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Reduction of test anxiety by short, ad hoc use of a mindfulness based mobile app.

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March 2016 (2030922)
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ABSTRACT

This study explored the use of a mindfulness intervention, delivered on an ad hoc basis via an online mobile application to reduce test anxiety in university students. First, the relationship between scores on self-report scales for Test Anxiety and Mindfulness was measured. Findings revealed a significant negative correlation between scores on the Westside Test Anxiety Scale and on the Five Faceted Mindfulness Questionnaire. A small group of students (N=9) then took part in a brief mindfulness intervention, completed over ten days in the lead up to an examination period, which was delivered via a mobile application. Students who took part in the mindfulness intervention had significantly lower Test anxiety scores following the intervention, while no reduction in test anxiety was observed in the control group. This is the first study to explore the effectiveness of the ad hoc use of a mindfulness based mobile app in reducing Test anxiety among a student population, which appears to be a popular new direction of mindfulness delivery and practice. Despite some methodological limitations, the findings of the study suggest that ad hoc use of mindfulness based mobile apps may be an effective tool for reducing test anxiety among university students.

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INTRODUCTION

Tests and exams are an essential part of most people's lives, particularly in higher education and can lead to significant stress and anxiety among students. Test anxiety can be described as a significantly unpleasant experience of worry and emotionality during situations where an individual feels he or she is being assessed. Test anxiety is an important factor which has been shown to reduce psychological wellbeing as well as seriously hinder student's academic achievement. The present study aims to explore the potential use of a mindfulness intervention, delivered in an ad hoc basis, via an online mobile application, in reducing test anxiety among university students.

TEST ANXIETY

Early research indicated that test anxiety was a singular attribute, which could be measured with uni-dimensional scales (Sarason, 1961). However since the early 1970s there has been a general consensus that test anxiety (TA) is a bi-dimensional construct, consisting of the components worry and emotionality (Liebert and Morris, 1967). Worry, sometimes referred to as 'cognitive test anxiety', is the cognitive reaction or internal dialogue in the lead up to, during and after evaluative situations (Cassady 2001). Individuals who have high levels of cognitive TA often report thoughts of comparing self-performance to peers, worries over the consequences of failure, loss of self-esteem and self-worth, low levels of confidence in their own abilities as well as excessive worry over evaluation (Deffenbacher, 1980; Depreeuw, 1984; Hembree, 1988) Emotionality, refers to the physiological responses associated with TA. Physiological manifestations include increased galvanic skin response and heart rate, dizziness, nausea, or feelings of panic (Cassady 2001; Deffenbacher 1980; Hembree 1988). However Schwarzer (1984) reported that the emotionality component of test anxiety refers not to the physiological arousal itself but rather the individual's subjective interpretation of internal events. This was after finding that the subjective arousal of individuals with high test anxiety only moderately correlated with objective arousal.

The predominant view of the relationship between these two components of test anxiety is that the cognitive component directly impacts performance in evaluative situations (Williams, 1991; Bandalos, Yates, & Thorndike-Christ, 1995; Cassady & Johnson 2002), while the emotionality component is related but does not directly influence test performance (Hembree, 1988). Cassady and Johnson's (2002) research found that students with high, medium and low cognitive TA differed considerably in their performance on subject examinations and the SAT. Students with high test anxiety scores were consistently and significantly outperformed by students with low test anxiety, therefore revealing a clear disadvantage on high stakes testing for these students. Importantly, differences in SAT scores may hamper attempts made by students with high levels of test anxiety from getting in to colleges and university courses, putting these students at a distinct disadvantage. In addition to correlational studies, experimental data by Kurosawa & Harackiewicz (1995) demonstrated that experimental manipulation of evaluative stress caused high test anxious students to make more performance errors than those students with low TA. In the absence of evaluative stress, there were no differences in performance between the students. Therefore, researchers concluded that during times of evaluative stress, cognitive test anxiety was the causal determinant of poor performance.

The traditional interpretation of the relationship between test anxiety and exam performance is Sarason's (1984) cognitive interference model, which suggests that poor performance is due to students being unable to retrieve previously learned information during the evaluative situation, due to intruding thoughts. These interfering thoughts include fears about failure, self-critical thoughts and comparing self to peers which leads to retrieval failure during the assessment due to an overabundance of cues available at the time of taking the test (Schwarzer and Jerusalem's 1992). However, this conceptualization of test anxiety can be said to be over simplistic, failing to take into consideration the effect of interfering thoughts in the preparation and lead up to an examination. Naveh-Benjamin (1991) found that students with high levels of test anxiety experienced problems at all levels of information processing, that is encoding, storage and retrieval. Therefore, the earlier practice of focusing only on the evaluative situation can be said to be unnecessarily restrictive, and the model has been extended to include these different stages, and has been termed the information processing model of test anxiety (Naveh-Benjamin, MsKeachie, Lin and Holinger 1981).

The information processing model, is thought to be the most comprehensive and widely accepted theoretical model for understanding test anxiety and its relation to exam performance. However, it does not address the self-critical thought patterns which interfere with information retrieval. The importance of self-criticism in the development and maintenance of test anxiety was first described by Sarason (1984, 1986). Self-criticism can be described as scrutiny and censorship of personal behaviors, thoughts and emotions. There can be said to be two different types of self-criticism, these are compared self-criticism (comparing self to others) and internalized self-criticism, which involved comparing oneself to a personal set of expectations. Criticism then arises when there is a gap between the individual's perception of reality and their own expectations (Cunha and Paiva 2012). In their study of high school students, Cunha and Paiva (2012) showed that test anxiety was highly correlated with self-criticism. Furthermore, high test anxious students had higher feelings of inadequacy, feelings of self-disgust and a lower capacity for self-acceptance and self-compassion. Researchers have also looked at the influence of self-expectations and self-efficacy on test anxiety. Self-efficacy can be described as an individual's belief about their ability to perform on a certain task and reach specific goals (Bandura 1994). Preiss et al (2006) found a negative correlation between test anxiety and self-efficacy. Cassady (2004) also found that individuals with high test anxiety reported higher levels of helplessness over test performance than low TA students. This low level of self-efficacy among students with high TA is associated with learned helplessness, failure avoidance and low personal goal setting. Therefore, these students are less likely to find coping strategies for their anxiety which reinforces the cycle of low self-expectations, high levels of cognitive test anxiety and poor performance on tests. Therefore, it is clear that self-efficacy and learned helplessness plays an important part in the self-critical thinking of students with high levels of test anxiety. The role of both self-esteem and self-criticism in the development and persistence of test anxiety is vital to our understanding of this concept and should be considered when thinking about possible intervention strategies.

There have been a range of different therapeutic procedures employed in the attempt to treat test anxiety. One of the most commonly used behavioral techniques for reducing exam anxiety is systematic desensitization (SD) , which is made up of two components. First, the student is taught relaxation techniques, once learned it is hoped that the individual will be able to use these techniques to remain calm when in an anxiety provoking environment, in this case a testing situation. Students are then exposed to different aspects of the situation which evoke anxiety, for example

imagine walking in to an exam hall, then as anxiety arouses, practice using these relaxation techniques. This is repeated until the individual is able to imagine the testing situation with considerably reduced amount of anxiety. Katahn, Strenger, and Cherry (1966) found that test anxious students who took part in a systematic SD intervention showed significant drop in levels of test anxiety and an increase in GPA, compared with controls. In a meta-analysis, Hembree (1988) found that SD and cognitive-behavioral techniques such as cognitive modification, attentional training and insight therapy were shown to significantly reduce TA across a number of studies. While group counselling to cope with worry, and study skills training appeared to have no effect on reducing exam anxiety. Therefore, there appears to be some success of interventions aimed to reduce test anxiety.

