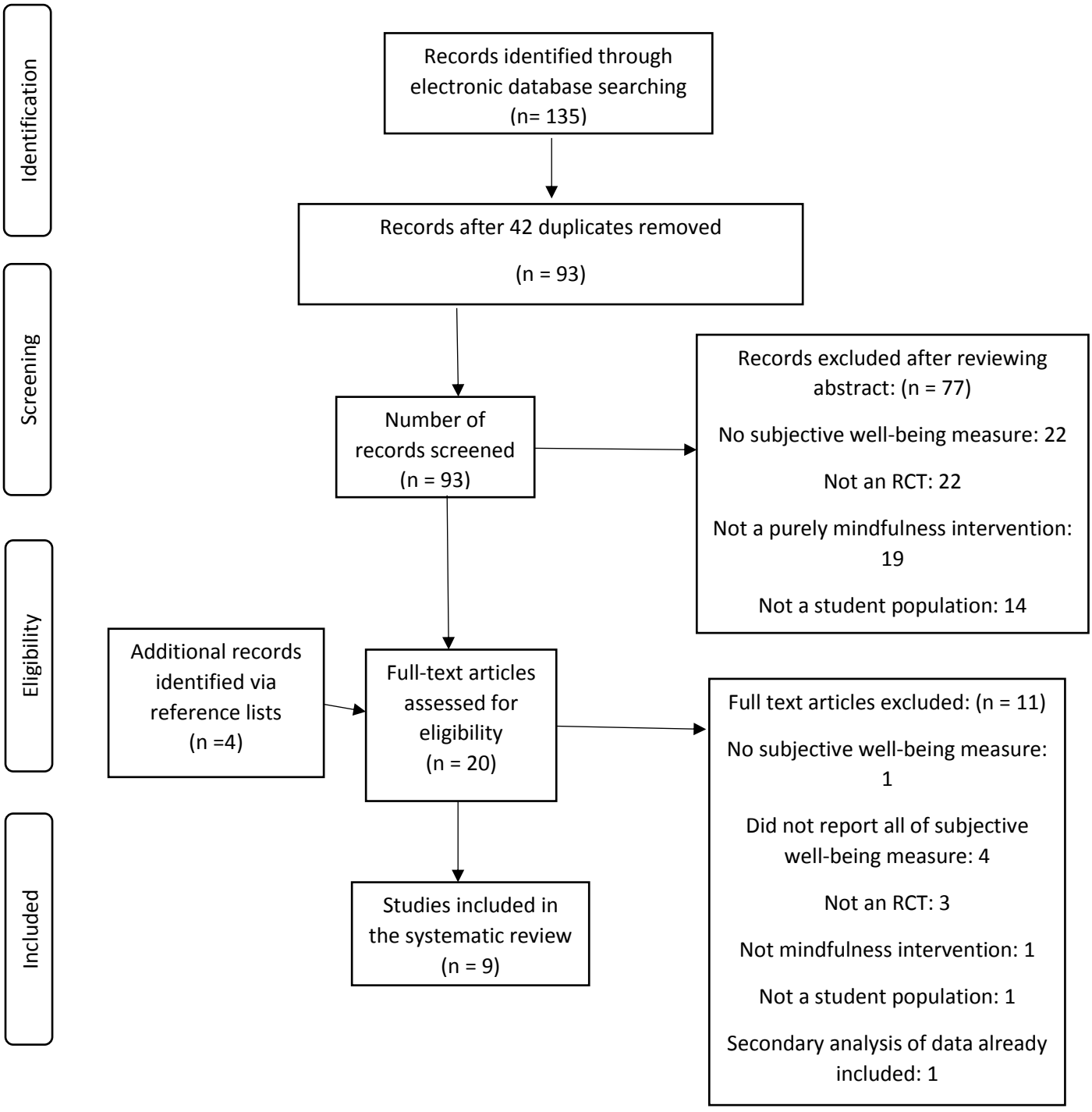
1) As mindfulness interventions have been questioned for not controlling for nonspecific effects such as group participation (Guyatt et al., 2008), only quantitative randomised controlled trails (RCTs) were included in this review to ensure a level of robustness. 2) To attempt to maintain research scientific rigor only full text articles in peer reviewed journals were included. Dissertations were not included. 3) It was a requirement that the study reported the effect of an MBI on students' subjective well-being. 4) The study had to include at least two arms to ensure that the MBI was compared to either an active or waiting-list control condition in a comparable sample. 5) Subjective well-being needed to be measured using a subjective well-being measure. 6) The study had to be undertaken with an undergraduate and/or postgraduate student population. 7) To reduce the effect of confounding variables only MBIs that stated the use of mindfulness as the intervention key component were included. Interventions that included other potentially active ingredients such as Acceptance and Commitment Therapy (ACT), Dialectical Behaviour Therapy (DBT), art therapy, or mindfulness plus peer support were excluded. 8) Only research studies published in English were included.

The exclusion criteria were: 1) any other study methodology that was not a RCT (e.g. reviews or qualitative research if it did not also include a quantitative component). 2) Studies that only reported an aspect of a subjective well-being measure (such as reporting the negative affect on the Positive and Negative Affect Schedule). 3) Studies on children or adults who were not undergraduate or postgraduate students.

Assessment of Study Quality

Risk of bias was assessed using the bias assessment tool for RCTs recommended by Boland, Cherry, and Dickson (2013) shown in Table 1. Intervention quality was assessed using three criteria (Chambless & Hollon, 1998). These authors specify that a high quality intervention should use a treatment manual, be delivered by specifically trained therapists, and treatment fidelity should be assessed. The researcher assessed for the risk of bias (shown in Table 1) and intervention quality by reviewing the content of the published articles and determining if each criterion was present. If the particular criterion was not mentioned it was assumed that it had not been assessed. These data for each included study are presented in Table 2 along with the other relevant data that were extracted from the studies (see below).

Figure 1: Flow chart of search process



Results

The initial literature search identified 135 papers (Figure 1). Out of the initial 135, 42 were removed as duplicates, leaving 93 papers that were screened by title and abstract. Subsequently 77 titles were excluded from the review, including qualitative papers, correlational studies, theoretical papers, book chapters, and papers that did not use a measure of subjective well-being. The remaining 16 full texts were sourced and checked against the eligibility criteria above. Reference lists of these studies were also checked and four additional studies were identified. Of the resultant 20 studies, nine met all the eligibility criteria and were included in this review. The researcher did not contact experts in the field as it was discussed in supervision and decided that it was not appropriate as no clear expert was evident or centre of research activity in this specific area.

Quality assessment

The quality of the studies was assessed using six dimensions (Randomisation, Baseline comparability, Eligibility, Blinding, Withdrawals, and Outcomes). These are presented in Table 1. Overall the quality rating for the nine studies was poor. With reference to the first of these dimensions, only three of the nine studies met all the criteria for complete randomisation (De Vibe et al., 2013; Kang, Choi, & Ryu, 2009; Lever Taylor, Strauss, Cavanagh, & Jones, 2014). Six studies described a truly random method of randomisation (De Vibe et al., 2013; Kang et al., 2009; Kingston et al., 2007; Kvillemo, Brandberg, & Branstrom, 2016; Lever Taylor et al., 2014; Vinci et al., 2014). In only four studies the group allocation post randomisation was concealed from the researcher (De Vibe et al., 2013; Kang et al., 2009; Kingston et al., 2007; Lever Taylor et al., 2014). All but one study (Kingston et al., 2007) clearly reported the number of participants randomised.

All nine studies reported the degree to which the participants in each group had similar characteristics before the intervention took place (baseline comparability). This was fully achieved in six studies (Kang et al., 2009; Kingston et al., 2007; Lever Taylor et al., 2014; Shapiro, Brown, Thoresen, & Plante, 2011; Vinci et al., 2014; Weytens, Luminet, Verhofstadt, & Mikolajczak, 2014) and partially achieved in three (De Vibe et al., 2013; Hindman, Glass, Arnkoff, & Maron, 2015;

Kvillemo et al., 2016). Both inclusion and exclusion criteria were reported in only five studies (Kang et al., 2009; Kingston et al., 2007; Kvillemo et al., 2016; Lever Taylor et al., 2014; Vinci et al., 2014).

A significant limitation of the majority of the included trials was the lack of adequate blinding procedures. Only four studies reported assessor blinding (De Vibe et al., 2013; Kang et al., 2009; Kingston et al., 2007; Lever Taylor et al., 2014). Although no studies reported therapist or participant blinding, in intervention studies that use a waiting list control is it clearly impossible for participants to be blind to group allocation.

Over 80% of the participants randomised were included in the final analysis in seven out of the nine studies (De Vibe et al., 2013; Hindman et al., 2015; Kang et al., 2009; Kingston et al., 2007; Lever Taylor et al., 2014; Shapiro et al., 2011; Vinci et al., 2014). Seven studies experienced unexpected drop outs (De Vibe et al., 2013; Kang et al., 2009; Kingston et al., 2007; Kvillemo et al., 2016; Lever Taylor et al., 2014; Shapiro et al., 2011; Weytens et al., 2014) six of which reported the reasons for withdrawals (De Vibe et al., 2013; Kang et al., 2009; Kvillemo et al., 2016; Lever Taylor et al., 2014; Shapiro et al., 2011; Weytens et al., 2014). Of these six, five reported the reasons for these drop outs to an adequate degree (De Vibe et al., 2013; Kang et al., 2009; Kvillemo et al., 2016; Lever Taylor et al., 2014; Shapiro et al., 2011) and one to a partial degree (Weytens et al., 2014). Only three of the studies reported the use of intention to treat analysis (De Vibe et al., 2013; Kvillemo et al., 2016; Lever Taylor et al., 2014). One study reported fewer outcomes than were initially measured (Shapiro et al., 2011). All the studies in the review used self-report measures of subjective well-being, therefore the likelihood of expectancy bias is high, especially as stated above, when the participants were aware they had received an intervention.

Study Characteristics

The nine randomised controlled trials that met eligibility criteria, included a total of 837 participants. Of these participants, 661 were female (79%) and 176 male. The mean age was 23.23 years (age range 18-45). Sample sizes ranged from 30 to 288 participants. Three of the studies took place at universities in the United States of America (Hindman et al., 2015; Shapiro et al., 2011; Vinci

et al., 2014), two in the United Kingdom (Kingston et al., 2007; Lever Taylor et al., 2014), one in Korea (Kang et al., 2009), one in Sweden (Kvillemo et al., 2016), one in Norway (De Vibe et al., 2013), and one in Belgium (Weytens et al., 2014). Ethnicity data were not reported in five of the nine studies (De Vibe et al., 2013; Kang et al., 2009; Kingston et al., 2007; Kvillemo et al., 2016; Weytens et al., 2014). MBSR was the basis for four of the group mindfulness interventions (De Vibe et al., 2013; Hindman et al., 2015; Kang et al., 2009; Shapiro et al., 2011).

Regarding the nature of the intervention to be tested, MBSR was also the basis for one internet delivered course (Kvillemo et al., 2016). One of the studies (Lever Taylor et al., 2014) was a self-help intervention delivered through weekly prompts to read certain chapters of a mindfulness book based on MBCT. The other three studies were a general mindfulness intervention (Kingston et al., 2007); a ten minute tape recording (Vinci et al., 2014); and a loving kindness meditation group (Weytens et al., 2014). A summary of the characteristics of the included articles is provided in Table 2.

The duration of the MBIs ranged from ten minutes to 16 hours. Four studies used a wait-list control (De Vibe et al., 2013; Kang et al., 2009; Lever Taylor et al., 2014; Shapiro et al., 2011). Three studies employed a three-arm design: Formal MBI/informal MBI/ wait-list control (Hindman et al., 2015), MBI/relaxation/word search control (Vinci et al., 2014) and Loving kindness meditation/ Positive emotion regulation/wait-list control group (Weytens et al., 2014). The remaining two studies had active control arms: MBI/Guided visual imagery sessions (Kingston et al., 2007), and internet MBI/internet based expressive writing intervention (Kvillemo et al., 2016).

The studies used five different self-report subjective well-being measures. The Satisfaction with Life Scale (SWLS) was used in three trials (Hindman et al., 2015; Lever Taylor et al., 2014; Weytens et al., 2014). The SWLS is a five item measure of global life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985). Each item is rated on a 1-7 scale and combined to produce a total score. The scale has high internal consistency ($\alpha = 0.87$) and good convergent and discriminant validity (Pavot & Diener, 1993).

The Positive and Negative Affect Schedule (PANAS) was used in two trials (Kingston et al., 2007; Vinci et al., 2014); one trial included both the PANAS and the SWLS and created an amalgamated score to represent subjective well-being (Shapiro et al., 2011). The PANAS (Watson, Clark, & Tellegen, 1988) is a 20 item self-report measure. It assesses participants' positive (PA) and negative affect (NA) at a single time point. Participants rate a set of twenty emotions from 1 (very slightly or not at all) to 5 (extremely). The scale has good internal consistency (r = .86-.90 for PA, and r = .84-.87 for NA) and moderate concurrent validity (r= .51-.74) (Watson et al., 1988). Through the combination of both PA and NA (affect balance) the PANAS is used as a measure of subjective well-being and has been shown to have good reliability and validity in non-clinical samples (Crawford & Henry, 2004).

The Subjective Well-Being Scale (SWB) was employed in one trial (De Vibe et al., 2013). The SWB (Moum, Næss, Sørensen, Tambs, & Holmen, 1990) is a four item measure. Previous studies have reported it to have good psychometric properties and correlate well with the SWLS (Røysamb, Harris, Magnus, Vittersø, & Tambs, 2002).

The Psychological Well-Being Scale (PWB) scale was used in one trial (Kvillemo et al., 2016). The PWB (Ryff & Singer, 1996) measures six dimensions: environmental mastery, self-acceptance, positive relations with others, purpose in life, personal growth, and autonomy. It has been shown to have acceptable factor structure and validity, and has been widely used (Ryff & Singer, 1996).

The Psychosocial Well-being Index-Short Form (PWI-SF) was used in one trial (Kang et al., 2009). The PWI-SF (Chang, 2000), is an 18 item questionnaire in which each item is rated on a five point scale from 0-4. Good internal consistency ($\alpha = 0.90$) has been reported by the original author in a study on Korean labourers and the general public (Chang, 2000).

MBIs significantly increased subjective well-being of students in between group comparisons in six out of the nine studies included in this review (De Vibe et al., 2013; Hindman et al., 2015; Kang et al., 2009; Lever Taylor et al., 2014; Shapiro et al., 2011; Vinci et al., 2014).