MINDFULNESS

In the last couple of decades there has been a surge of interest in mindfulness, both as a psychological construct as well as a clinical intervention (Keng, Smoski & Robins 2011). Mindfulness can be defined as the intentional, accepting and non-judgmental focus of one's attention on the emotions, thoughts and sensations occurring in the present moment (Kabat-Zinn, 2003). The ability to direct one's attention in this way is often practiced through mindfulness meditation. Mindfulness meditation finds its roots in ancient spiritual traditions, primarily Buddhism, and is a tradition which is over 2550 years old. Mindfulness has been both theoretically and empirically associated with wellbeing, and despite its ancient roots, the application of mindfulness to Western psychology and mental health is a fairly recent phenomenon. The essential elements of mindfulness are awareness of one's moment-to-moment experience, nonjudgmentally and with acceptance (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). It is these elements of mindfulness that have been thought to be potentially effective tools to treat psychological distress, such as anxiety, stress and depression. Mindfulness has been cultivated to prevent maladaptive tendencies to avoid, suppress, or over-engage with distressing thoughts and emotions (Hayes & Feldman, 2004). Research has shown positive correlations between self reported mindfulness and psychological health (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Brown & Ryan, 2003; Chadwick et al., 2008).

Since the 1970s, clinical psychology has developed therapeutic applications based on mindfulness. The most frequently cited method of mindfulness training is the mindfulness-based stress reduction (MBSR) (Kabat-Zinn 1982), and is often used by the NHS for the treatment of depression and anxiety. MBSR is a structured group programme of mindfulness, consisting of an eight weekly sessions where participants learn mindfulness techniques such as the body scan and take part in group meditations. Reibel et al, (2001) found that hospital patients who had taken part in an eight week MBSR course experienced a decrease in levels of depression and anxiety. Mindfulness-based Cognitive therapy (MBCT) developed by Teasdale, Segal, and Williams (1995), is based laregely on Kabat-Zinn's MBSR. Teasdale et al proposed that the skills of attentional control taught in mindfulness meditation could be helpful in preventing relapse of major depression. Incorporating elements of cognitive therapy, patients are taught to observe their thoughts and feelings without judgment and to view them as events that will come and go, rather than something which is part of themselves. Teasdale et al (2000) found that for patients with 3 or more previous episodes of depression, MBCT significantly reduced risk of relapse.

Researchers such as Kabat-Zinn, have attempted to explain the mechanisms of mindfulness skills and how they may lead to both reductions in symptoms and changes in behavior (Baer 2003). One of these mechanisms is cognitive change, Linehan (1993) describes how observation of anxiety related thoughts and feelings may lead to the understanding that they are only thoughts, and are not always reflection of reality and therefore do not need to be escaped or avoided. For example having the thought "I am a failure" does not make it true. Mindfulness training also promotes self-management and coping skills. Awareness of cognitive and emotional events as they occur, encouraged by mindfulness training can help individuals to recognise early signs of a problem, such as signs of a depressive relapse. Mindfulness training, therefore can allow recognition of early signs of a problem, at a time where previously learned coping strategies can be effective in managing this (Teasdale et al. 1995). Finally, mindfulness training teaches acceptance, in this context acceptance can be described as "experiencing events fully and without defense, as they are". Baer et al (2003) describe an individual who suffers from panic attacks, who may engage in various maladaptive behaviors in order to prevent future panic attacks, for example drug and alcohol abuse, avoidance of stressors. If instead the individual were to accept that panic attacks are time restricted, unpleasant experiences which can be tolerated, and not dangerous experiences to be avoided, this would prevent the individual from engaging in such avoidance maladaptive behavior.

Although mindfulness finds its origin in ancient Buddhist traditions, Western researchers who have introduced mindfulness practice into mental health treatment programs teach these skills independently from the religion and culture of its origin. (Kabat-Zinn, 1982). Despite beginning as a spiritual practice, this can be said to have changed in the last forty years, with mindfulness being used in a variety of different context, from mental health to the work place. This can be said to reflect mindfulness as a flexible tradition, one which is able reimagine itself every time it meets a new culture. It can be observed that mindfulness is changing, as it adapts in response to things it has never encountered, such as western psychology and technology (Gunatillake 2016). An example of this is what has been termed 'mobile mindfulness'. This is the increase in Mindfulness-based mobile apps as an alternative delivery medium for mindfulness training. The delivery of mindfulness through mobile apps can be said to address two major issues. The first is that the worldwide prevalence and burden of mental health issues is substantial, and being able to provide services and support to the many millions of people in needs remains a challenge for Governments across the globe. Mobile health is a new emerging field which utilizes technology such as smartphones to enhance and monitor physical and psychological health (Free et al 2013). As demonstrated in the research mindfulness can be an effective tool for improving psychological well-being and the use of mobile apps as a mindfulness delivery medium can help mindfulness to reach a wider audience. The second issue, is what Gunatillake (2016) describes as the 'digital problem', explaining how mindfulness and technology are often presented as being in opposition to each other, though he argues this need not be the case. Smartphone use is growing rapidly and smartphones now account for 25% of total Web usage, Mackay (2014) reported that 88% of survey respondents used the internet or applications on their smartphones. Devices are checked on average every 6.5 minutes and people spend most of their time using applications (Khalaf, 2013). In our fast paced modern world, where our lives are fundamentally dependent on technology, Gunatilllake argues that when it comes to our wellbeing we cannot simply dismiss all things digital. The delivery of mindfulness training through mobile apps allows mindfulness to evolve in order to 'fit' with the demands

of modern life in the west. Mobile mindfulness embraces the importance of technology in our lives and allows mindfulness meditation to become a mobile activity, in our busy, technology driven lives.

Vilardaga and Boudreaux (2015) conducted a systematic review of mindfulness-based iPhone mobile apps and evaluated their quality using the Mobile Application Rating Scale (MARS). Only 4% of the 700 apps identified in the researchers search provided mindfulness training and education. The 23 mindfulness apps reviewed in this study had a median objective quality MARS score of 3.2, authors concluded that theses apps had an overall acceptable level of quality. The highest quality apps were aesthetically pleasing and included mindfulness education as well as guided meditations. The Headspace app was shown to have the highest average MAR score (4.0). Howells, Ivtzan , and Eiroa-Orosa (2014) explored the effectiveness of the 'Headspace' mindfulness app to a group of 'happiness seekers'. Their results revealed that use of this mindfulness application led to significant gains in positive affect and reduced depressive symptoms, no such gains were observed in the control condition. Therefore, the very few limited studies on mindfulness based mobile applications suggest that this is an acceptable and innovative method of delivering mindfulness to a wider audience, and may lead to marked improvements in wellbeing. Far more research is needed concerning the effectiveness of such mindfulness based mobile apps.

THE RELATIONSHIP BETWEEN MINDFULNESS AND TEST ANXIETY

In reviewing the important mechanisms of mindfulness training as well as the benefits of Mindfulness based interventions it can be understood why researchers in recent years have taken an interest in the possible cultivation of mindfulness in helping students with TA. Cunha and Paiva (2012) research explored the extent to which individuals with high TA were distinguished from those students with low TA in terms of self-criticism, acceptance and mindfulness skills. Their results revealed that students with high TA had significantly higher levels of negative self-criticism as well as significantly lower values of acceptance and mindfulness. Therefore researchers concluded that high levels of self-critical thoughts paired with low levels of acceptance and mindfulness skills have an important role in the development and maintenance of TA. Moreover, these findings would imply that mindfulness based interventions could be cultivated to help students with test anxiety identify and have an increased awareness of thoughts of self-criticism, and to accept these thoughts without judgment. It may be suggested that acknowledgement of negative, self-critical thoughts such "I am not smart enough to pass this exam" with non-judgmental acceptance may work to prevent the negative spiral of intrusive self-critical thoughts which maintain and exacerbate TA. This then in turn could help to improve both psychological wellbeing and test performance in highly test anxious students.

In recent years there has been a handful of research which has looked at the use of mindfulness interventions on TA. Niss (2012) explored the effectiveness of a brief Mindfulness Intervention on Maths Test Anxiety and Exam Scores in a High School Population. Participants took part in a brief guided meditation directly before sitting their math exam. Participants intervention showed significant reductions in anxiety, as well as improvements in exam scores from before to after the intervention. Carsley, Heath & Fajnerova (2015) explored the Effectiveness of a classroom mindfulness colouring activity for test anxiety in primary school aged children. Mindfulness colouring pairs the physical and creative manipulation of materials of art making with the benefits of mindfulness meditation (Curry & Kasser 2005). Researchers allocated students to either a structured mindfulness colouring condition, or free colouring

condition. Test anxiety scores were measured before and immediately after the administering of a spelling test. Results showed an overall reduction in anxiety for both groups, with no significant effect of the mindfulness colouring. Therefore, it can be seen that findings of the effectiveness of mindfulness techniques on reducing test anxiety are somewhat mixed, though this may partly be due to the use of different method of mindfulness delivery and the population studied.

CURRENT STUDY

Despite some initial mixed findings, it seems appropriate to suggest that mindfulness skills, which involve moment to moment awareness and non judgmental acceptance of inner thoughts and experiences, may be cultivated to help reduce the cognitive symptoms of test anxiety, including self criticism, comparing self to peers and excessive worry over the consequences of failure. Therefore, this present study aims to first look at the relationship between mindfulness and test anxiety, and second explore the potential benefits of a short mindfulness intervention in reducing test anxiety. While the majority of the research on test anxiety addresses its effect on hindering academic performance, it is important to consider the consequences of test anxiety on psychological wellbeing. For example, high test anxious students at university who spend a lot of their time in a context of academic evaluation and regular testing, anxiety can seriously affect their wellbeing. Therefore, this study will focus on the use of mindfulness to reduce test anxiety among university students, not simply with a view to improving academic performance, but rather to enhance the psychological wellbeing of these students.

Cunha and Paiva (2012) research suggested that people with high levels of test anxiety had lower levels of acceptance and mindfulness skills as well and were more likely to engage in self criticism. The first part of the current study tested this link between mindfulness and test anxiety by having students to complete the Five Faceted Mindfulness Questionnaire and the Westside Test Anxiety scale in order to determine whether students who score High on test anxiety would score low on Mindfulness. It was hypothesized that there will be a negative correlation between test anxiety scores on the test anxiety scale and mindfulness scores on the five faceted mindfulness questionnaire (FFMQ).

The second part of this study involves a short mindfulness intervention, in order to observe effects of mindfulness in reducing TA among University students. A mindfulness based mobile application was chosen for the delivery of this mindfulness intervention. This is due to the overwhelming increase in smart phone usage, particularly among young people, and the suggestion than mobile technology may be a more accepted medium to improve the wellbeing of young people through the use of mindfulness based mobile applications (Christensen & Hickie 2010). Despite this there has been no research to date which examines the effectiveness of these mindfulness based mobile applications in reducing anxiety. From the rise in number of mindfulness based mobile apps available may suggest that the way in which people are practicing mindfulness is changing. This reflects the role of mindfulness as a flexible tradition, one which is able to adapt and re-imagine itself when faced with a new context. It can be said that the context which mindfulness finds itself in today is one which is centered around technology. We have observed mindfulness evolve from an ancient Buddhist tradition in the East to a clinical intervention in Western psychology, perhaps mindfulness is re defining itself once again to be used in a more flexible, ad hoc manner by non clinical populations, accessed through mobile technology. Previous research has been adopted a Kabat-Zinn (1990) medical model approach to

mindfulness interventions, whereby consistent formal practice is necessary to reap the benefits of mindfulness. Therefore, it could be argued that the literature has thus far ignored the emerging shift in how mindfulness is being practiced among clinical populations. This means that the current study will be the first to examine the effectiveness of such mindfulness based mobile apps used in an ad hoc basis, in this instance to reduce TA among university students.

The application chosen for this research was 'Headspace' which delivers simple mindfulness based daily activities. Headspace is based on empirical research and includes both mindfulness education as well as guided meditations. Vilardaga and Boudreaux (2015) review of mindfulness based apps found Headspace to be the highest quality app in their study. Participants were instructed to follow the daily mindfulness exercises featured in the 'Take ten' program for 10 minutes a day for ten days, during the revision period in the lead up and during the winter examination period. Headspace is an application which delivers simple daily activities based on mindfulness practice. It teaches beginners the basic concepts of mindfulness through simple guided meditations and content is supported by science. As participants completed one mindfulness session the next meditation track was unlocked, each session was a sitting meditation, consisted of focusing on the breath, a body scan (awareness of the body, focusing individually on each part as you move down the body) and encouraged listeners to acknowledge thoughts and emotions non-judgmentally, as they come and go. The application was brief with an easy to use interface and free to download.

Participants in this mindfulness intervention group completed the WTAS before taking part in the intervention. The WTAS was then again completed in the weeks following the exams. Scores were then compared with those of a control group. The two hypotheses are as follows;

- Follow up test anxiety scores for participants who took part in the mindfulness intervention will be significantly lower than for those who were in the control group.

- Participants in the intervention group will have higher test anxiety scores before the mindfulness intervention and lower test anxiety scores after the mindfulness intervention.

METHOD PART 1: THE RELATIONSHIP BETWEEN TEST ANXIETY AND MINDFULNESS

Hypothesis 1: There will be a negative correlation between test anxiety scores on the test anxiety scale and mindfulness scores on the five faceted mindfulness questionnaire (FFMQ).

A correlational study was conducted to observe the relationship associated with Test anxiety (WTAS) and self reported mindfulness (FFMQ).

PARTICIPANTS

Participants were recruited from three universities across Glasgow, via advertisements on social media. The study was advertised as researching Test anxiety and protective practices. 96 participants completed the initial survey (69 Females, 25 males and 2 other). The majority of the participants were in their final year of an undergraduate degree (N=34) the rest of the group was made up of 1st year (N= 15) , 2nd year (N=21) and 3rd year (N=23) students.

MEASURES

An initial questionnaire was issued to all participants taking part in the study. This questionnaire consisted of the Westside Test Anxiety Scale (WTAS), the five faceted mindfulness scale (FFMQ) and also additional questions which asked participants own experiences of text anxiety as well past experience of mindfulness. Selected demographic information was also collected.

FIVE FACETED MINDFULNESS QUESTIONAIRE

A questionnaire was completed by the participants. This consisted of the short form of the Five Faceted Mindfulness Questionnaire (FFMQ) (Appendix 1) (Bohlmeijer Klooster, Fledderus, Veehof and Baer, 2011) (The five facets of the questionnaire include:

- Non judging of inner experience,
- Non reactivity to inner experience
- acting with awareness
- observing
- describing

Non-judging of inner experience measures the individual's ability to accept their thoughts and feelings without placing judgment upon them. Non reactivity to inner experience refers to the ability to allow thoughts to enter the mind without acting upon them. Acting with awareness measures an individual's ability to be in the moment, and focusing on the present task. The observing dimension addresses and individual's ability to notice or acknowledge both internal and external feelings. Describing, measures an individual's ability to put into words, their thoughts and experiences.

The short form of the FFMQ consists of 24 items, compared with the original version with 39 items. This short form was chosen as it was thought to reduce participant lethargy from answering similar types of questions because many

of the items on the original FFMQ were repeated. Participants are given statements such as "I criticize myself for having irrational or inappropriate emotions" and are asked to rate how true each statement is to themselves. Each of the 24 items of the FFMQ is measured using a 5-point scale where:

1 = Never or very rarely true

2 = rarely true,

3= Sometimes true

4= often true,

5 = very often or always true.