As indicated in Table 2 intervention quality was assessed according to three criteria (see above for explanation). However, of the nine RCTs, only one study achieved all three criteria for a high quality intervention (De Vibe et al., 2013). None of the other RCTs clarified whether they assessed for treatment integrity during the intervention. Three studies used a manualised treatment and the therapy was delivered by specifically trained therapists (Kang et al., 2009; Vinci et al., 2014; Weytens et al., 2014). Two studies did not use a manualised approach but the interventions were conducted by specifically trained therapists (Hindman et al., 2015; Kingston et al., 2007); one of the trials used a manualised treatment but did not explain whether the therapists were specifically trained (Shapiro et al., 2011). Finally two of the interventions were manualised but not delivered via a therapist, so the training of the therapist or treatment integrity was not applicable. One intervention was delivered via an internet course (Kvillemo et al., 2016), and the other utilised a self-help book (Lever Taylor et al., 2014).

Statistical synthesis of the data

The participants in the nine studies were from similar populations (students). There is apparent homogeneity of the direction of the effect in six out of the nine studies (De Vibe et al., 2013; Hindman et al., 2015; Kang et al., 2009; Lever Taylor et al., 2014; Shapiro et al., 2011; Vinci et al., 2014). However, the studies differed on a number of study characteristics (see Table 2). The MBIs varied in the format of the intervention. The dose or number of hours of the MBIs also varied from ten minutes to 16 hours. In the four MBSR groups the hours of intervention were 16 (Kang et al., 2009), 15 (de Vibe et al., 2015), 12 (Shapiro et al., 2011), and six (Hindman et al., 2015).

The different studies used five different subjective well-being outcome measures, and collected data at varying time points. Of the four MBSR groups only two studies collected data at the same time point (Hindman et al., 2015; Shapiro et al., 2011). Therefore because of the diversity of intervention type, dose and outcome timings a statistical synthesis of the included trial results was not appropriate.

Table 1: Quality assessment of the RCTs included in the review

	Randomisation			Baseline comparability		Eligibility	Blinding				Withdrawals				Outcomes
Trial	Method truly random	Allocation concealment	Number stated	Presented	Achieved	Eligibility criteria specified	Researcher (single blind)	Therapist	Participants	Procedure assessed	>80% in final analysis	Reasons stated	Unexpected dropouts? *	Intention to treat	Other outcomes not reported *
De Vibe, M. 2013	✓	✓	✓	✓	✓×	×	✓	×	×	×	✓	✓	✓	✓	×
Hindman, R. K.2015	✓×	×	✓	✓	✓×	×	×	×	×	×	✓	NA	×	NA	×
Kang, Y. S.2009	✓	✓	✓	✓	✓	✓	✓	×	×	×	✓	✓	✓	×	×
Kingston, J.2007	✓	✓	NS	✓	✓	✓	✓	×	×	×	✓	×	✓	NS	×
Kvillemo, P.2016	✓	×	✓	✓	✓×	✓	×	×	×	×	×	✓	✓	✓	×
Lever Taylor, B.2014	✓	✓	✓	✓	✓	✓	✓	×	×	×	✓	✓	✓	✓	×
Shapiro, S. L. 2011	NS	NS	✓	✓	✓	×	×	×	×	×	✓	✓	✓	×	✓
Vinci et al, 2014	✓	×	✓	✓	✓	✓	×	×	×	×	✓	NA	×	NA	×
Weytens, F. 2014	NS	NS	✓	✓	✓	×	×	×	×	×	×	✓×	✓	×	×

Allowed responses: ✓= yes (item adequately addressed); ×=no (item not adequately addressed); ✓×=partially (item partially addressed); NS= not stated; NA=not applicable

Questions with a * after them denotes that a negative response to this question is the preferred answer.

Table 2: Study characteristics of the RCTs included in the review.

Trial	Source Population Age in yrs.	Sample Size (recruited) completed	Control Group	Intervention Type	Duration of Intervention (hours)	Intervention Quality	Subjective well-being Measure	Outcome Assessment Time Frame	Sig Increase in Subjective well-being?
De Vibe, M. 2013	Medical and psychology Students Mean age 23.8 (SD 5.2)	(293) 288	Wait-list control	7 week Mindfulness Based Stress Reduction (MBSR)	15	Manual (+) Training (+) Integrity check (+)	Subjective well-being scale (SWB)	2 weeks following intervention	Yes for the female participants between experimental and control group ($F=16.16$, $p < 0.001$). Males did not reach significance. Hedges g treatment effect 0.4 (.27- .63) (small)
Hindman, R. K.2015	Graduate and undergraduate students Mean age 22.35 (SD 3.15) range 18- 30	(34) 34	Two active conditions and wait list	Mindful stress management (MSM), Mindful stress management-informal (MSM-I) workshops	6	Manual (-) Training (+) Integrity check (-)	Satisfaction With Life Scale (SWLS)	Immediately following intervention	Yes in MSM ($F=29.54$, $p <0.05$) but no in the MSM-I Medium to large ES
Kang, Y. S.2009	Nursing students Mean age 22.69	(41) 32	Wait-list control	8 weekly group sessions on a stress coping program based on mindfulness meditation	16	Manual (+) Training (+) Integrity check (-)	Psychosocial well-being index-short form (PWI-SF)	1 week following intervention	Yes between experimental and control group ($F=6.145$, $p = 0.02$) no ES

*= Data sourced from paper detailing the full RCT (Oman, Shapiro, Thoresen, Plante, & Flinders, 2008). SD = standard deviation. ES = effect size. NA = Not applicable

Table 2: Study characteristics of the RCTs included in the review (continued).

Trial	Source Population age in yrs	Sample Size (recruited) completed	Control Group	Intervention Type	Duration of Intervention (hours)	Intervention Quality	Subjective well-being Measure	Outcome Assessment Time Frame	Sig Increase in Subjective well-being?
Kingston, J.2007	University students Mean age 23 (SD NS)	(45) 42	Active control	Mindfulness group sessions twice weekly	6	Manual (-) Training (+) Integrity check (-)	Positive and Negative Affect Schedule (PANAS)	Immediately following intervention	No ES N/A
Kvillemo, P.2016	University students mean age 29 (SD NS) Range 18- 45	(90) 49	Active control	Internet based 8 week mindfulness program	8 internet based sessions	Manual (+) Training (NA) Integrity check (NA)	Psychological well-being Scale (PWB)	Immediately following intervention	Yes, within group ($p < 0.05$) But not between groups ES N/A
Lever Taylor, B.2014	University students Mean age 26.61 (SD 9.12)	(80) 76	Wait-list control	8 weeks to read 8 chapters of Mindfulness based cognitive therapy self-help book (MBCT-SH)	**NA**	Manual (+) Training (NA) Integrity check (NA)	Satisfaction with Life Scale (SWLS)	Immediately following intervention and at a follow up 2 weeks later	Yes between experimental and control group ($F=17.47$, $p < 0.001$) reported as medium to large ES

*= Data sourced from paper detailing the full RCT (Oman, Shapiro, Thoresen, Plante, & Flinders, 2008). SD = standard deviation. ES = effect size. NA = Not applicable

Table 2: Study characteristics of the RCTs included in the review (continued).

Trial	Source Population age in yrs	Sample Size (recruited) completed	Control Group	Intervention Type	Duration of Intervention (hours)	Intervention Quality	Subjective well-being Measure	Outcome Assessment Time Frame	Sig Increase in Subjective well-being?
Shapiro, S. L. 2011	Undergraduate students Mean age 18.73 (SD 1.29) range 18- 24	(32) 30	Wait-list control	8 weeks Mindfulness Based Stress Reduction (MBSR)	12*	Manual (+) Training (-) Integrity check (-)	Positive and Negative Affect Schedule (PANAS) and Satisfaction with Life Scale (SWLS)	Immediately post intervention, 2 month, and 1 year follow up	Yes between experimental and control group at 2 month follow up ($p<.01$) and at 12 month follow up ($p<.05$) ES Cohen d 0.004 at 2 months
Vinci et al, 2014	University student at risk drinkers Mean age 20.13 (SD 1.89)	(207) 207	Two active conditions and wait list	mindfulness tape recording	10 minute	Manual (+) Training (+) Integrity check (-)	Positive and Negative Affect Schedule (PANAS)	Immediately following intervention and after the negative affect induction	Yes, significant increase in positive affect ($F= 3.16$, $p = 0.008$) Significant decrease in negative affect in the mindfulness group ($t[38]=4.45$, $p=0.001$) No ES
Weytens, F. 2014	Undergraduate students Mean age 22.29 (SD 2.49)	(113) 79	Two active conditions and wait list	Loving kindness meditation groups	12	Manual (+) Training (+) Integrity check (-)	Satisfaction with Life Scale (SWLS)	4 weeks after the intervention	No No ES

*= Data sourced from paper detailing the full RCT (Oman, Shapiro, Thoresen, Plante, & Flinders, 2008). SD = standard deviation. ES = effect size. NA = Not applicable

Discussion

Previous research has argued that a reduction in psychiatric symptomology (such as anxiety or depression) or in negative mood states implies improvement in subjective well-being. However, this assumption is becoming increasingly challenged in the literature. This study investigated, in a review of randomised controlled trials, whether MBIs significantly increase subjective well-being, when measured using a subjective well-being measure, in an adult student (undergraduate and/or postgraduate) population.

The initial literature search identified 135 papers. This was thought to be a relatively small number for the initial search. This is perhaps because of the large number of uses of the Boolean term 'AND'. It also identifies that although mindfulness has been extensively studied, there is a limited number of studies that investigate its effects on subjective well-being in the student population.

Six of the nine studies found improvement in the expected direction, that MBIs improve subjective well-being (De Vibe et al., 2013; Hindman et al., 2015; Kang et al., 2009; Lever Taylor et al., 2014; Shapiro et al., 2011; Vinci et al., 2014). Of these studies only four reported effect sizes, ranging from small to medium/large. Two studies reported a specific effect size (De Vibe et al., 2013; Shapiro et al., 2011). The other two only provided the category of effect in the narrative not the precise number (Hindman et al., 2015; Lever Taylor et al., 2014). Three studies do not show a positive impact of MBIs on subjective well-being (Kingston et al., 2007; Kvillemo et al., 2016; Weytens et al., 2014). Interpretation of these outcome findings therefore needs to be cautious since a significant finding alone does not give any indication of the strength of the effect.

The eligibility criteria chosen in this review identified nine randomised controlled trials suitable for inclusion. This is a surprisingly small number considering the recent growth in research and application of mindfulness based interventions. Nonetheless, piloting the search strategy and enhancing it with hand searching of the reference lists of the included papers, provides some confidence in the number of papers identified. The conclusions of this review are based on synthesis of all the available evidence that meets the inclusion criteria.

One of the three studies that did not demonstrate a significant effect (Weytens et al., 2014), had a large amount of attrition in the mindfulness condition (43%). This meant that the analysis lacked sufficient power to test for an effect. The second study (Kingston et al., 2007) had a control condition which may have included some of the active components of a mindfulness intervention. It is possible that the guided visualisation active control condition may have inadvertently taught participants to maintain attention and awareness. Attention and awareness is one of the proposed five core elements of mindfulness (Nilsson and Kazemi, 2016). This could explain why a significant difference between the two conditions was not found. The final study that did not report a significant difference between groups (Kvillemo et al., 2016), used an active control condition of internet delivered creative writing. However, although the creative writing condition based on the work of Pennebaker and colleagues (1986) has been used in many previous studies, Kvillemo (2016) added additional elements to it. These additional elements may have played a role in the improvements in subjective well-being. As explained in the paper, Kvillemo (2016) states:

"In addition to writing about stressor-related emotions, participants were asked to write for 10 minutes using a positive prompt following the first writing assignment. Examples of positive prompts are: 'What has become better since….,' 'What personal strengths helped you deal with…,' and 'What makes you feel hopeful about the future?'" (pp.4-5)

These positive prompts are strikingly similar to some of the core therapeutic questions used in Solution Focused Therapy, a therapy developed in the 1980s by Shazer and Berg (Shazer et al., 1986). Solution Focused Therapy is a psychological therapy that has been evidenced to improve student subjective well-being (Pakrosnis & Cepukiene, 2015). It is therefore possible that the inclusion of these positive prompts contaminated the active control condition.

The six RCTs that found an increase in subjective well-being scores found a significant difference between the MBIs and the wait-list control condition (De Vibe et al., 2013; Hindman et al., 2015; Kang et al., 2009; Lever Taylor et al., 2014; Shapiro et al., 2011; Vinci et al., 2014). One RCT (Kingston et al., 2007) used an active control group and did not show a between group effect. These findings could be used to support the argument that has been applied to MBIs, that it might be the

non-specific elements of group participation that are the active ingredients in improving participants' subjective well-being rather than the mindfulness intervention (Guyatt et al., 2008).

Only two studies used different delivery methods: one study used a self-help mindfulness book (Lever Taylor et al., 2014) and reported a significantly different between-group increase in subjective well-being score when compared to a wait-list control; and the second study used an internet delivered MBI (Kvillemo et al., 2016), but this study did not achieve a significant difference between-group increase in subjective well-being score. Therefore the findings from this systematic review cannot answer the question about whether or not there is any specific benefit derived from the mindfulness component of the intervention.

Turning to the three studies that did not report a significant between group improvement in subjective well-being, all have considerable methodological flaws and as a consequence cannot contribute to the discussion of whether MBIs can significantly improve subjective wellbeing in a student population.

Previous literature has focused on the reduction of negative psychological states such as anxiety, stress and depression, and researchers argued that by reducing this distress subjective well-being is increased. However subjective well-being is not simply an absence of psychological pathology (Bech et al., 2003). For that reason this review selected studies that reported findings using a specific subjective well-being measure. This focus adds new information to the published literature. However there are a number of strengths and limitations to the studies included in the review and the review process itself. These factors will be discussed below but need to be taken into account when considering the generalisability of the results and suggested recommendations from this review.

Strengths and limitations

The studies included in this review have a number of strengths. The inclusion criteria ensured that all included trials were RCTs. RCTs are considered to produce the most reliable form of scientific evidence as they reduce the risk of bias (Guyatt et al., 2008). However, the results of un-blinded RCTs tend to be biased towards beneficial effects if the RCT outcome measures are subjective (Wood et al.,

2008). Further, in pragmatic RCTs such as the ones included in this review, in which participants and therapists are not blinded it would be desirable to ensure that the assessors are blind and/or an objective source of data for the evaluation of outcome is used (Zwarenstein et al., 2008). These requirements can clearly not be met when (as in all these studies), the primary outcome measure is a self-report subjective well-being scale. However to date subjective well-being (as captured using self-report measures) has been described as a reliably global and state phenomenon (Pavot, Diener, Colvin, & Sandvik, 1991), which has been predictably associated with other measures including the General Health Questionnaire (Banks, 1983). At the present time the author is not aware of any better standardised or more valid ways of measuring the phenomenon of subjective well-being. This measurement dilemma in turn has a major impact on the implications of using RCT designs to evaluate the efficacy or clinical effectiveness of interventions targeting subjective well-being.