Research had shown that the FFMQ is a reliable and valid measure to assess mindfulness (Baer, Smith, Lykins, Button, Krietemeyer &Sauer et al. 2008).All facets of the FFMQ demonstrated adequate internal consistency, ranging from .73 for non-reactivity to .91 for describing The facets were also moderately inter-correlated, suggesting that the facets measure related, but sufficiently distinct aspects of mindfulness, in order to be treated as separate dimensions (Williams, Dalgleish, Karl, & Kuyken 2014). In addition to the high reliability and validity of the FFMQ, this questionnaire was chosen as a measure of mindfulness because it allows researchers to identify not only if an individual is mindful of not, but also whether there may be a particular facet (eg. Non judging of inner experience) that they might score higher or lower on. This allows exploration of not only the relationship between average Test anxiety scores (TAS) and average Mindfulness scores (FFMQ), but also to explore whether participants who display high test anxiety may score low on a particular facet of the FFMQ.

WESTSIDE TEST ANXIETY SCALE

The second measurement used in the questionnaire was the Westside Test Anxiety Scale (WTAS) (appendix 2) developed by Driscoll (2007). The scale was constructed to measure anxiety impairments, with most items asking directly about performance impairment or about worrying, which interferes with concentration. The scale measures the cognitive component of test anxiety as this has shown to be most associated with declines in performance while symptoms of physiological stress are found to be relatively weak indicators of performance impairments (Deffenbacher, 1980; Cassady and Johnson, 2001). The Westside scale combines six items assessing impairment, four items on worry and dread, and no items on physiological over-arousal.

The scale measures 10 items on a five-point scale. Participants are asked to rate how true each statement is to themselves, using the five-point scale, where:

1= not at all or never true

2 = slightly or seldom true

3= moderately or sometimes true,

4 = highly or usually true

5 = extremely or always true.

Driscoll (2007) found Anxiety reduction benefits measured by the WTAS correlated .44 on average with test gains which is a solid validation coefficient. Therefore the WTAS was chosen, as it has been shown to be a reliable and valid measure of test-anxiety impairment and is brief, easily administered, and free of charge.

OTHER MEASURES

In addition to the two scales used to measure TA and Mindfulness, several other questions were asked, in order to gain a wider understanding of both the impact of test anxiety (Appendix 3) on students' lives as well as any previous experience with mindfulness. Examples of questions exploring lived experience of test anxiety include asking whether participants felt that anxiety around test taking impacted upon their exam performance, revision and/or their exam performance. Participants were also asked if they had taken steps to reduce test anxiety in the past and how effective they found these.

Previous experience of mindfulness (Appendix 4) was measured by asking participants whether they had ever used mindfulness training/meditation techniques before. Those who had were asked to rate which statement best reflected their experience with mindfulness ('I use mindfulness techniques when I feel I need them (e.g. when I am feeling anxious)').

PROCEDURE

Students were invited to take part in the study through social media. Participants first read though the purposes of the research and were asked to complete an electronic consent form (Appendix 5) before completing the survey. Students could withdraw consent and exit the survey at any point during the study, and this was made clear. Participants first completed the WTAS, followed by answering questions regarding their experience of TA. Next participants then completed the FFMQ , followed by questions exploring participants previous experience with Mindfulness. Demographic information including University, Year of study and gender were collected. Participants were then given access to a debriefing page (Appendix 6) which explained a bit about mindfulness and the study's aim to explore its relationship to test anxiety. Participants were then asked to indicate whether they would like to take part in a second follow up stage of the research. This included the option to take part in a short, online mindfulness intervention and/or willingness to complete a similar follow up questionnaire following the winter exam period. Participants were provided with a contact email and encouraged to ask any questions they may have about the research.

METHOD PART 2 – MINDFULNESS INTERVENTION

- ***Hypothesis 2: Follow up test anxiety scores for participants who took part in the mindfulness intervention will be significantly lower than for those who were in the control group.***
- ***Hypothesis 3: Participants in the intervention group will have higher test anxiety scores before the mindfulness intervention and lower test anxiety scores after the mindfulness intervention.***

DESIGN

This study used a between participants design was to test the second hypothesis, comparing mean follow-up TA scores in the control and intervention groups. A within subject's design was implemented to test the third hypothesis, which looked at test anxiety scores pre and post intervention.

PARTICIPANTS

MINDFULNESS INTERVENTION GROUP: Despite 54 participants initially indicating that they would like to be contacted with regards to taking part in the short mindfulness intervention, only 15 responded to the email invitation to take part. In the end only 9 participants completed the short mindfulness intervention. All of the participants in the intervention group were female and all were psychology students. Four of the participants were in their 4th year of their undergraduate degree, one was in 1st year, three were in 2nd year and one was in 3rd year. Six of the participants were identified as having "Very high test anxiety" at baseline. One participants was identified as having "High test anxiety" , one participant "High normal Test anxiety" and one further participant had "Comfortable low Test anxiety", as indicated on the WTAS.

CONTROL GROUP: Similarly, 72 participants indicated in the initial survey that they would be willing to complete a similar second questionnaire as part of follow up research. However, only 23 completed the follow up questionnaire, these participants made up the control group for this study. The group was made up of 17 females and 6 males. Students were from a variety of different schools across the three Universities (School of psychology = 11, School of arts = 3, School of life sciences = 3, School of Maths and Engineering =4 and The School of Social Science =3) The majority of students were in their 4th year of an undergraduate degree (N=13) the rest of the group was made up of 1st year (N=3), 2nd year (N=1), 3rd year (N=4) and 5th year (N=2) students. Three of the participants were identified as having "Extremely high test anxiety", six were identified as having "High Test anxiety" , two participants had "Moderately high Test anxiety" , five had "High normal Test anxiety" , three had "Normal Test anxiety" and four had "Low Test anxiety" as identified on the WTAS at baseline.

MATERIALS AND MESAURES

Participants in both the control and intervention group completed the initial questionnaire, described in the previous section, these were completed around one month before the winter exam period.

SHORT MINDFULNES INTERVENTION

Participants in the intervention group were directed to download the headspace application. Headspace is a popular digital welfare platform providing guided mindfulness meditations. Participants signed up to the ten-day free trial called 'take ten'. This consists of ten, 10 minute guided meditations, one to be completed each day in the lead up to the winter exams. The take ten programme teaches beginners the basic concepts of mindfulness through simple guided meditations. As participants complete one mindfulness session the next meditation track for the following day is unlocked. Each session was a sitting guided meditation which involved focusing on the breath and a body scan and encouraged listeners to acknowledge thoughts and emotions and to let these thoughts pass without judgment.

FOLLOW UP QUESTIONAIRES:

Both the control and intervention group were issued with a follow up questionnaire after the winter examination period.

INTERVENTION GROUP

The intervention group were issued with a follow up questionnaire (Appendix 7). This consisted of the WTAS, participants were asked to think back rate how true each statement was of them **during the recent winter exam period only.** Again this was done using the same 5 point Likert scale. Participants then were asked whether they felt anxiety around test taking impacted upon their performance, psychological wellbeing and/or revision during the recent winter exams. Finally, participants were asked questions regarding their thoughts on the mindfulness intervention and its impact upon any exam anxiety they experienced. These were five questions, where participants rated to the extent they agreed with each statement (e.g. I feel that the ten days of mindfulness meditation helped to reduce any exam anxiety I had during the December exams) where 1 = strongly disagree, 2 = disagree, 3 = Neither agree nor disagree 4 = agree and 5 = strongly agree.

CONTROL GROUP

Participants in the control group were also issued a follow up questionnaire after the winter examination diet. This consisted of the WTAS, again participants were asked to think back and rate how true each statement was of them **during the recent winter exam period only,** the same as the intervention group

PROCEDURE

Participants who completed the initial questionnaire, which included the FFMQ and the WTAS were then asked to indicate whether they would be happy to be contacted with regard to taking part in a short, online mindfulness training in the lead up to the forthcoming winter exam period and/or would they be happy to complete a follow up questionnaire after the examination period. Those who were interested were asked to provide their email address.

All participants who indicated that they would be willing to take part in the mindfulness intervention were sent an email inviting them to take part. The email outlined the purpose of the research; to see if a brief mindfulness intervention can reduce exam anxiety in university students. It was explained to participants that taking part in the intervention may reduce anxiety around test taking, but that there were no guarantees. Participants were asked to express any interest in taking part by replying to the researcher's email.

Due to limited interest, all participants who indicated they wanted to take part in the mindfulness training made up the intervention group. The control group was made up of participants who had expressed a willingness to complete a follow up questionnaire but not to take part in the mindfulness intervention.

In the days leading up to the revision period for the winter exams, participants in the intervention group were sent an email with a link to Headspace . Participants were advised that they could use Headspace on their smart phone or tablet via the Headspace app. Participants were instructed to set up an account by clicking the 'create free account' option on the homepage menu. Participants were then asked to enter their email and to create a password, once the account is set up participants have access to the 'take ten' free trial.

Take ten is made up of ten short guided meditations, it was explained to participants that these can be done at any time of the day, anywhere you like. Meditations can be done on the train, in the house or anywhere you feel most comfortable, but that a fairly quiet environment is usually best. Participants began their ten days of mindfulness on the first day of the 'revision period' which was around 5 days before the first exams. Researchers emailed participants once a day with a reminder to complete their mindfulness meditation for that day, if that had not already done so.

Follow up questionaries' were emailed to both the intervention group and the control group in the weeks following the winter examination period.

RESULTS SECTION

Hypothesis 1: There will be a negative correlation between test anxiety scores (TAS) on the Westside test anxiety scale (WTAS) and mindfulness scores on the five faceted mindfulness questionnaire (FFMQ).

A spearman's rho correlation was conducted on test anxiety scores (TAS) and mindfulness (FFMQ), this analysis was used due to the ordinal nature of the data. A significant negative relationship was found at the .01 level $r_s = -0.395$, n= 95, p =<0.01 .

Other significant relationships found include the 'non-judging of inner experience' subscale of the FFMQ, this was significant at the 0.01 level ($r_s = -.315$, n=95, $p<0.01$). The 'non-reactivity to inner experience' subscale was also significant at 0.01 level ($r_s = -0.323$, n=95, $p<0.01$). 'Acting with awareness 'was significant at 0.05 ($r_s = -0.224$, n=95, <0.05). No relationship was found between 'Observing' and 'Describing' subscales of the FFMQ and the TAS.

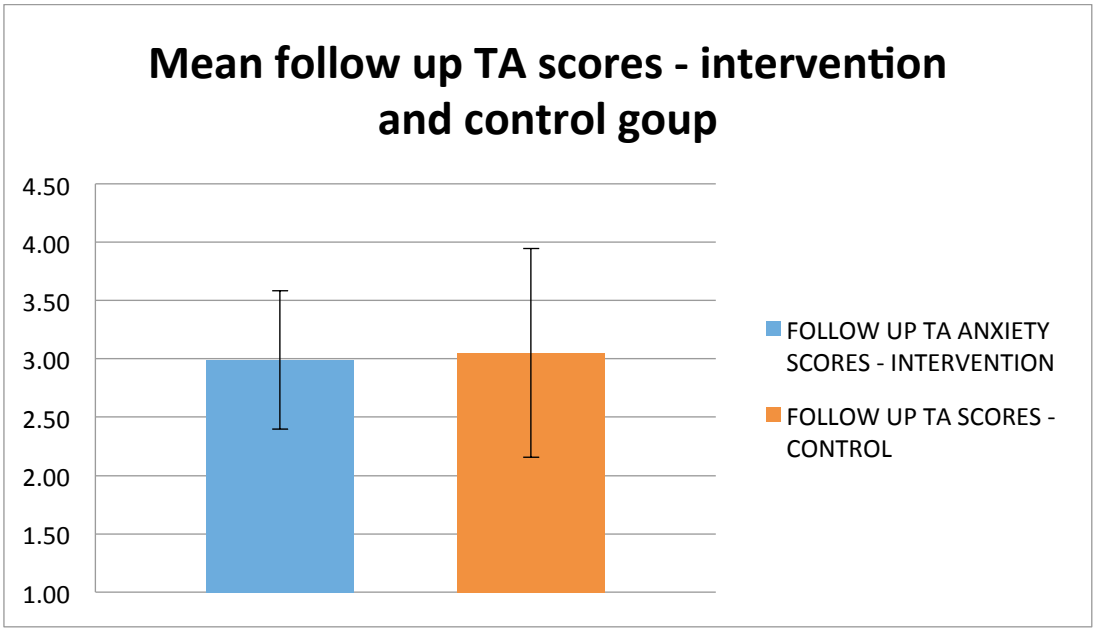
Hypothesis 2: Follow up test anxiety scores for participants who took part in the mindfulness intervention will be significantly lower than for those who were in the control Group.

The table below details the mean TA for the control and intervention group both at baseline and follow up, as well as standard deviation values. The table revels that the intervention group bad higher TA scores at baseline than the control group. In the follow up test, the control group demonstrated a slight increase in mean TA score, whereas the intervention group seen a drop in mean TA score.

Table 2 – test anxiety scores at baseline and follow up

	Mean TA score at baseline	*Standard Deviation at baseline*	*Mean TA score – follow up*	*Standard deviation – follow up*
Control Group	2.95	0.9095	3.05	0.8954
Intervention Group	3.59	0.796	2.99	0.1982

Figure 1: Comparing mean follow up TA scores – intervention and control



An independent samples t-test was conducted and the difference between follow up test anxiety scores for the intervention and control group. A t test was chosen because despite the ordinal nature of the data, it was shown to be normally distributed and therefore a t test was deemed the most appropriate analysis. The difference between mean

follow up TA scores in the intervention and control groups was shown to be statistically insignificant, at T(30) = -0.142, p= > 0.05

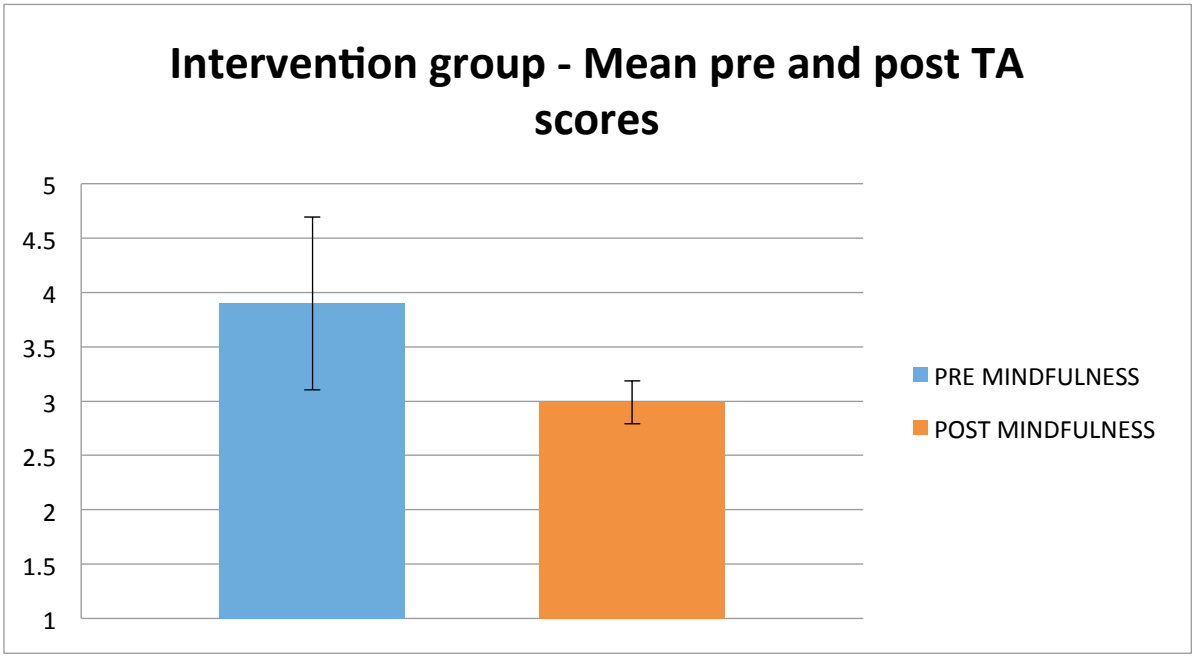
Hypothesis 3: Participants in the intervention group will have higher test anxiety scores before the mindfulness intervention and lower test anxiety scores after the mindfulness intervention.