Further even when considering the self-report subjective well-being measures employed in the studies included in this review, five different measures were employed. This made comparisons between studies problematic. To facilitate future research an agreed consensus on a set of outcome measures both objective and subjective would be beneficial.

The studies included also had a number of additional limitations. First considering the types of subjects recruited to the studies: all the subjects were aged between 18-45 years but the majority (79%) of the participants were female students, and only four studies reported ethnicity (Hindman et al., 2015; Lever Taylor et al., 2014; Shapiro et al., 2011; Vinci et al., 2014). One study (De Vibe et al., 2013) however had sufficient male participants to include gender as a factor in the multiple analysis of covariance. This study reported in the subsequent analyses of covariance, that subjective well-being only significantly increased in the female participants. Second, although all the study participants were students (undergraduate and postgraduate), a number of different recruitment strategies were used. Most studies used adverts to promote recruitment. Some studies offered incentives for participation (such as course credits) and others relied on volunteers. All these factors potentially compromise the representativeness of the sample and the generalisability of the findings.

A further area of limitation is the method of analysis used in these studies. As reported above only three of the studies used an intention to treat analysis (De Vibe et al., 2013; Kvillemo et al., 2016; Lever Taylor et al., 2014). Two studies had no attrition (drop outs or withdraws) (Hindman et al., 2015; Vinci et al., 2014). However the results of the other four studies may potentially be biased as they did not include the participants that dropped out of the research in the analyses (Kang et al., 2009; Kingston et al., 2007; Shapiro et al., 2011; Weytens et al., 2014).

In terms of the delivery of the MBI therapies, as described in table 2, the majority had some features of good quality – manualised interventions were used and the MBI was delivered by specifically trained therapists. However, only one study provided any evidence that treatment fidelity (adherence to the manualised intervention) was assessed (De Vibe et al., 2013). A further major weakness of the studies is that none of them measured or discussed treatment competence. Treatment competence is the degree to which at the individual level of the therapist, the therapy is delivered in accordance with the therapeutic model. It refers to specific aspects of delivery such as tone of voice, enunciation, therapeutic style etc. This means that the quality of the mindfulness interventions delivered is unclear, which casts doubt on the interpretations of the findings.

The systematic review process itself had a number of strengths. The quality of the included studies was assessed. The piloting of the search strategy and enhancing it with hand searching of the reference lists of the included papers, facilitates confidence in the number of papers identified. This increases the likelihood that the conclusions of this review are based on synthesis of all the available evidence that meets the inclusion criteria.

There are also some limitations of this review. It was not possible to enlist the help of a second reviewer (as a reliability check) to double code a proportion of the identified papers, meaning that there is more opportunity for errors or biases to have impacted on the selection of papers. The researcher also did not identify any topic experts in this field. As mentioned previously this was discussed in supervision and it was agreed that no obvious centre could be identified where this research was a main focus of activity. However this decision meant that some relevant studies might

have been missed, if for example they were in the process of publication or for some reason not identifiable through electronic database searches.

Another potential limitation of the review is that the inclusion criteria did not specify a minimum dose of MBI. This resulted in studies meeting the inclusion criteria with a wide range of amount of MBIs from 10 minutes (Vinci et al., 2014), to 16 hours (Kang et al., 2009). Previous research has investigated whether there is a dose-response relationship between the amount of MBI practiced and the degree of psychological benefits (Carmody and Baer, 2009; Vettese, Toneatto, Stea, Nguyen, & Wang, 2009), although they did not find a systematic relationship between these two variables. Similarly, the reported 'dose effect' in this review does not appear to be clear cut. Two studies using MBSR (De Vibe et al., 2013; Shapiro et al., 2011), with longer durations of interventions (15 and 12 hours respectively), reported small effect sizes. In contrast, Hindman et al (2015) reported a medium to large effect size with a duration of intervention of 6 hours, and the study with a 10 minute intervention (Vinci et al., 2014) reported a significant increase in SWB. Further research is needed to consider how the dose of MBIs may interact with other aspects of delivery.

The nine RCTs recruited participants from six different of countries: the United States of America, United Kingdom, Sweden, Belgium, Norway, Korea. A potential limitation is that this review only included papers published in English. Subjective well-being measures have however been translated into several languages (Pavot et al., 1991). This is likely to mean that there may well be relevant studies that are not published in English. However, as the included articles were from a variety of countries, this might not be such a problem.

Conclusions

This is the first systematic review to address the efficacy of MBIs in non-clinical student populations using specific subjective well-being measures. However the number of studies identified is relatively small and the quality of the studies is variable. This means that at present there is insufficient evidence to draw clear conclusions about the effects of MBIs in student populations. Overall the studies indicated that MBIs have the potential for improving subjective well-being in the

female student population. Further research using studies of high methodological quality and a low risk of bias are needed to investigate MBIs in equally balanced male and female student populations. Particular attention needs to be paid to the representativeness of recruited samples, the delivery, content, fidelity and competence of delivery of the type of MBI; the choice and content of the active comparator intervention and the development of more robust tools (including the potential role of psychometrically rigorous reliable and properly validated subjective well-being measures). Enhancing levels of mental well-being in undergraduate and postgraduate students in a sustainable way, may have a protective function which in turn might reduce psychological distress in these at risk populations. MBIs may well have the potential to meet this urgent need but the quality of research studies needs to be refined in order to generate more robust evidence.

There are several implications of the findings of this systematic review for clinical psychology. Firstly, the variability in the dose effect and delivery method of MBIs highlights the need for further research to refine our understanding of the most cost effective method and amount of MBIs to improve well-being in both clinical and non-clinical samples. Secondly, SWB has been linked to stress and other risk factors for pathology. It is therefore important to measure SWB as an aspect of current functioning and response to treatment. Thirdly as clinical psychologists work with at risk populations the study of interventions such as MBIs designed to boost SWB may have a protective function and so reduce psychological distress, enhancing outcomes.

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Chapter 3: Empirical paper

Threatening experiences and subjective well-being in medical students: The mediating role of perseverative negative thinking and the moderating role of attention control (How medical students respond to stressful events)

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Threatening experiences and subjective well-being in medical students: The mediating role of perseverative negative thinking and the moderating role of attention control (**How medical students respond to stressful events**)

Abstract

Theory

Medical students face situations which threaten their subjective well-being (SWB), including illness, injury or assault; relationship break downs; or exam stress. Medical schools are increasingly interested in helping maintain students' SWB through stressful experiences. This paper examines two factors, perseverative negative thinking (PNT) and attention control (AC), and the extent to which they mediate and moderate the impact of those experiences on SWB.

Hypotheses

Three hypotheses were tested. The first is that the frequency of exposure to threatening experiences will be negatively related to SWB. The second is that PNT will mediate the relationship between threatening experiences and SWB. The third is that AC will moderate the relationship between threatening experiences and SWB.

Methods

Medical students (n=148) at University of Liverpool provided demographics and completed four online questionnaires: BBC Subjective Well-being Scale (BBC-SWB); List of Threatening Experiences Scale (LTE); Perseverative Thinking Questionnaire (PTQ); Attention Control Scale (ACS).

Results

The study found significant correlations between, LTE and BBC-SWB, PTQ and ACS. LTE and PTQ were negatively correlated with BBC-SWB, and ACS was positively correlated with BBC-SWB. Mediation analysis found a significant indirect effect of threatening life experiences on SWB through PNT, B = -.56, $p<.05$. Moderation analysis showed AC moderating the relationship between threatening life experiences and SWB, B = .17, $t(143) = 2.13$, $p = <.05$.

Conclusions

The findings suggest the effect of LTE on BBC-SWB is partially mediated by PTQ, and secondly that ACS moderates the relationship between LTE and BBC-SWB. These relationships imply that the effects of threatening experiences on SWB could be decreased by reducing PNT and increasing AC. Investigating whether interventions designed to modify these thinking processes can reduce the detrimental impact on SWB from threatening experiences could potentially benefit both medical students and patient care.

Keywords: Subjective well-being, Perseverative negative thinking, Attention control, Threatening life experiences, medical education, Medical students

Introduction

In 2013, there were 40,625 medical students in the UK, of which 54% are female (1). A ten year retrospective study found the drop-out rate of medical students was 5.7% (2). This study reports that although the rate is low compared to other university courses, drop-outs have considerable financial, social and emotional repercussions for affected students and have adverse medium and longer term implications for manpower planning of the wider NHS. The main reason (36.4%) for withdrawal from medical education is 'personal' and not academic (3). Exposure to threatening experiences (e.g. exam stress, relationship breakdown, unemployment, assault), adds to the demands of medical training and affects students' subjective well-being (SWB). This may alter the student's ability to remain in education, leading to premature withdrawal (3).

Medical students undergo a greater degree of stress compared to the general student population (4). Long hours of study, high workload (5), large amounts of information to process and retain (6, 7), reduced time for hobbies (8), and placement related factors (9), all strain their mental health. Personal factors are also important. In a study of over 1000 medical students, 42% reported a change in health of a relative, 25% described personal illness or injury, and 15% disclosed the death of a family member (10). Despite the many social, academic, and emotional stressors of medical training, most students graduate (3). Although 'personal' reasons are the most frequently reported, most research has focused on training-related stressors.

It is likely that the stresses of training, compounded by threatening life experiences, results in medical student withdrawal. However, the processes involved in how these threatening experiences

affect medical students have not been fully studied.

Subjective well-being (SWB) has attracted increasing interest as it has been shown to have a major impact on health and performance amongst medical students (11). This raises the possibility that SWB acts as a protective factor against the risk of mental health distress. Positive mental health and SWB have become key elements of awareness and provision for UK medical students with the publication of the General Medical Council's 'Factors that impact on medical student well-being – perspectives of risk' (11). There have been numerous approaches to defining and measuring SWB (12), alongside the development of programmes promoting SWB practices (13). SWB is a complex concept related to optimal experience and functioning (14). It is a dynamic state in which people appraise how fulfilled their lives are, through interactions with their circumstances, activities and psychological resources (13). For the purpose of this paper the following consensus definition will be employed:

"Subjective well-being is an umbrella term used to describe the level of well-being people experience according to their subjective evaluations of their lives." (15). (pp.391)

Research has established an association between exposure to threatening experiences and increased emotional disorders, e.g. depression (16), anxiety disorders (17), and post-traumatic stress disorder (18). Studies have also explored the impact of exposure to threatening experiences on SWB; for example, the greater the frequency and severity of threatening experiences, the lower the reported experience of SWB in the following months (19).

Psychological literature has identified two processes associated with the relationship between threatening life experiences and a reduction in SWB, namely perseverative negative thinking (PNT), e.g. rumination and worry (20-23) and attention control (AC), the ability to be aware of and choose to control attention (24, 25). The relationship between threatening experiences and emotional disorders has been found to be significantly mediated by certain types of PNT (26-28). However, one limitation of exploring PNT is that most measures have been developed with a focus on specific emotional disorders e.g. rumination for depression, worry for anxiety disorders. This has precluded using these kinds of measures to explore the relationship between PNT and non-disorder states, such as SWB. In response to this, Ehring and colleagues have developed a non-disorder specific measure of PNT, the Perseverative Thinking Questionnaire (PTQ) (29). This may enable a more appropriate assessment of

the role of this kind of cognitive process within non-disorder contexts. It is likely that individual differences in PNT reflect the operation of cognitive self-regulation and control processes, which underlie how people respond to threatening experiences. Authors (26, 28) have demonstrated that PNT mediates the impact of life events on SWB.

Related to this aspect of self-regulation is the ability to exercise executive control over attention, i.e. the ability to focus and shift attention in the face of distraction, which may in turn moderate the impact on SWB. Attention control (AC) is hypothesised to influence self-regulation in a number of different ways, including the ability to withdraw attention and therefore disengage from PNT, and in holding attention on task-relevant information rather than monitoring for threat information. AC, as an executive self-regulatory process, is thought to play a part in promoting SWB, evidenced by the extent to which various therapy approaches incorporate some element of attention training, whether explicitly, e.g. Meta Cognitive Therapy (30), or embedded in mindfulness meditation practices, e.g. Acceptance and Commitment Therapy (31), and Mindfulness Based Cognitive Therapy (32).

This study investigates how PNT and AC influence the relationship between threatening life experiences and SWB in medical students. PNT will be examined as a potential mediator. There is a logical rationale for a causal chain relationship between threatening experiences and increasing PNT, which in turn may reduce SWB. There is also a strong and consistent relationship between threatening experiences and PNT (26, 33, 34) warranting mediation analysis, as recommended by Baron and Kenny (36). However, the relationship between threatening experiences, AC and SWB is less straightforward. AC may have a contingent relationship on SWB. Therefore, after a threatening experience, when AC is high, it may result in the ability to disengage from PNT and potentially stop the detrimental effects that PNT has on SWB. In contrast, when AC is low, this protective prevention of PNT may not happen, so SWB is reduced. As the potential relationship of AC on SWB is differentially based on the amount of AC, this warrants a moderation analysis.

Therefore, the current study has three distinct aims. The first is to investigate the existing negative relationship between threatening experiences and SWB. The second is to extend this research by exploring the presence of a mediating role for PNT in the relationship between threatening experiences and SWB. The hypothesis is that PNT will partially or fully mediate this relationship,

with a positive relationship between threatening experiences and PNT, and a negative relationship between PNT and SWB. The third aim is to examine the potential moderating effect of AC in the relationship between threatening experiences and SWB. Although it is expected that threatening experiences will be positively associated with PNT, there is less expectation that threatening experiences will have a strong association with AC. Nevertheless, it is proposed that AC will be positively associated with SWB. It is predicted that individual differences in AC can be used to examine its role in moderating the relationship between threatening experiences and SWB. AC may operate as a protective factor in the relationship between threatening experiences and SWB, i.e. the presence of high AC may reduce the negative effect of threatening experiences on SWB.

This study was conducted in a population of medical students. The clinical relevance of this lies in the need to establish the evidence base to inform the development of effective SWB promotion programmes (13). If the degree of impact of threatening experiences on SWB is related to the degree of PNT and ability to control one's attention, then programmes can be developed which specifically focus on increasing AC. This in turn might reduce the presence and impact of PNT. Such programmes would need to be evaluated to investigate whether they enable medical students to maintain high SWB in the presence of threatening experiences.

Hypotheses

The first hypothesis of this study is that the frequency of exposure to threatening experiences will be negatively related to SWB. The second hypothesis is that perseverative thinking will mediate the relationship between threatening experiences and SWB. The final hypothesis is that AC will moderate the relationship between threatening experiences and SWB.

Method

Participants

One hundred and forty-eight medical students studying at the University of Liverpool completed online questionnaires. The age range was 18 – 42 years (mean 21.36, median and mode 21). One hundred and seven females and 41 males completed the study. Their current year of study ranged from 1 – 6+ (mean 2.8, median 3, mode 1). One hundred and thirty-six of the medical students identified their origin status as the UK (91.9%), two as the EU (1.4%) and ten (6.8%) as International

students.