The table below details the pre and post intervention test anxiety scores for all of the participants in the intervention group. It can be seen that 7/9 participants showed a drop in test anxiety score following the mindfulness intervention.

Table 2 - Intervention Group: pre and post intervention TA scores

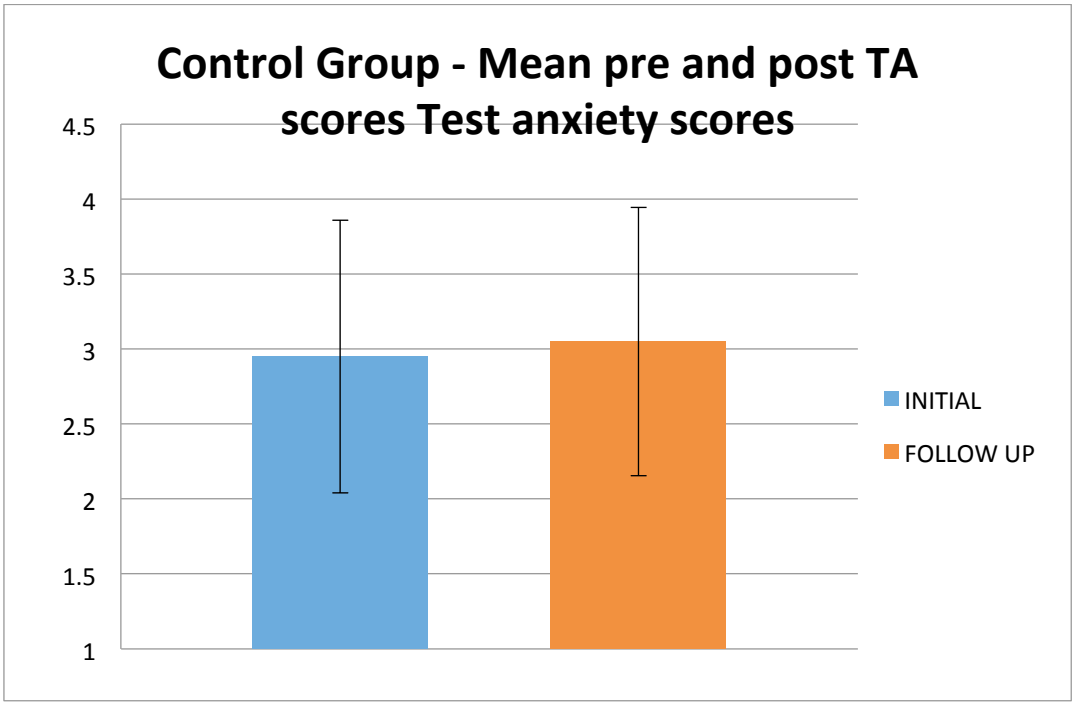
	Test anxiety scores at baseline	*Test Anxiety Scores – post intervention*
Participant 1	4	*2.7*
Participant 2	4	*2.8*
Participant 3	*2.9*	*3*
Participant 4	*1.7*	*1.7*
Participant 5	*4*	*3.7*
Participant 6	*4*	*3*
Participant 7	*4*	*3.6*
Participant 8	*4*	*3*
Participant 9	*3.7*	*3.4*

Figure 2 – Mean pre and post TA scores for Intervention group



A paired samples t-test was conducted, which compared average Test Anxiety scores for the intervention group, before and after the mindfulness intervention. A significant result was found at the 0.01 level $t(8) = 3.402$, $p = < 0.01$.

Figure 3 – Control group – mean TA scores at baseline and follow up



From the bar chart illustrated above it can be seen that there was relatively little difference in mean TA scores at baseline and follow up among the control group, in fact there was a very slight increase in mean TA scores at follow up.

A paired samples t-test was also conducted which compared average test anxiety scores in the control group in the initial questionnaire and the follow up questionnaire. This was insignificant at $t(22) = -0.930$, $p = < 0.05$.

EXPERIENCE OF TEST ANXIETY AND MINDFULNESS

62% of participants felt that anxiety around test taking negatively impacts upon their exam performance, while 61% felt that it negatively impacted upon their psychological wellbeing. Only 34% of participants had taken steps to reduce their anxiety around test taking in the past.

Thirty-seven participants (39%) had used mindfulness meditation or training techniques in the past. When asked the main motivation for using mindfulness 35% used mindfulness to reduce stress or anxiety, 25% to enhance psychological wellbeing, 18% was due to a general interest in the benefits of mindfulness and 10% was desire to improve physical health (7% other). When asked those who had used mindfulness in the past 44% described their mindfulness practice as ‘using mindfulness techniques when I feel I need them (eg. When I feel anxious or stressed)’, a further 43% said they had done some guided meditations ‘once or twice’. Only 8% said that they practice mindfulness meditation weekly, and 3% practiced mindfulness meditation every day.

POST MINDFULNESS INTERVENTION

Of the participants who took part in the mindfulness intervention around 56% (5/9) agreed, that the ten days of mindfulness meditation helped to reduce any exam anxiety during the December exams. 22% (2/9) neither agreed nor disagreed, 11% (1/9) disagreed and 11% strongly disagreed with the statement. 3/9 (33.3%) of these participants agreed that the mindfulness training would have better reduced their exam anxiety had they started the meditation sooner. 5/9 (56%) neither agreed not disagreed, and 1/9 disagreed with the statement.

44% (4/9) participants agreed that they found it difficult to put aside ten minutes every day during the revision period to complete their mindfulness meditation. 33.3% disagreed with this statement and 2/9 (22%) neither agreed nor disagreed. 89% (8/9) participants agreed that they would recommend 'Headspace' or another similar digital guided meditation application to a friend suffering with exam anxiety. 1/9 neither agreed nor disagreed with the statement. 56% (5/9) participants agreed that they felt the offer of mindfulness was a good match for reducing any exam anxiety which they had experienced. 22% (2/9) disagreed with this statement and a further 22% (2/9) neither agreed nor disagreed.

DISCUSSION

This study examined the relationship between self-reported mindfulness and test anxiety among university students, as well as the effects of a brief digital mindfulness intervention in reducing TA. Findings revealed that there was a significant negative correlation between self-reported mindfulness and test anxiety. Students with high levels of test anxiety reported lowest levels of mindfulness. Students who took part in the brief mindfulness intervention showed significantly lower levels of test anxiety after the intervention. There was not however a significant difference in follow up TA scores between the control and the intervention group.