Measures

The Modified BBC Subjective Well-being Scale (BBC-SWB)

The Modified BBC Subjective Well-being Scale (BBC-SWB) (36) is a 24-item self-report measure used to assess an individual's appraisal of their own SWB. The authors modified the measure from a four to a five point Likert scale to improve data quality, internal consistency and discriminant validity. Participants rate each item, ranging from 1 = 'a little' to 5 = 'extremely', resulting in total scores ranging from 24 to 120. Higher scores indicate a higher degree of SWB. The BBC-SWB has demonstrated high internal consistency (α = .94), and good convergent validity as it correlated well with other measures of SWB (36).

The List of Threatening Experiences Scale (LTE)

The List of Threatening Experiences Scale (LTE; (37)) in its original form, for use with a general population, had 12 items assessing the presence or absence of particular threatening experiences e.g. "have you suffered a serious illness, injury or assault?" The scale was modified and validated by the researcher's supervisor in previous research (unpublished) to reflect the target student population, e.g. "becoming unemployed" was changed to "suspending studies". Four items were added to reflect common negative life events reported by students (e.g. unplanned pregnancy, serious discrimination, abuse, major accommodation problems). Participants respond 'yes' or 'no' to events occurring over the past three months, the time frame when threatening experiences impacts SWB (19). Scores increase from 0 to 15 with increasing numbers of threatening life experiences. The original scale demonstrated good test-retest reliability (kappa values of 0.7-0.9 (37)). Concurrent validity was assessed by comparing LTE scores to scores obtained on a semi-structured interview using the Life Events and Difficulties Scale (LEDS; (38)).

The Perseverative Thinking Questionnaire (PTQ)

The Perseverative Thinking Questionnaire (PTQ; (29)) is a 15-item self-report measure used to assess PNT. Each item is rated on a 5-point Likert scale (ranging from 0 = 'never' to 4 = 'almost

always'), resulting in total scores ranging from 0 to 60, with higher scores indicating a higher degree of PNT. It is a content-independent measure, which has been developed to address problems with previous PNT questionnaires, e.g. The Penn State Worry Questionnaire (PSWQ) and The Response Style Questionnaire (RSQ), which were confounded with specific emotional disorders, anxiety and low mood respectively. The PTQ has five sub-scales that define the key characteristics of this form of thinking, i.e. that it is experienced as repetitive, involuntary, difficult to disengage from, unproductive, and that it captures mental capacity. The PTQ has good internal consistency ($\alpha = .95$) and good concurrent validity, correlating well with other measures of PNT (RSQ, $r = 0.72$; PSWQ $r = 0.70$; and the Rumination Scale $r = 0.62$) (29).

The Attention Control Scale (ACS)

The Attention Control Scale (39) is a 20-item self-report measure used to assess participants' perceived ability to control their attention. Analysis shows two distinct factors, attention focusing (e.g. "My concentration is good even if there is music in the room around me"); and attention shifting ("It is easy for me to read or write while I'm also talking on the phone"). AC has been defined as the executive ability to direct attention (40). Participants rate the 20 items on a 4-point Likert scale (ranging from 1 = 'almost never' to 4 = 'always') resulting in total scores ranging from 20 to 80. Higher scores indicate a higher degree of AC. The ACS has demonstrated good internal consistency ($\alpha = .84$; (41).

Demographic data

The following demographic information was gathered: age, gender, year of study, origin status (UK, EU or International student).

Design

The study design is cross-sectional. One measure (BBC-SWB) assessed a relatively short-term state psychological construct, asking how the participant felt generally at the time of completion. One scale (LTE) assessed the frequency of exposure to external stressors retrospectively over the past three months. Two measures (PTQ and ACS) assessed trait-type dispositional constructs.

Procedure

The study received ethical approval from the Doctorate of Clinical Psychology Research Review Committee (IPHS-1415-LB-289) at the University of Liverpool (Appendix C). A recruitment advert email was sent to the administration lead of the school of medicine at the University of Liverpool. The administrator forwarded this to all the undergraduate medical students (Appendix H). The email briefly detailed the purpose of the study, what participation would entail, i.e. approximately 15-20 minutes to complete self-report questionnaires, and information about entry into a prize draw for participants (Appendix E). The email contained a link to the start page of the online study. The first page required participants to electronically indicate consent (Appendix D). They were informed that if they consented to participate all their data would be anonymised and kept confidential in a password protected university shared drive. Participants then completed the five questionnaires (Demographic information section -5 items; The Modified BBC Subjective Well-being Scale [BBC-SWB]; The List of Threatening Experiences Scale [LTE]; The Perseverative Thinking Questionnaire [PTQ]; The Attention Control Scale [ACS]) (Appendix G).

A follow-up recruitment email was sent out after two weeks to encourage participation. The prize draw was made two weeks after the recruitment ended.

Power Calculation

A power calculation was conducted, based on a linear regression analysis with two predictor variables, for both the moderation and the mediation analyses, with five covariates: age, gender, study programme, year of study, and origin status. A priori power calculations using G*Power 3 software (42) indicated that to obtain a medium effect size ($f^2 = 0.15$) with 80% power and an alpha level of $p \leq 0.05$ the required sample size is 92 participants (Appendix J).

Statistical analysis

The data from the four questionnaires was first assessed against parametric assumptions. Bivariate correlations were then conducted to test that the variables correlated in the predicted directions and that there was no inter-correlation between the variables. As both these conditions were met, the mediation analysis of PTQ in the relationship between LTE and BBC-SWB, and the moderation analysis of AC in the relationship between LTE and BBC-SWB were conducted.

Results

Preliminary analysis

The key study variables were examined to confirm they met the assumptions for parametric data analysis. In relation to assumptions relevant to mediation and moderation regression analyses, no evidence of multi-collinearity was observed in the data. Outliers were tested for using Mahalanobis distance (43). There were no significant multivariate outliers identified for the mediation analysis and one outlier for the moderation analysis, which was removed prior to running the analysis. Histograms and normality plots indicated that residuals were normally distributed (Appendix K). Age, gender, year of study, and country of origin were not significantly correlated with the main outcome variable SWB score, therefore they did not have to be controlled for in the mediation and moderation analyses.

Table 1 below displays the means, standard deviations and bivariate correlations for the study variables. The mean BBC-SWB score for this population was 84.09, with a standard deviation of 15.07. This mean is 9.39 points higher than the mean score reported by 8,020 young people aged 18-34 years (a comparable age range to this study) from an online study of 23,341 participants (12). The mean score in the Pontin study was 74.7 with a standard deviation of 17.0. This indicates that the medical student population in this study report a higher BBC-SWB than the general population of a similar age range, but a similar distribution around the mean. The mean number of threatening life experiences in the three months prior to the study was 2.66. The threatening life experience reported with the highest frequency was accommodation problems (44.2%), followed by death of a close family friend or relative (42.2%); then a serious illness, injury or assault happening to a close relative (37.4%). None of the students reported having experienced an unplanned pregnancy, or problems with the police, a court appearance or border agency.

As predicted, there were significant negative correlations both between LTE and BBC-SWB, and between PTQ and BBC-SWB. There was significant positive correlation between ACS and BBC-SWB. The variables LTE and PTQ, and LTE and ACS were not highly inter-correlated; this indicated that there is no multicollinearity in the data, allowing the mediation and moderation analyses to be conducted.

Table 1: Means, standard deviations and correlations of the study variables.

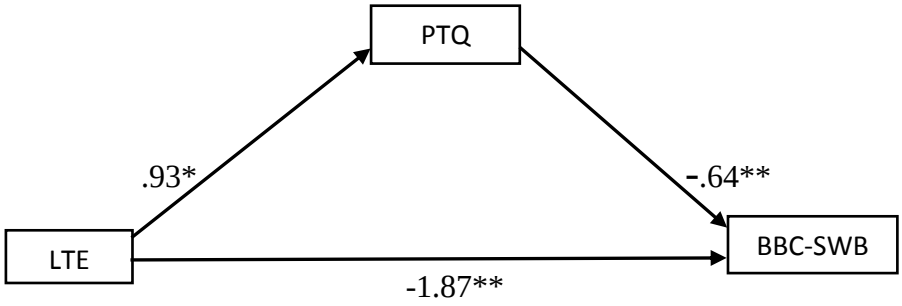
	Total LTE	Total PTQ	Total ACS	Mean	SD
Total BBC-SWB	-.366**	-.543**	.391**	84.09	15.07
Total LTE		.186*	-.163*	2.66	2.30
Total PTQ			-.454**	28.91	11.51
Total ACS				49.81	8.11

Note. N = 148. BBC-SWB = The Modified BBC Subjective Well-being Scale; LTE = The List of Threatening Experiences Scale; PTQ = The Perseverative Thinking Questionnaire; ACS = The Attention Control Scale. * = p<.05; ** = p.01.

Mediation analyses

The Hayes Process (44) plug-in tool for SPSS was used to compute the mediation analysis. This uses an ordinary least squares or logistic regression-based path analytic framework for estimating direct and indirect mediation and moderation effects. The relationship between the number of threatening experiences and reduction in subjective well-being was partially mediated by perseverative thinking. The total effect of threatening experiences significantly predicted a reduction in SWB, B = -2.40, $t(146) = -4.75$, $p = <.001$ with every threatening experience producing a 2.4 point reduction in SWB score. As Figure 1 illustrates, the regression coefficient between threatening experiences and PNT was statistically significant, B = .93, $t(146) = 2.29$, $p = <.05$. This means that every additional threatening experience increased PNT by .93 of a unit. The regression coefficient between PNT and SWB was also significant, B = -.64, $t(145) = -7.32$, $p = <.001$. Therefore for every additional point on the perseverative thinking scale, SWB decreased by .64 of a unit. The indirect effect was (.93)*(.-64) = -.60. The direct effect of threatening experiences on SWB, B = -1.80, $t(145) = -4.08$, $p = <.001$, when accounting for the mediation of PNT, was still significant but had reduced from B = 2.4 to B = 1.87. The significant difference between the direct and indirect effect was tested using the Sobel test (normal theory test), $Z = -2.17$, p = <.05, $\kappa^2 = .10$ (45), indicating a medium effect size. Thus the difference between the direct and indirect effect was significantly different from zero, meaning the relationship between threatening experiences and SWB was partially mediated by PNT.

Indirect effect B = (.93* -.64) = -.60, *p* = < .001



Direct effect B = -1.87, *p* = < .001

Total effect B = (-.60 + -1.87) = -2.4, *p* = < .001

Figure 1: Regression coefficients for the relationship between threatening experiences and SWB as mediated by perseverative thinking, on the top two arrows. The regression coefficient between threatening experiences and SWB, controlling for perseverative thinking, is shown on the bottom arrow.

**p<.05, **p<.001*

Moderation analysis

To test the third hypothesis, a moderation analysis was conducted using the Hayes Process tool plug-in to SPSS (44). Attention control was examined as a moderator of the relationship between the number of threatening experiences and SWB. The overall moderation model was significant: $F(3, 143,) = 12.15$, $p < .001$, $R^2 = .26$. Therefore when including the three variables of AC, threatening experiences and their interaction, 26% of the variance in SWB is explained. AC had a positive relationship with SWB, B = .62, $t(143) = 4.44$, $p = < .001$. i.e, every unit increase in AC produced a .62 unit increase in SWB. Threatening experiences on the other hand had a negative relationship with SWB, B = -1.86, $t(143) = -3.32$, $p = < .001$. i.e, for each addition of threatening experience, there was a 1.86 unit decrease in SWB. The analysis also produced a significant interaction effect, B = .17, $t(143) = 2.13$, $p = <.05$, indicating that the relationship between threatening life experiences and SWB is moderated by AC. This supports the third hypothesis.

Figure 2 below illustrates the moderation effect of AC, highlighting the protective effect of AC on preserving SWB after threatening experiences. The process tool (46) produces a table of the conditional effects of AC on SWB, split into three groups: low (one standard deviation below the mean), average (a centred mean score) and high (one standard deviation above the mean). These data are represented graphically in Figure 2. When AC is low (solid line), SWB significantly decreases the more threatening experiences the person reports. At low AC, the relationship between threatening experiences and SWB is, B = -3.19, $t(143) = -3.72$, $p = <.001$. Thus at low levels of AC there is a highly significant relationship between threatening experiences and SWB. For each additional threatening experience reported, SWB reduces by 3.19 units. At an average amount of AC (small dotted line), the reduction of SWB caused by threatening life experiences is reduced, B = -1.86, $t(143) = -3.32$, $p = .001$. Thus for an average level of AC, there is a reduced though still highly significant relationship between threatening experiences and SWB: for each additional threatening experience, reported SWB reduces by 1.86 points. Finally when AC is high (dot dash dot line) the impact of threatening life experiences on SWB is reduced even further, and the effect of threatening life experiences on SWB is no longer significant, B= -.52, $t(143) = -.63$, $p = .53$.

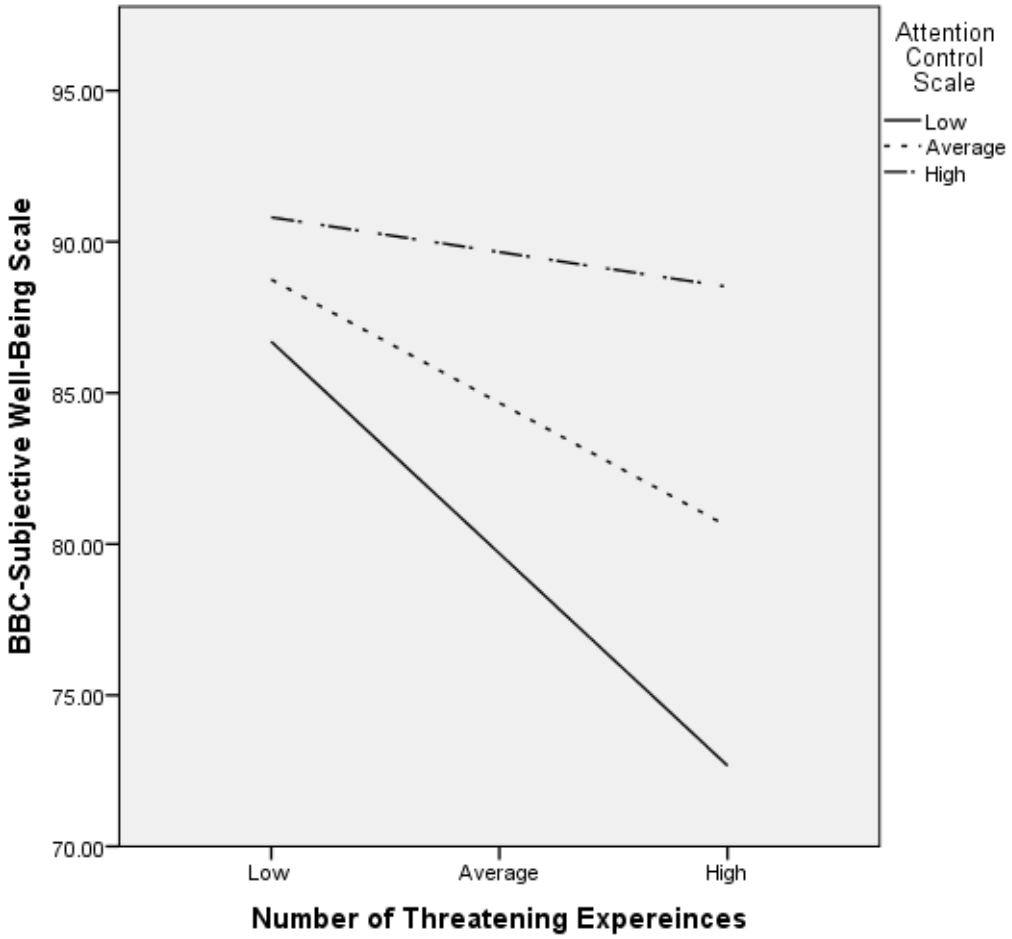


Figure 2: A line graph showing simple slopes of the number of threatening experiences related to SWB for one standard deviation below the mean of AC (Low), the mean of AC (Average), and one standard deviation above the mean of AC (High).

Discussion

The aims of this study were to investigate whether, in a population of medical students, threatening experiences significantly reduced subjective well-being (SWB), whether perseverative negative thinking (PNT) mediated the effects of threatening experiences on SWB, and finally whether attention control (AC) moderated the effects of threatening experiences on SWB. This is important for understanding the factors influencing the processes by which threatening experiences reduce SWB in this population.

Testing Hypothesis 1, a significant negative correlation was found between the number of threatening experiences and SWB. This finding is consistent with previous research (19, 27, 28).

For Hypothesis 2, PNT was found partially to mediate the relationship between threatening experiences and SWB. Therefore this indicates that a proportion of the effect that threatening experiences appear to have on SWB is due to PNT. Threatening experiences may cause an increase in PNT, and it could be that PNT itself causes a reduction in SWB. However, this is a partial mediation, since PNT does not account for all of the reduction in SWB. Threatening experiences may well also reduce SWB in ways that are not explained by the increase in PNT (28).

For Hypothesis 3, AC was found to significantly moderate the relationship between threatening experiences and SWB. This result indicates that different levels of AC change the nature of the relationship between threatening experiences and SWB. Students with low to medium AC were less able to maintain their SWB as the number of threatening experiences increased. However, students with high AC were able to maintain their SWB even when the recorded number of threatening experiences increased. Thus interventions designed specifically at increasing students' ability to control their attention may assist their ability to preserve their SWB, even when faced with a combination of threatening life events and academic stressors. Further, the moderating role of AC may explain the success of several different therapeutic approaches which incorporate some element of attention training either explicitly, such as in Meta Cognitive Therapy (30), or embedded in mindfulness meditation practices, e.g. Acceptance and Commitment Therapy (31), and Mindfulness Based Cognitive Therapy (32).

The findings of this study do not diminish the importance and impact that threatening experiences have on SWB. Instead, they suggest that developing interventions that focus on the two cognitive processes under investigation, PNT and AC, may have the potential to help medical students preserve their SWB when faced with threatening experiences. Further research will be needed, since this current study was a cross-sectional correlational design, so inferring direction of causality between the variables is not possible.

Another important finding of this study is the high number of threatening experiences reported by the cohort of medical students over the three month period prior to taking part. 20% of students reported no threatening experiences, but 70% of the students reported experiencing 1-5 threatening experiences, and 10% reported between 6-11 threatening experiences in the last 3 months. This replicates previous reports that during medical training students experience a large number of non-academic stressors. These findings support the need for interventions designed to equip students with skills to mediate the effects of threatening experiences on their SWB. If such interventions are shown to be effective, the benefits may be highly valuable to their academic success and patient care.

Strength and limitations

One limitation of this research is that it is based on cross-sectional data, so it is difficult to state direction of causality. Although Hayes (46) argues that with the correct caveats mediation and moderation analysis can be used to imply direction of causality due to the statistical modelling used, since the primary data were cross-sectional, the researcher would not be confident in stating direction of causality unless it was followed up with longitudinal data in an experimental design.

Although the study used questionnaires that have good psychometric properties of reliability and validity, they remain subjective measures of people's perceived abilities in these areas. Future research could repeat this study using other measures of AC such as computer based attention tasks that actively test participants' attention capabilities.

An additional potential limitation is the lack of screening questionnaires for common mental health problems (e.g. depression or anxiety). As this study did not include measures of depression and anxiety it was not able to control for them in the analysis. It is possible that, even in this non-clinical population, some participants might have scored highly on measures of depression or anxiety which in

turn might have impacted on the effects of PNT or AC in the relationship between threatening experiences and SWB, this could question the legitimacy of the study's findings. It would be interesting for future studies to include disorder specific measures to investigate this hypothesis further. However, these measures were not included in this study as they may have primed medical students to view the study in terms of pathology and thereby affected how they rated their AC, PNT, or SWB.

This study employed opportunistic sampling, in which medical students received an email invitation to participate in the study. There may be characteristics of the types of medical students who would respond to this sort of invitation, which are not held by the general medical student population. In addition to this 107 (72%) females and only 41 (28%) males completed the study. Therefore the findings may not be generalizable to the medical student population as a whole. Another possible confounding variable may be that the email invitation indicated that the study was about how students manage their SWB when responding to stressful life events. Therefore students who have recently gone through stressful life events, and potentially struggled to maintain their SWB, may have been more inclined to participate in the study, potentially creating a biased sample. The reverse may also be true, with students avoiding taking part in a study which might remind them of stressful events. However, as the number of stressful life events reported by the students was so high, this is less likely.

The study offered participants the chance to win either a £50 or £100 Amazon voucher for their participation, and 13% of the students identified, later in the study, that they had a major financial crisis in the last three months. There is a chance that this incentive may have prompted their participation. Amazon vouchers can be used to buy a range of items including essentials such as food and clothing.

Another potential limitation of the research is that 86% of the participants were aged between 18-23 years old. Therefore the findings of this data might not apply to postgraduate medical students. Future research could look at a sample of only postgraduate medical students to examine if the trends shown here are also present in that population.

In this study, 70% of the students reported experiencing 1-5 threatening experiences in the three month period prior to recruitment. Thus in addition to the academic stressors identified in the introduction, medical students also encounter a large number of personal threatening experiences. More research is required to investigate the potentially destabilising effects of threatening life experiences in combination with medical training. In this study threatening experiences were combined and an aggregate was used. However, it is reasonable to expect that not all threatening experiences are equal in their effects on SWB. Future research might investigate further the relationships identified in this study by looking at specific threatening experiences. For example, does PNT have the same relationship to all threatening experiences, or only specific ones? Does the combination of certain threatening experiences – such as the death of a close relative or friend, with academic stressors – have differential effects or are they the same? Could interventions be devised to aid specific combinations of threatening experiences?

This study examined AC under the premise that it was a trait variable that was consistent over time. It then investigated if AC moderated the relationship between threatening experiences and SWB. However, it could be argued that AC is a state variable, and if so it is feasible that SWB might moderate the relationship between threatening experiences and AC.

A possible next step would be to further investigate the relationships shown in this study using a longitudinal design. Such a study could investigate if the effects shown here persist over time whilst measuring if AC is an unchanging trait or a changing state variable.

As described in the introduction, the SWB of medical students is important both to their academic success and to patient care. A large number of stressors both personal and professional are placed on medical students. This study indicates that two cognitive processes may play a role in the effects of threatening experiences on SWB. It is in the interests of medical educational providers to investigate further, with a potential view to developing specific interventions to equip medical students right from the beginning of their training with strategies to help reduce the amount they engage in PNT and to help improve their AC. This may not require the creation of new interventions, but instead shed light on how some interventions such as mindfulness based interventions (MBI) work. Further research could examine whether MBI training courses such as Mindfulness Based

Cognitive Therapy improve people's attention control and give them strategies to reduce their perseverative negative thinking.

Conclusions

The findings of this study suggest firstly that threatening experiences are related to subjective well-being. Secondly, the effect of threatening experiences on subjective well-being is partially mediated by perseverative negative thinking. This implies that the effects of threatening experiences on SWB could potentially be reduced by reducing perseverative negative thinking and increasing attention control. It is in the best interests of medical students and patient care to further this research by investigating whether interventions designed to reduce perseverative negative thinking and increase attention control can reduce the deterioration of subjective well-being from threatening experiences.

The findings of this research also have potential implications for other students especially those in the healthcare professions, including clinical psychology, in which patient care may be affected by the SWB of the professional. Threatening experiences are a common occurrence, and understanding aspects of the underlying mechanisms by which they impact SWB is important for both clinical and non-clinical samples. SWB has been linked to stress and other risk factors for pathology. It is therefore relevant for clinical psychologists to consider SWB as an aspect of current functioning and response to treatment.

Further research could investigate if interventions that specifically target PNT and AC are effective. This could be done by developing new approaches or looking at specific elements of existing approaches that may affect these processes such as mindfulness based interventions.

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Appendices

Appendix A

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Cite references in the text by name and year in parentheses. Some examples:

- Negotiation research spans many disciplines (Thompson 1990).
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Abou-Allaban, Y., Dell, M. L., Greenberg, W., Lomax, J., Peteet, J., Torres, M., & Cowell, V. (2006). Religious/spiritual commitments and psychiatric practice. Resource document. American Psychiatric Association. http://www.psych.org/edu/other_res/lib_archives/archives/200604.pdf. Accessed 25 June 2007.

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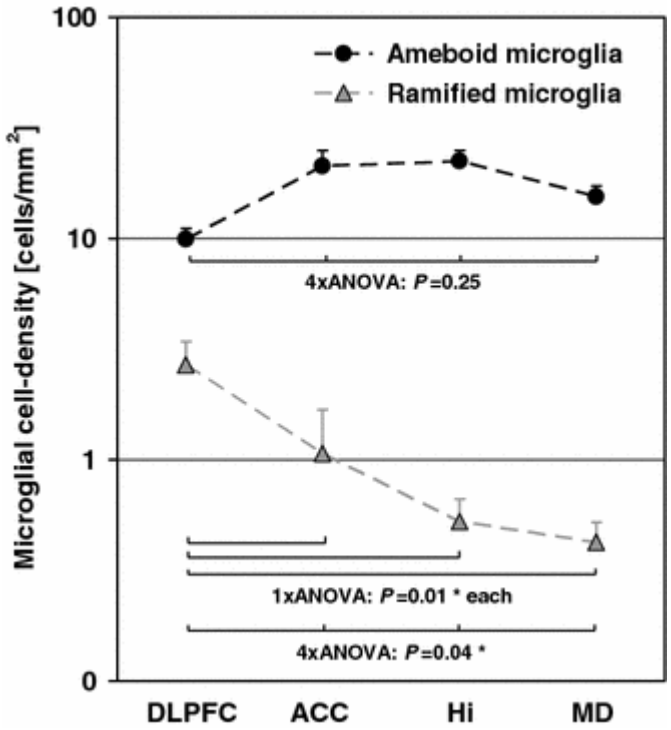
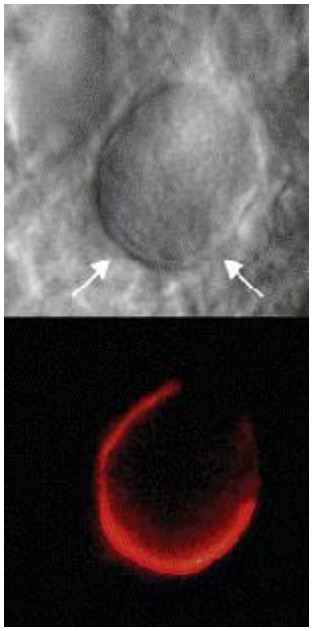


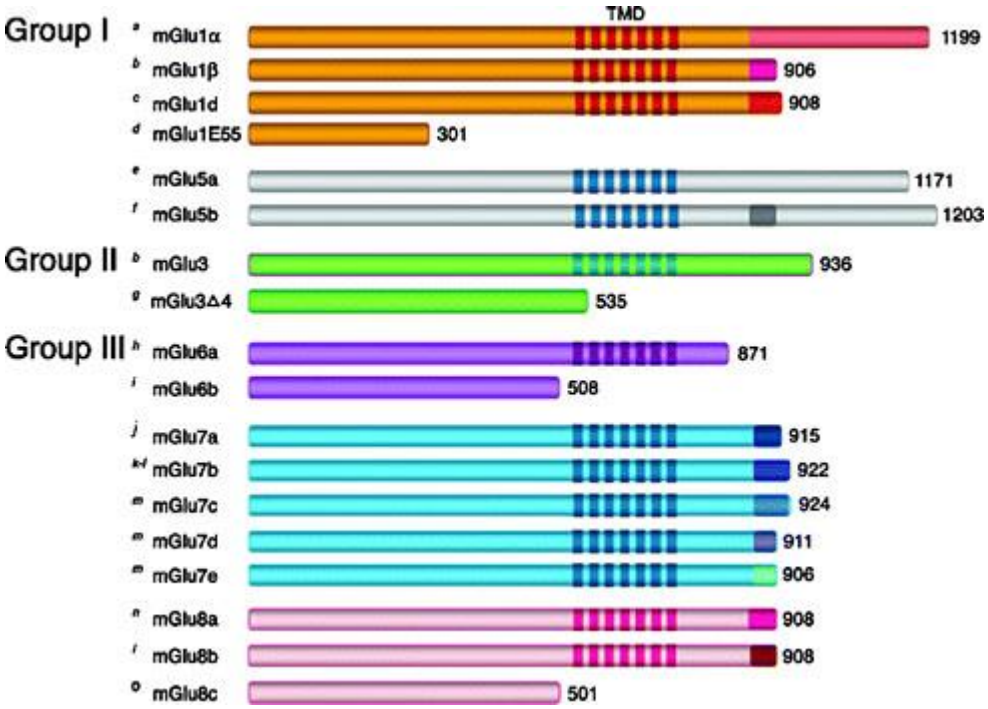
- Definition: Black and white graphic with no shading.
- Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.
- All lines should be at least 0.1 mm (0.3 pt) wide.
- Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.
- Vector graphics containing fonts must have the fonts embedded in the files.

Halftone Art



- Definition: Photographs, drawings, or paintings with fine shading, etc.
- If any magnification is used in the photographs, indicate this by using scale bars within the figures themselves.
- Halftones should have a minimum resolution of 300 dpi.

Combination Art



- Definition: a combination of halftone and line art, e.g., halftones containing line drawing, extensive lettering, color diagrams, etc.
- Combination artwork should have a minimum resolution of 600 dpi.