THE RELATIONSHIP BETWEEN MINDFULNESS AND TEST ANXIETY

The finding of a negative correlation between scores on the Westside Test Anxiety Scale and the scores on the five faceted mindfulness questionnaire supports previous research by Cunha and Paiva (2012) which found that high school students with high levels of TA had low levels of acceptance and mindfulness skills. Due to their use of a high school population, Cunha and Paiva (2012) measured mindfulness using the Child and Adolescent Mindfulness Measure (CAMM) (Greco, Baer & Smith 2011). CAMM was designed for use with children and adolescents, it uses a single factor structure, and this was due to researcher's adaptation of mindfulness measures for participants developmental level(Greco, Baer & Smith 2011). Despite research on adults suggesting that mindfulness is a multifaceted construct (Baer et al 2006), Greco et al's factor analysis revealed that for a youth sample, a single factor structure was found to be more appropriate, suggesting that the different mindfulness skills are less distinct in youths and adolescents than they are in adults. The use of the FFMQ in the present study allows researchers to confirm the negative correlation between self-reported mindfulness and test anxiety among a young adult population of university students for the first time. What the FFMQ also allows, is for researchers to explore the relationship between individual mindfulness facets and TA. For example the finding in the current study that there was significant relationship between test anxiety: 'non-judging of inner experience', 'non-reactivity to inner experience' and 'Acting

with awareness' subscales on the FFMQ, which that these elements may be central to the relationship between mindfulness and TA.

The implication of the finding of a negative correlation between Mindfulness and TA is that teaching of mindfulness skills and provision of mindfulness training should be considered as an intervention for university students who have high levels of test anxiety. Furthermore, the finding that particular elements of mindfulness are more associated with TA might suggest that mindfulness training that teaches students acceptance and non-judgment and reactivity to inner thoughts and experiences, as well as an ability to act with awareness might act to reduce the negative cognitive reactions involved in TA. These include; self-criticism, comparing self to peers, excessive worry over the consequences of failure as well as loss of self-esteem and self-worth.

MINDFULNESS INTERVENTION

The finding that a short mobile-mindfulness intervention significantly reduced levels of self-reported test anxiety among a group of university students, contributes to the limited research which has explored mindfulness as a potential intervention for test anxious students. Findings support that of Niss (2012) who found that a brief mindfulness intervention significantly reduced maths test anxiety in a high school population. Carsley, Heath and Fajnerova (2015) explored the effectiveness of mindfulness based coloring activity on reducing TA among primary school aged children. Findings revealed that while both genders experienced reductions in anxiety in the Mindful colouring condition, the prediction that the mindfulness colouring would lead to greater test anxiety reduction than the free colouring, was supported for girls but not boys. These two studies appear to be the only research which looks at the effects of mindfulness on reducing test anxiety to date, therefore initial findings may be said to be mixed and inconclusive. Both studies also focus on delivering of mindfulness to a school aged population. While the current study was the first to examine the effectiveness of a mindfulness intervention in reducing TA among university students, Bamber & Schneider (2016) reviewed the research testing the effects of mindfulness meditation on stress and anxiety in the college students and found that mindfulness interventions significantly reduced anxiety among college students in 80% of the studies reviewed. Despite the very limited number of research on the effects of mindfulness interventions on TA, an overwhelming number of studies have demonstrated that mindfulness has shown promise in decreasing anxiety more generally among university students (Taylor, Strauss, Cavanagh, & Jones, 2014; Byrne, Bond & London, 2013 & Bamber & Schneider, 2016). The current research lends credibility to the effectiveness of a short digital mindfulness based intervention in reducing test anxiety and suggests that the mindfulness training may act as an antidote to the negative, maladaptive thought patterns shown in students with TA.

It is important to acknowledge that the mindfulness intervention offered in this study was brief. Participants completed ten minutes of guided meditation every day, delivered via a mobile application, for ten days, in the lead up to the examination period. This method of mindfulness training is what's described as informal practice, compared with extensive formal practice such as those taught in interventions like MBSR. Gunatillake (2016) describes informal mindfulness practice as making the decision to use any activity which an individual may be engaged in as the basis for developing moment to moment awareness, and he argues that both formal and informal mindfulness practice are of equal importance. However, with more time and opportunity for such informal practice of mindfulness, this should be

made a priority. Some researchers such as Kabat-Zinn (1990) argue that extended formal mindfulness meditations are necessary for cultivating mindfulness, while other believe that mindfulness can be developed through any method which allows for an increased accepting attitude and moment to moment awareness (Bishop et al 2004). Baer, Smith, Hopkins, Vettesse, Toneatto, Stea, Nguyen & Wang (2009) found that formal meditation time, not informal practice, was related to an increase in scores on the FFMQ. However Brown and Ryan (2003) found that the extent to which mindfulness meditation practice was used in day to day experiences (informal mindfulness practice) was related to mindfulness levels, whereas total time spent meditating was not. Hindman (2013) compared a stress management workshop which used formal mindfulness meditations with informal practice to one that used only brief mindfulness exercises and informal practice. Findings indicated that formal mindfulness meditations paired with informal practice showed more promising results as an intervention for university students than did the brief mindfulness exercises paired with informal practices, although both groups demonstrated increased levels of mindfulness, self-compassion as well as reduced stress, depression, and worry. Therefore, researchers concluded that mindfulness training, both formal and informal can be effective in managing stress among a student population. It has been suggested that brief and informal methods of mindfulness training may be more suited to university students with TA, as many students simply cannot find the time to put aside 45 minutes from revision to complete a formal meditation. Programmes such as MBSR have also shown high levels of dropout rates due to the time commitment necessary (Chang et al., 2004; Shapiro, Astin, Bishop, & Cordova, 2005). In the current research, 4/9 students found it difficult to put aside only 10 minutes a day during the revision period to complete their mindfulness meditation. Perhaps brief and informal mindfulness practice provides a viable alternative method of mindfulness practice for university students. Findings of the present study demonstrated that a brief and informal mindfulness practice significantly reduced TA among a group of university students. Therefore, suggesting that informal mindfulness practice can be effective, in this context.

In addition, the present study investigates the use of a mindfulness intervention used on an ad hoc basis, that is meaning it was implemented to reduce TA and used for short period in the lead up to the examination period. Findings from this study suggest that brief and informal mindfulness practice can be used during a period where someone is particularly stressed or anxious, in this case during exam time, and still be effective in significantly reducing anxiety. This use of mindfulness in an 'as and when required' manner can be said to contradict traditional views of how mindfulness should be practiced. Kabat-Zinn (1990) argues that consistent, formal meditation is necessary to cultivate mindfulness, as this allows individuals to practice being mindful at times of low stress, therefore making it easier to be mindful in periods of high stress or crisis. The majority of the research to date has adopted a Kabat-Zinn medical model of mindfulness meditation, which is formally delivered via group sessions over a period of 8 weeks. Despite this, there does not appear to be any evidence which suggests that 8 weeks is the absolute minimum to reap the benefits of mindfulness training, rather findings from the current study demonstrated for the first time, that even a very brief ad hoc use of mindfulness delivered via a mobile application can significantly reduce anxiety. The findings of this research suggest a promising new direction for mindfulness delivery as well as future research. Mindfulness has already demonstrated that it is a dynamic and flexible tradition which is able to reimagine itself when it comes into contact with a new culture and ways of living. The flexibility of mindfulness practice can already be observed as it has moved from an ancient Buddhist tradition in the East to a clinical intervention in western psychology. It may be suggested that mindfulness has reimagined itself again in our modern and technology driven world this can be seen in

the huge numbers of mindfulness based mobile application being downloaded. Psychological research can be said to have neglected this shift in how mindfulness is practiced, and perhaps researchers should focus not only on an 8-week mindfulness stress reduction course and should instead, acknowledge the mobile ad hoc use of mindfulness in non-clinical populations. For example, an important finding in this research was when participants were asked to describe their previous practice of mindfulness, 44% said that the "Used mindfulness techniques when they need them(e.g, when feeling stressed or anxious)", a further 43% said they had "done some guided meditations once or twice", only 8% said that they used mindfulness everyday. This suggests there is a clear shift in how mindfulness is being practiced, and the increase in mindfulness being used only during periods of stress. This research lays the foundations for future research examining the effectiveness of ad hoc, mobile mindfulness practice in a variety of different contexts. The finding that brief mindfulness training, delivered via a mobile application during a period of high stress can significantly reduce TA demonstrates just how powerful and impressive mindfulness can be as a psychological intervention.