Color Art

- Color art is free of charge for online publication.
- If black and white will be shown in the print version, make sure that the main information will still be visible. Many colors are not distinguishable from one another when converted to black and white. A simple way to check this is to make a xerographic copy to see if the necessary distinctions between the different colors are still apparent.
- If the figures will be printed in black and white, do not refer to color in the captions.
- Color illustrations should be submitted as RGB (8 bits per channel).

Figure Lettering

- To add lettering, it is best to use Helvetica or Arial (sans serif fonts).
- Keep lettering consistently sized throughout your final-sized artwork, usually about 2–3 mm (8–12 pt).
- Variance of type size within an illustration should be minimal, e.g., do not use 8-pt type on an axis and 20-pt type for the axis label.
- Avoid effects such as shading, outline letters, etc.
- Do not include titles or captions within your illustrations.

Figure Numbering

- All figures are to be numbered using Arabic numerals.
- Figures should always be cited in text in consecutive numerical order.
- Figure parts should be denoted by lowercase letters (a, b, c, etc.).
- If an appendix appears in your article and it contains one or more figures, continue the consecutive numbering of the main text. Do not number the appendix figures,
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- Each figure should have a concise caption describing accurately what the figure depicts. Include the captions in the text file of the manuscript, not in the figure file.

- Figure captions begin with the term Fig. in bold type, followed by the figure number, also in bold type.
- No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the caption.
- Identify all elements found in the figure in the figure caption; and use boxes, circles, etc., as coordinate points in graphs.
- Identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption.

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- Any figure lettering has a contrast ratio of at least 4.5:1

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- Supported file formats: avi, wmv, mp4, mov, m2p, mp2, mpg, mpeg, flv, mxf, mts, m4v, 3gp

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- Name the files consecutively, e.g. “ESM_3.mpg”, “ESM_4.pdf”.

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  - English language tutorial
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- Disclosure of potential conflicts of interest
- Research involving Human Participants and/or Animals
- Informed consent

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When reporting studies that involve human participants, authors should include a statement that the studies have been approved by the appropriate institutional and/or national research ethics committee and have been performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.
If doubt exists whether the research was conducted in accordance with the 1964 Helsinki Declaration or comparable standards, the authors must explain the reasons for their approach, and demonstrate that the independent ethics committee or institutional review board explicitly approved the doubtful aspects of the study.
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"This article does not contain any studies with animals performed by any of the authors."
"This article does not contain any studies with human participants or animals performed by any of the authors."

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All individuals have individual rights that are not to be infringed. Individual participants in studies have, for example, the right to decide what happens to the (identifiable) personal data gathered, to what they have said during a study or an interview, as well as to any photograph that was taken. Hence it is important that all participants gave their informed consent in writing prior to inclusion in the study. Identifying details (names, dates of birth, identity numbers and other information)

of the participants that were studied should not be published in written descriptions, photographs, and genetic profiles unless the information is essential for scientific purposes and the participant (or parent or guardian if the participant is incapable) gave written informed consent for publication. Complete anonymity is difficult to achieve in some cases, and informed consent should be obtained if there is any doubt. For example, masking the eye region in photographs of participants is inadequate protection of anonymity. If identifying characteristics are altered to protect anonymity, such as in genetic profiles, authors should provide assurance that alterations do not distort scientific meaning.
The following statement should be included:
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If identifying information about participants is available in the article, the following statement should be included:
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Appendix B

Teaching and Learning in medicine

Instructions for authors

Thank you for choosing to submit your paper to us. These instructions will ensure we have everything required so your paper can move through peer review, production and publication smoothly. Please take the time to read and follow them as closely as possible, as doing so will ensure your paper matches the journal's requirements. For general guidance on the publication process at Taylor & Francis please visit our Author Services website.

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Aims and Scope

Teaching and Learning in Medicine (TLM) is an international forum for scholarship on teaching and learning in the health professions. Its international scope reflects the common challenge faced by all medical educators: fostering the development of capable, well-rounded, and continuous learners prepared to practice in a complex, high-stakes, and ever-changing clinical environment. TLM's contributors and readership comprise behavioral scientists and health care practitioners, signaling the value of integrating diverse perspectives into a comprehensive understanding of learning and performance. The journal seeks to provide the theoretical foundations and practical analysis needed for effective educational decision making in such areas as admissions, instructional design and delivery, performance assessment, remediation, technology-assisted instruction, diversity management, and faculty development, among others.TLM's scope includes all levels of medical education, from premedical to postgraduate and continuing medical education, with articles published in the following categories:

Groundwork. Medical education scholars are increasingly recognizing the centrality of context to all aspects of teaching and learning. Groundwork articles examine in-depth a particular phenomenon so as to advance understanding of the systematic nature of practice and its development. These articles may feature ethnographic studies, inter-disciplinary literature reviews, work analyses, and incident investigations, among other approaches.

Validation. Valid assessment of the constructs employed in educational research is critical to ensuring a sound evidence base for theory development and practical decision making. Validation articles demonstrate how a given assessment approach accurately and adequately represents the construct of interest or explore how contextual factors influence the meaning of assessment data. These articles may feature psychometric analyses, latent variable modeling, and multi-trait-multi-method studies as well as emerging approaches to validation and experimental or quasi-experimental studies.

Investigations. Studies that formally test theoretical explanations of learning provide an important foundation for the design of curriculum and instruction. Investigations articles extend learning theory by revealing causal relationships and specifying how/when they hold. These articles may feature laboratory experiments, quasi-experiments, covariance modeling, and meta-analysis, among other approaches.

Educational Case Reports . The practitioner's personal experience with teaching and learning can provide valuable information about the context to which some researchers expect their findings to apply. Educational Case Reports present detailed reflections on educational interventions, including novel approaches to instruction, assessment, and admissions/selection. These articles document in-depth what was tried, why, and under what conditions and present a process and outcome analysis of lessons learned. Taken together, Educational Case Reports should reveal trends in educational need and everyday factors that influence what and how health professionals learn.

Observations. Medical education is a broad-ranging field that benefits from the diverse perspectives brought by people drawn to teaching and learning for different reasons and from different backgrounds. Observations articles raise awareness of an issue not yet addressed in medical education and identify a specific need for further investigation or intervention. These issues are national or international in scope, and argumentation is supported by multiple sources of evidence, such as a literature review and multi-institutional or national-level surveys.

Manuscript Submission

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TLM's final acceptance rate is approximately 10%. Manuscripts are first reviewed by the editors to determine prioritization for peer review. Approximately 30% of new submissions are sent out to review. To increase the likelihood that a manuscript will be prioritized for review, authors must compose manuscripts using the content and formatting guidelines provided in these instructions. Manuscripts not submitted in conformance with these guidelines will be returned without review.

Maximum target length for manuscripts, excluding references, appendices, and table/figure captions, is 5,000 words.

All parts of the manuscript should be typewritten, double-spaced, with margins of at least one inch on all sides. All paragraphs should be indented. All pages should be numbered consecutively throughout the manuscript. Authors should supply a shortened version of the title suitable for the running head, not exceeding 50 character spaces.

The manuscript should be written in clear English. TLM readers benefit greatly from the insights gained by scholars worldwide, but language barriers can make readability difficult and prevent prioritization for review. Native English speaker review and critique of manuscripts written by non-native English speakers is strongly encouraged.

Abstract

Manuscripts should include an abstract with a maximum of 300 words without references or abbreviations, using the formats presented below. The body of the manuscript need not conform to the structure of the abstract.

Groundwork

Phenomenon (Briefly state the phenomenon that was studied in depth)

Approach (Briefly describe the investigatory approach)

Findings (Briefly state the findings of the investigation)

Insights (Briefly present the new insights about the phenomenon gained by the present investigation)

Validation

Construct (Briefly state the construct assessed by the instrument(s) being validated)

Background (Briefly summarize the previous attempts to assess the construct of interest and the new validity evidence needed)

Approach (Briefly present the validation approach employed in the present study)

Results (Briefly state the findings of the investigation)

Conclusions (Briefly describe the new validity evidence provided by the present investigation)

Investigations

Theory (Briefly summarize the theory tested in the present investigation)

Hypotheses (Briefly state the hypotheses that extend from the theory being tested)

Method (Briefly present the method used to test the hypotheses)

Results (Briefly state the findings of the investigation)

Conclusions (Briefly describe the new theoretical understanding enabled by the present investigation)

Educational Case Reports

Problem (Briefly state the practical learning or performance gap addressed by the intervention)

Intervention (Briefly describe the intervention, specifying why it addresses the practical problem)

Context (Briefly summarize the context in which the intervention was implemented)

Outcome (Briefly describe what happened to educational process and outcomes when the intervention was implemented)

Lessons Learned (Briefly summarize the lessons learned the other educators can use when attempting to address a similar practical problem)

Observations

Issue (Briefly state the issue identified on the present observation)

Evidence (Briefly summarize the evidence that the issue exists and is important)

Implications (Briefly present the implications of this evidence for further investigation or intervention)

Statistical Reporting

The reporting of results from all statistical testing must conform to American Psychological Association (APA) formatting requirements.

References

Identify references cited within the text by superscripted numerals in the order in which they appear. If the reference numbers appear next to punctuation marks, do not separate the text from punctuation mark with the reference number. References should be listed at the end of the manuscript using the following publication style:

1. Journal Article: Whitehorse E. The teaching of complementary and alternative medicine in physician assistant education: Results from a nationa l survey. Current Surgery 1999;8:132–4.

2. Book: Smith D. The reflective practitioner. 5th ed. London: Temple Smith, 1983. (or for year put “In press.”)

3. Website: Residents' Teaching Skill. Available at: http://www.resideteach.com. Accessed July 17, 2007.

4. Article in Edited Volume: Cohen J, Grath PL. The t test. In K Smith (Ed.), Statistical analysis for the sciences (2nd ed., pp. 20–7). Hillsdale, NJ: Erlbaum, 1988.

5. Paper Presentation: Braveman P, Cubbin C, Marchi KS. A wide approach. Paper presented at: The 130th Annual Meeting of the American Health Association; November 9-13, 2002; Philadelphia, PA.

6. Conference Proceedings: Harnden P, Joffe JK, Jones WG, eds. Germ Cell Tumours V. Proceedings of the 5th Germ Cell Tumour Conference; September 13-15, 2001; Leeds, UK. New York, NY: Springer; 2002.

7. Newspaper Article: Gottlieb M. A free-for-all in swapping Medicaid. New York Times. October 2, 1995:A1, A4. OR Markoff J. Voluntary rules proposed. New York Times. June 5, 1996. http://www.nytimes.com/library/cyber/yo5dat.html. Accessed April 1, 1998.

8. Online Journal: Taylor BN. Use of the International System of Units. 1995 ed. Gaithersburg, MD: National Institute of Standards and Technology; April 1995. NIST Special Publication 811. http://physics.nist.gov/Document/ sp811.pdf. Accessed June 25, 2003.

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Asterisks should be used within the text for footnotes.

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These should not be embedded in the text, but should be included as separate pages. A short descriptive title should appear above each table with a clear legend and any footnotes suitably identified below. All units must be included. Figures should be completely labeled, taking into account necessary size reduction. Captions should be typed, double-spaced, on a separate page.

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D.Clin.Psychology Programme

Division of Clinical Psychology

Whelan Building, Quadrangle

Brownlow Hill

LIVERPOOL

L69 3GB

James Le Couteur
Trainee Clinical Psychologist
Doctorate of Clinical Psychology Programme
University of Liverpool
L69 3GB

24/06/2015

Dear *James,*

RE: 'The relationship between threatening experiences and subjective well-being: The mediating role of perseverative negative thinking and the moderation role of attention control in a sample of healthcare students'

Thank you for our response to the reviewers' comments of your research proposal submitted to the Chair of the D.Clin.Psychol. Research Review Committee (*dated 09/05/2015*).

I can now confirm that your amended proposal (*dated 09/05/2015*) meet the requirements of the committee and have been approved by the Committee Chair.

Please take this Chairs Action decision as ***final*** approval from the committee.

You may now progress to the next stages of your research.

I wish you well with your research project.

Dr Peter Taylor
Vice-Chair D.Clin.Psychol. Research Review Committee

Appendix D: Consent form

CONSENT FORM

Title of Project: Investigating how students on healthcare professional training programmes respond to stressful life events

Names of Researchers: James Le Couteur (Trainee Clinical Psychologist), Dr. Pierce O'Carroll (Senior Clinical Psychologist) and Prof Peter Kinderman (Professor of Clinical Psychology and Head of the Institute of Psychology, Health and Society)

	Please tick box
1. I confirm that I have read and understood the information sheet dated..... (version.....) for the above study.	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time	☐
3. I agree to take part in the above study.	☐

Appendix E: **Participant**  **Information Sheet**

Title of Study: Investigating how students on healthcare professional training programmes respond to stressful life events

You are being invited to take part in an online research study. Before you decide whether you would like to take part or not, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear, or if you would like more information. Thank you for reading this.

What is the study for?

This research will investigate how negative life events can affect the well-being of healthcare students. Research has indicated that negative life events (e.g. serious illness, or financial crisis) reduce people's well-being. We want to understand more about what influences this relationship. We will use this research to help us to improve the care and support that we give to healthcare students.

Who is doing the study and who has approved it?

The study is being carried out by a team from the University of Liverpool. It has been approved by the University of Liverpool's Research Ethics Committee.

Why have I been chosen to take part?

You have been chosen because you are an undergraduate healthcare student, studying at University of Liverpool.

Am I eligible to take part?

We are inviting individuals who are currently studying an undergraduate healthcare subject at University of Liverpool. Furthermore, for ethical reasons we can only invite individuals who are aged 18 years or over to take part.

Do I have to take part in the study?

No. It is up to you to decide whether or not to take part. If you decide to take part then we will ask you to sign a consent form. However, you are still free to stop at any time without giving a reason. Incomplete data sets will be deleted from the study.

What will taking part involve?

If you want to take part then we will firstly ask you to complete an online consent form. This is to confirm that you are fully informed about the study. You will then be asked to complete a set of short online questionnaires. We estimate that these should take no longer than 15 minutes to complete in a single sitting. You are required to complete the questionnaires in one sitting. At the end of the study, you will be given the option to enter your email address, should you wish to be entered into a prize draw to win either 1st prize of a £100 Amazon voucher or 2nd prize of a £50 Amazon voucher. Email addresses for the prize draw are kept separate to other data collected. Once the study closes, the draw will take place and you will be informed by email if you have won a prize.

Will there be benefits to taking part?

There are no specific benefits from taking part, besides the chance to win an Amazon voucher. However, by taking part you will help us to further improve care and support for healthcare students.

What are the possible disadvantages of taking part?

The questionnaires will take time to complete (usually about 15 minutes). They might involve answering questions about things that are upsetting to you. For example, you will be asked about the presence or absence of negative life events in the last three months. If you feel you would like additional support we would advise you to contact Student Support Services, and their contact information will be given at the end of the study. However, you are free to discontinue with the study at any time.

What will happen if I want to stop taking part?

You can stop at any time. Should you wish to do this, simply close the internet browser and your data will be deleted from the study.

What if I am unhappy or there is a problem?

If you wish to complain or have any concerns about any aspect of this study, you can contact the Principle Investigator Dr. Pierce O'Carroll (ocarroll@liverpool.ac.uk). Alternatively, you can contact the Research Governance Officer (0151 794 8290 or ethics@liv.ac.uk). All this information will be provided again at the end of the study. When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

Will my participation in this study be kept confidential?

Yes it will. Questionnaire data is anonymous. Any information which identifies you (for example, your email address, should you wish to be entered into the prize draw) will be stored separately from questionnaire data. The data will only be viewed by the researchers involved in the study. All information collected for this study will be kept safely and securely on a University of Liverpool password-protected computer for 10 years. It will be kept in a central file store in line with University of Liverpool policy for the storage of research data.

What will happen to the results of this study?

The results will form part of a Doctorate thesis in Clinical Psychology and will be written-up for publication in academic journals.

Who can I contact for further information?

James Le Couteur (Trainee Clinical Psychologist) E: J.Le-Couteur@liverpool.ac.uk

Thank you for taking the time to read this.

James Le Couteur, Trainee Clinical Psychologist, University of Liverpool

Professor Peter Kinderman, Professor of Clinical Psychology and Head of the Institute of Psychology, Health and Society, University of Liverpool

Dr Pierce O'Carroll, Lecturer, University of Liverpool

Appendix F: Participant debrief form

PARTICIPANT DEBRIEF SHEET

Investigating how students on healthcare professional training programmes respond to stressful life events

Thank you for taking part, your participation is greatly appreciated. The study aimed to look at the role of forms of repetitive thinking (e.g. worry and rumination) and our ability to control our attention, when we are confronted with stressful life events. Studies have shown that training and increased awareness of repetitive thinking and attention control can strengthen our resource to cope with life stressors. The data gathered from this study will help to clarify this further.

Sometimes people may find being reminded of recent stressful life events concerning. If you found that you became upset or distressed by these memories and you would like to discuss your concerns confidentially with someone, please contact one of the following sources of support within the University:

University counselling

http://www.liv.ac.uk/studentsupport/counselling/

GP student health

http://www.liv.ac.uk/study/undergraduate/about-us/campus/health/

Psychological Support Services for Student Practitioners

http://www.liverpool.ac.uk/learning-and-teaching/psssp/

Contact details of the lead researcher:

Mr James Le Couteur
Trainee Clinical Psychologist
Doctorate of Clinical Psychology Programme
University of Liverpool
Email: J.Le-Couteur@liverpool.ac.uk

If you wish to complain or have any concerns about any aspect of the way you have been treated during this study, you can approach the study Principle Investigator Dr Pierce O'Carroll (0151 794 5535 or ocarroll@liverpool.ac.uk). Alternatively, you can contact the Research Governance Officer (0151 794 8290 or ethics@liv.ac.uk).

When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

Appendix G: Study measures

The Modified BBC Subjective SWB Scale (BBC-SWB)

The Modified BBC Subjective SWB Scale (BBC-SWB) (Pontin et al., 2013) is a 24-item self-report measure used to assess an individual's appraisal of their own SWB. Participants rate each item on a 5-point Likert scale (ranging from 1 = 'a little' to 5 = 'extremely') resulting in total scores ranging from 24 to 120. Item 4 must initially be reverse scored by subtracting its value from six, then all the items can be added together to produce a total score, with higher scores indicating a higher degree of subjective SWB. The 24 items are listed below.

V1. Are you happy with your physical health?
V2. Are you happy with the quality of your sleep?
V3. Are you happy with your ability to perform daily living activities?
V4. Do you feel depressed or anxious?
V5. Do you feel able to enjoy life?
V6. Do you feel you have a purpose in life?
V7. Do you feel optimistic about the future?
V8. Do you feel in control of your life?
V9. Do you feel happy with yourself as a person?
V10. Are you happy with your looks and appearance?
V11. Do you feel able to live your life the way you want?
V12. Are you confident in your own opinions and beliefs?
V13. Do you feel able to do the things you choose to do?
V14. Do you feel able to grow and develop as a person?
V15. Are you happy with yourself and your achievements?
V16. Are you happy with your personal and family life?
V17. Are you happy with your friendships and personal relationships?
V18. Are you comfortable about way you relate and connect with others?
V19. Are you happy with your sex life?
V20. Are you able to ask someone for help with a problem?
V21. Are you happy that you have enough money to meet your needs?
V22.Are you happy with your opportunity for exercise/leisure?
V23. Are you happy with access to health services?
V24. Are you happy with your ability to work?
Note. Variable 4 was reverse scored. All items rated on a 5-point scale,
1 = never to 5 = almost always.

The Perseverative Thinking Questionnaire (PTQ)

The Perseverative Thinking Questionnaire (Ehring et al., 2011) is a 15-item self-report measure used to assess repetitive negative thinking. Each item is rated on a 5-point Likert scale (ranging from 0 = 'never' to 4 = 'almost always'), resulting in total scores ranging from 0 to 60, with higher scores indicating a higher degree of repetitive negative thinking. The 15 items are listed below.

1. The same thoughts keep going through my mind again and again.
2. Thoughts intrude into my mind.
3. I can't stop dwelling on them.
4. I think about many problems without solving any of them.
5. I can't do anything else while thinking about my problems.
6. My thoughts repeat themselves.
7. Thoughts come to my mind without me wanting them to.
8. I get stuck on certain issues and can't move on.
9. I keep asking myself questions without finding an answer.
10. My thoughts prevent me from focusing on other things.
11. I keep thinking about the same issue all the time.
12. Thoughts just pop into my mind.
13. I feel driven to continue dwelling on the same issue.
14. My thoughts are not much help to me.
15. My thoughts take up all my attention.

The Attention Control Scale (ACS)

The Attention Control Scale (Derryberry & Reed, 2002) is a 20-item self-report measure used to assess participants' perceived ability to control their attention. Participants rate the 20 items on a 4-point Likert scale (ranging from 1 = 'almost never' to 4 = 'always') resulting in total scores ranging from 20 to 80. Eleven items (1, 2, 3, 6, 7, 8, 11, 12, 15, 16, and 20) need to be reversed scored meaning that higher scores indicate a higher degree of attentional control. The 20 items are listed below.

1. It's very hard for me to concentrate on a difficult task when there are noises around.
2. When I need to concentrate and solve a problem, I have trouble focusing my attention.
3. When I am working hard on something, I still get distracted by events around me.
4. My concentration is good even if there is music in the room around me.
5. When concentrating, I can focus my attention so that I become unaware of what's going on in the room around me.
6. When I am reading or studying, I am easily distracted if there are people talking in the same room.
7. When trying to focus my attention on something, I have difficulty blocking out distracting thoughts.
8. I have a hard time concentrating when I'm excited about something.
9. When concentrating I ignore feelings of hunger or thirst.
10. I can quickly switch from one task to another.
11. It takes me a while to get really involved in a new task.
12. It is difficult for me to coordinate my attention between the listening and writing required when taking notes during lectures.
13. I can become interested in a new topic very quickly when I need to.
14. It is easy for me to read or write while I'm also talking on the phone.
15. I have trouble carrying on two conversations at once.
16. I have a hard time coming up with new ideas quickly.

17. After being interrupted or distracted, I can easily shift my attention back to what I was doing before.
18. When a distracting thought comes to mind, it is easy for me to shift my attention away from it.
19. It is easy for me to alternate between two different tasks.
20. It is hard for me to break from one way of thinking about something and look at it from another point of view.

The List of Threatening Experiences Scale (LTE)

The List of Threatening Experiences Scale (LTE; (Brugha & Cragg, 1990) in its original form had 12 items assessing the presence or absence of particular threatening experiences e.g. "have you suffered a serious illness, injury or assault?" The original scale was developed for use with a general population. The scale has been modified for this study to reflect the target population, i.e. students, e.g. the item referring to "becoming unemployed" has been changed to "suspending studies". Also, three items have been added to reflect common negative life events reported by students, e.g. unplanned pregnancy, serious discrimination or abuse, and major accommodation problems. Participants respond 'yes' or 'no' to events that have occurred over the past three months. This time frame has been shown to be the amount of time that TE impact SWB (Suh et al., 1996). Scores range from 0 to 15, with higher scores indicating a greater number of threatening life experiences. The 15 items are listed below.

	Yes	No
Have you suffered a serious illness, injury or an assault?		
Has a serious illness, injury or assault happened to a close relative?		
Has a parent, sibling, child or spouse died?		
Has a close family friend or another relative (aunt, cousin, grandparent) died?		
Have you had a break-up in a steady relationship?		
Have you had a serious problem with a close friend, neighbour or relative?		
Have unforeseen events interrupted your attendance at university for more than three weeks?		
Have you had major financial crisis?		
Have you had problems with the police, a court appearance or with the border agency?		
Have you had something you valued lost or stolen?		
Have you or your partner had an unplanned pregnancy?		
Have you suffered serious discrimination, prejudice or stigmatisation?		
Have you had accommodation problems, e.g. noise, conflict with landlord or housemates?		
Have you had times when you have been unable to afford essential items, e.g. food, travel?		

Demographic

The following demographic information will be gathered: age, gender, year of study, study programme, origin status (i.e. UK, EU or International student).

Appendix H: Participant recruitment advertisement

Medical Students Participants Wanted: October 2015!

We are conducting a study looking at how students on healthcare professional training programmes manage aspects of their well-being when responding to stressful life events.

We would be grateful if you could spare 15 minutes of your time to complete an anonymous online questionnaire. On completion you can choose to be entered into a prize draw with the chance at ***winning either a £100 or a £50 Amazon*** *voucher.*

To take part you must be;

- **An Undergraduate healthcare student studying at the University of Liverpool**
- **Aged 18 years or older**
- **Have access to a computer.**

If you have any questions regarding the study then please feel free to contact the researcher;

James Le Couteur at J.Le-Couteur@liverpool.ac.uk

If you are interested then please follow the link below to complete the survey.

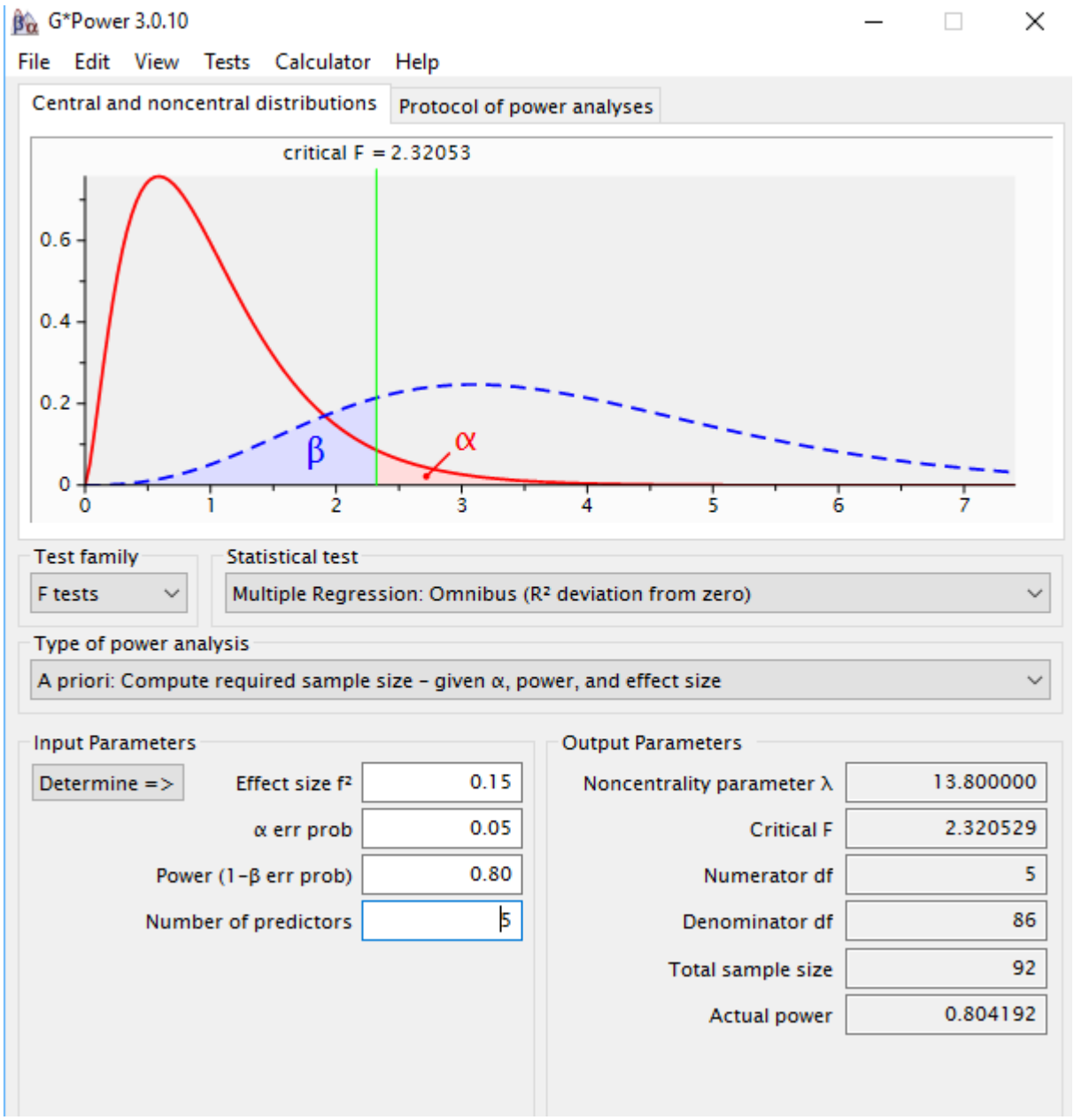
Appendix I: Participant Thank you form

THANK YOU!

We really appreciate the time and effort that you have put into participating in this study. If you would like to be entered into the prize draw to win either a £100 or £50 Amazon voucher, then please enter your email address into the box below. Entry is not mandatory, so if you do not wish to be entered into the draw then please leave this box blank.

The draw will take place once the study has closed, and you will be informed whether you have been successful via the email address above.

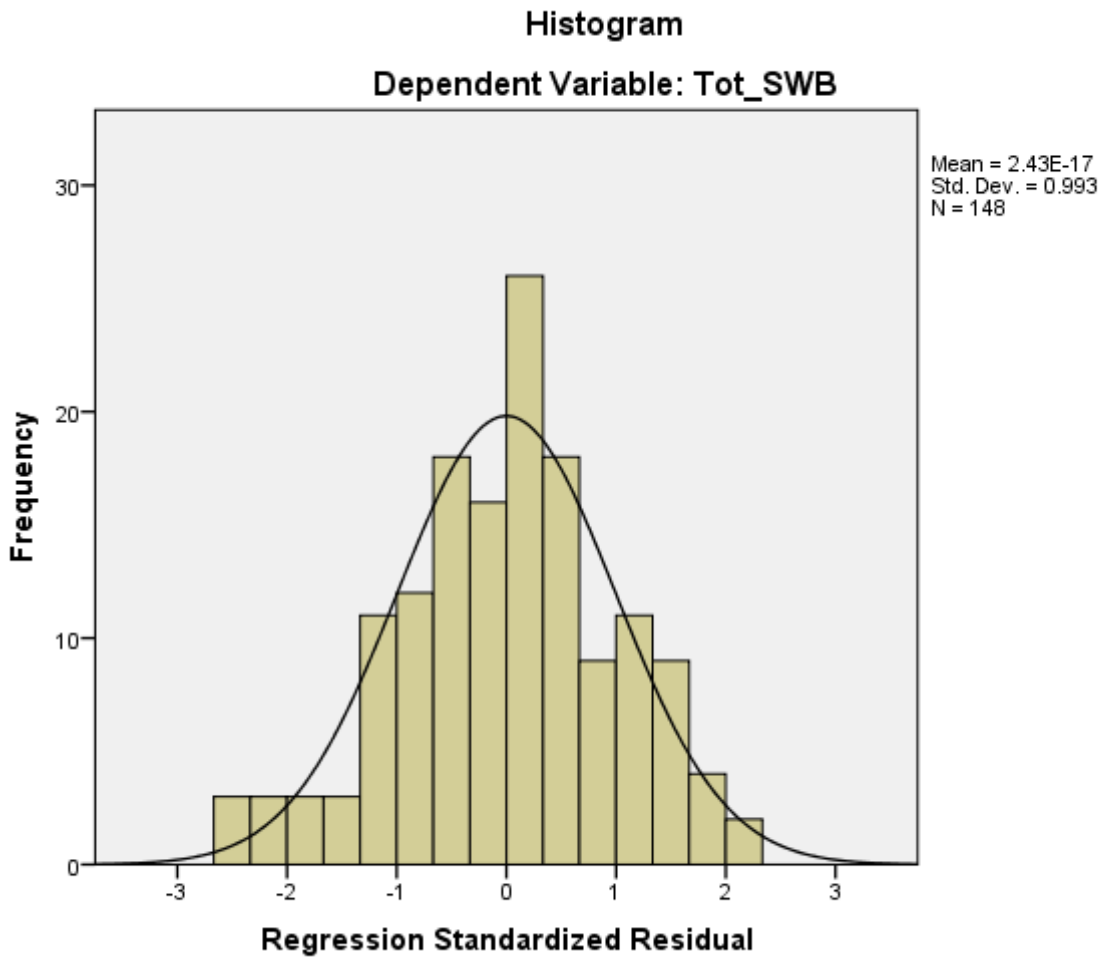
Appendix J: G*Power calculation

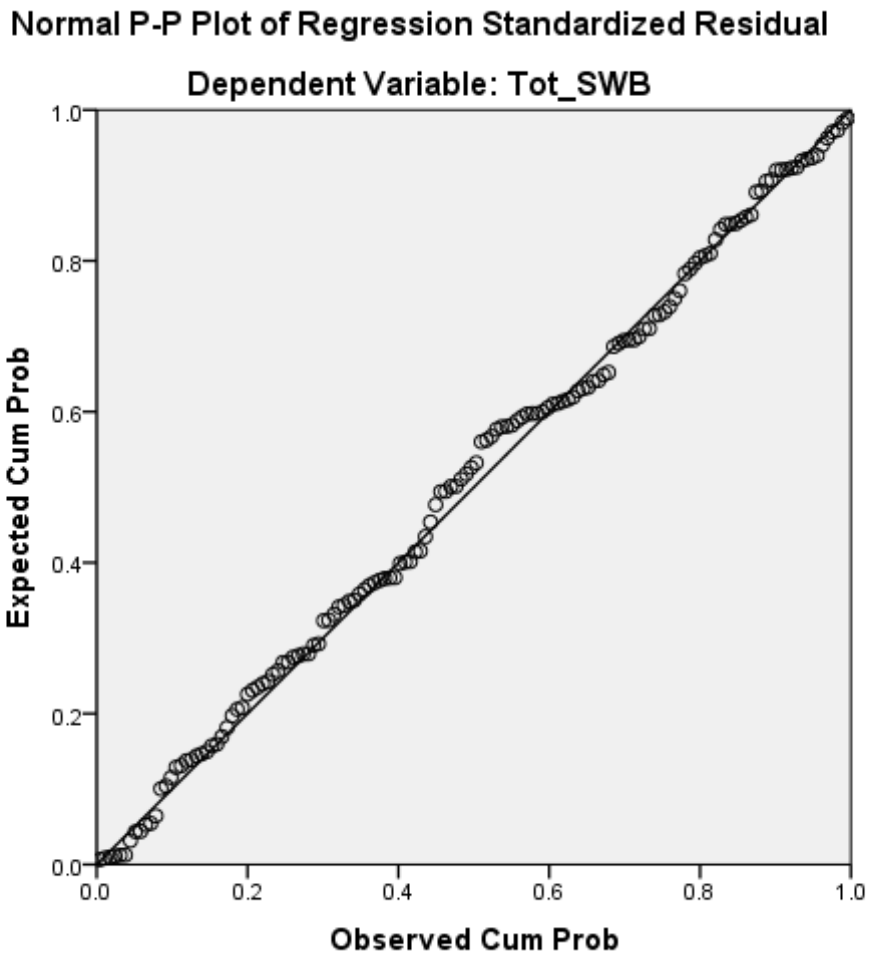


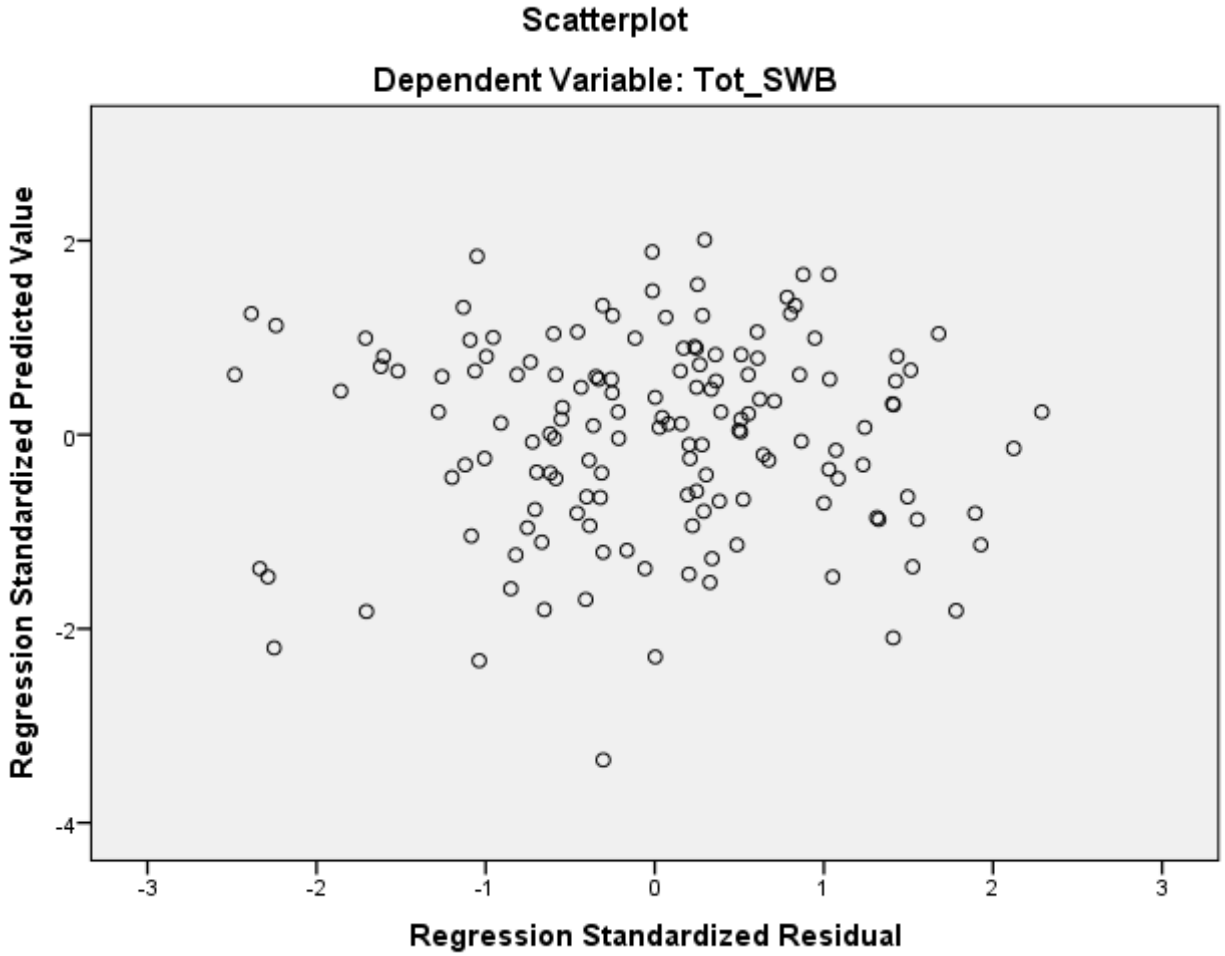
Appendix K: Frequency table and charts showing homogeneity of variance

Statistics

		Tot_SWB	Tot_ACS	Tot_LTE
N	Valid	148	148	148
	Missing	0	0	0
Mean		84.09	49.81	2.66
Median		85.00	50.00	2.00
Std. Deviation		15.071	8.113	2.296
Variance		227.147	65.814	5.273
Range		78	43	11
Minimum		38	27	0
Maximum		116	70	11


Histogram
Dependent Variable: Tot_SWB
Mean = 2.43E-17
Std. Dev. = 0.993
N = 148
Frequency
30
20
10
0
-3
-2
-1
0
1
2
3
Regression Standardized Residual


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Tot_SWB
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: Tot_SWB
Regression Standardized Predicted Value
2
0
-2
-4
-3
-2
-1
0
1
2
3
Regression Standardized Residual

Appendix L: Mediation total and indirect effects output

```
************************** TOTAL EFFECT MODEL ****************************
Outcome: Tot_SWB Y

Model Summary
  R       R-sq        MSE          F         df1         df2          p
.3659      .1339   198.0904    22.5628     1.0000   146.0000      .0000

Model
             coeff         se          t          p       LLCI       ULCI
constant   90.4873     1.7747    50.9865     .0000    86.9798    93.9947
Tot_LTE_X  -2.4013      .5055    -4.7500     .0000    -3.4004    -1.4022

****************** TOTAL, DIRECT, AND INDIRECT EFFECTS ********************

Total effect of X on Y
     Effect         SE          t          p       LLCI       ULCI
    -2.4013      .5055    -4.7500     .0000    -3.4004    -1.4022

Direct effect of X on Y
     Effect         SE          t          p       LLCI       ULCI
    -1.8001      .4412    -4.0798     .0001    -2.6722     -.9281

Indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
Tot_PTQ     -.6012      .2934    -1.2171     -.0676

Partially standardized indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
Tot_PTQ     -.0399      .0184     -.0757     -.0042

Completely standardized indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
Tot_PTQ     -.0916      .0435     -.1778     -.0108

Ratio of indirect to total effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
Tot_PTQ      .2504      .1056      .0504      .4739

Ratio of indirect to direct effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
Tot_PTQ      .3340      .2079      .0531      .9007

R-squared mediation effect size (R-sq_med)
            Effect    Boot SE   BootLLCI   BootULCI
Tot_PTQ      .0612      .0365      .0052      .1445

Preacher and Kelley (2011) Kappa-squared
            Effect    Boot SE   BootLLCI   BootULCI
Tot_PTQ      .0987      .0462      .0143      .1915

Normal theory tests for indirect effect
     Effect         se          Z          p
     -.6012      .2774    -2.1671     .0302
```

Appendix M: Moderation total output with conditional effects

```
**************************************************************************
Outcome: Tot_SWB

Model Summary
R       R-sq        MSE          F         df1         df2          p
.5093      .2594   168.5245    12.1546     3.0000   143.0000      .0000

Model
              coeff (b)     se          t          p       LLCI       ULCI
constant     84.6735   (a) 1.0913    77.5900      .0000    82.5164    86.8307
Tot_ACS        .6181       .1394     4.4350      .0000      .3426      .8935
Tot_LTE      -1.8570       .5591    -3.3215      .0011    -2.9621     -.7518
int_1          .1653       .0776     2.1286      .0350      .0118      .3187

Product terms key:

 int_1    Tot_LTE      X     Tot_ACS

R-square increase due to interaction(s):
R2-chng          F        df1        df2          p
int_1     .0322     4.5311     1.0000   143.0000      .0350

**************************************************************************

Conditional effect of X on Y at values of the moderator(s):
Tot_ACS     Effect       se          t          p       LLCI       ULCI
-8.0705    -3.1907      .8568    -3.7239      .0003    -4.8843    -1.4970
(50).0000  -1.8570      .5591    -3.3215      .0011    -2.9621     -.7518
8.0705      -.5232      .8223     -.6363      .5256    -2.1487     1.1022

Values for quantitative moderators are the mean and plus/minus one SD from
mean.
Values for dichotomous moderators are the two values of the moderator.

********************** JOHNSON-NEYMAN TECHNIQUE ***************************

Moderator value(s) defining Johnson-Neyman significance region(s)
      Value    % below    % above
     3.8040    66.6667    33.3333

Conditional effect of X on Y at values of the moderator (M)
Tot_ACS     Effect         se          t          p       LLCI       ULCI
-22.8980    -5.6410     1.8855    -2.9919      .0033    -9.3680    -1.9141
```

```
**************************************************************************

Data for visualizing conditional effect of X on Y
Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/Tot_LTE Tot_ACS Tot_SWB.
BEGIN DATA.

LTE               AC          SWB

    -2.1976    -8.0705    86.6973
      .0000    -8.0705    79.6854
     2.1976    -8.0705    72.6735
    -2.1976      .0000    88.7544
      .0000      .0000    84.6735
     2.1976      .0000    80.5926
    -2.1976     8.0705    90.8115
      .0000     8.0705    89.6616
     2.1976     8.0705    88.5117

END DATA.
GRAPH/SCATTERPLOT=Tot_LTE WITH Tot_SWB BY Tot_ACS.
```