The findings of the present research also lend credibility to the use of mobile application in delivering mindfulness training. Smart phones are at the center of our busy, technology driven world, this is often especially the case for young people. For many young people smart phones have become somewhat of a necessity, and their phone is the first thing they look at in the morning, and the last thing they look at before going to sleep (Lee, Chang , Zhao-Hong & Cheng 2014). Mobile applications which provide mindfulness training may therefore be a useful way of facilitating mindfulness accessibility. Mindfulness based mobile applications allow mindfulness meditation practice to be done with a more dynamic, mobile style, which is more consistent with our everyday experiences than sitting cross legged on a cushion meditating for 45 minutes (Gunatillake 2016). Despite the rapid growth in the number of mindfulness based apps available in recent years, there is very limited empirical research on their effectiveness (Vilardaga and Boudreaux 2015). Plaza et al (2013) conducted a review of mindfulness based phone apps and concluded that there was almost a complete lack of evidence regarding the effectiveness of these applications or its impact upon psychological wellbeing. The findings from the present research suggests that these mindfulness application, such as Headspace, used in the current study have the potential to reduce test anxiety among university students. Future researchers would be advised to explore the effectiveness of these mindfulness based mobile applications, perhaps in relation to more formal mindfulness delivery methods such a MBSR programmes, in order to compare the findings. Qualitative research, with students might be also recommended, to provide some insight in to student's experience of using these applications. Overall, current research suggests that brief, informal mindfulness training delivered via a mindfulness based mobile application may be effective in reducing test anxiety among university students. Mobile mindfulness allows the benefits of mindfulness to reach a wider audience, and also aids the supply and demand problem facing the mental health services, however much more research is needed regarding the effectiveness of such mobile apps to be able to confirm the findings of the current study.

Implications of the findings from the current research include Universities making mindfulness interventions available to students with TA. Lynch, Gander , Kohls , Kudielka & Walach (2010) examined the feasibility of implementing a new 8-week mindfulness-based programme, 'Mindfulness-Based Coping with University Life' (MBCUL), specifically tailored to the needs and demand of university students. Findings of the pilot study were positive, showing the programme to be mostly accepted by students who were interested, although there were high numbers of drop out in

the first few weeks. Results demonstrated reductions in perceived stress and anxiety and an increase in self-reported mindfulness. Combined with the results from the present study, it might be suggested that a session on coping with exam stress and test anxiety be implemented to the MBCUL programme. In this way, the programme may be able to act as an intervention recommended for students with high TA as well as promoting better psychological wellbeing for the greater student population. However in light of findings from the current study, ad hoc use of mobile mindfulness based apps might be just as effective in reducing TA among students, and in fact may prevent a more accessible and practical intervention for students. Implications might include the promotion and recommendation of mindfulness based mobile phone applications such as the one used in this research by the University, for students who are struggling with anxiety around exam time. With the time pressure of course work deadlines, and revision attending an eight-week course may be off putting to some and perhaps the offer of mindfulness based mobile apps is more practical for many university students. Universities may consider a subscription to a mindfulness app such as headspace, making it available to all students free of charge.

LIMITATIONS

The findings of this research must be interpreted in light of several limitations. Importantly, the study was not randomized, meaning we were unable to control for group differences. The reason for this was that despite large amounts of initial interest, the number of students who were willing to take part in the brief mindfulness intervention was very small, therefore it was considered most practical to allocate all of those interested students to the intervention group. Whereas the control group consisted of students who were willing to complete a follow up questionnaire, but whom did not express interest in taking part in the intervention. The difference in mean TA at baseline between the intervention and control group, suggests that there may have been important differences between the two groups to start with. This may be explained due to students who expressed interest in taking part in the mindfulness intervention, are likely to be those students who are struggling with anxiety, and are therefore motivated to take steps towards reducing this. However, despite this limitation of non-randomization and use of self-selection, this does not necessarily undermine the findings. The fact is that, findings of the research suggest that for those who are most in need and who are motivated to engage with the intervention– students with high levels of test anxiety – a short mindfulness intervention, delivered via a mobile application was shown to significantly reduce levels of TA. Therefore, despite being a non-randomized study with a small sample size, it can be suggested that the use of a short mindfulness intervention, delivered through a mobile app shows promising as an intervention for reducing TA among university students and thus further research with a larger sample size and stronger design is warranted, to explore this finding further.

Another limitation of the research which must be taken in to consideration is the fact that the FFMQ was not re-administered in the follow up questionnaire. Therefore, although it can be said that test anxiety scores significantly decreased following mindfulness intervention it cannot be concluded that this was due to the intervention increasing mindfulness among these students. This is an important limitation, and means that the research was unable to explore the mediating effect of the mindfulness intervention on reducing TA. Past research has demonstrated mixed findings regarding changes in self-reported mindfulness levels following different mindfulness interventions (Brown and Ryan, 2003; Shapiro et al, 2008; Smith al 2008). It may be implied that the the mindfulness intervention increased

mindfulness levels among the university students, thus reducing TA, however there is no evidence in the current study which would allow researchers to conclude this. This limitation should therefore be addressed in future research, by measuring changes in self-reported mindfulness pre and post intervention in order to further explore the mediating role of the mindfulness based intervention in reducing TA.

DIRECTIONS FOR FUTURE RESEARCH

In light of the findings of the current study, several suggestions may be made for future research. First and foremost future researchers should address the limitations of the present study, by developing a larger scale randomized control study which compares the effectiveness of ad hoc use of a mindfulness based mobile application with a formal 8-week MBSR or MBCUL programme, in reducing TA. In addition, the suggestion that the delivery of mindfulness based via mobile phone applications may be more practical for university students around exam time may be explored through qualitative methods, perhaps a focus group or open ended surveys. The use of Qualitative analyses would allow researchers to conclude not only what method of mindfulness is most effective in reducing TA, but also which method would be more accepted by and practical for university students, which is crucial in terms of applications of research findings. There was some interested open ended data collected in this research (Appendix 8) but it was beyond the systematic scope of this study. While a great deal of the literature on TA looks at its effect on academic performance, this was not explored in the present study. A direction for future research may involve exploring whether mindfulness training could be used to improve test scores among highly test anxious students. Finally, future researchers might be well advised to take in to consideration the effect of gender, as previous research has suggested females have higher levels of TA than males (Hembree 1988) , as well as differing effects of mindfulness based interventions in reducing anxiety across genders (Carsley, Heath and Fajnerova ,2015). Exploring gender differences was not possible in the present study due to a limited sample size and an overwhelming majority of female participants.

CONCLUSION

The findings of this study demonstrate not only that students with high levels of test anxiety have lower levels of self reported mindfulness but also that a brief, ad hoc mindfulness intervention delivered via a mindfulness based mobile app can significantly reduce TA among university students. Despite methodological limitations of the research, it can be said that such ad hoc use of digital mindfulness training can be effective in reducing TA, and Universities would be well advised to make available such mindfulness based interventions for students. Furthermore, the current study is the first to address and examine the effectiveness of what appears to be a new way of practicing mindfulness among non-clinical populations that is during periods of anxiety or stress and accessed through smart phone apps and has found this method to be successful in reducing TA among university students. Therefore it can be suggested that ad hoc use of mindfulness based mobile applications is a promising new tool for reducing TA, one which is accessible, effective and consistent with students busy, technology driven lives.

APPENDIX 1

5 Faceted Mindfulness Questionnaire (short from)

Below is a collection of statements about your everyday experience. Using the 1–5 scale below, please indicate, in the box to the right of each statement, how frequently or infrequently you have had each experience in the last month (or other agreed time period). Please answer according to what really reflects your experience rather than what you think your experience should be.

never or very rarely true 1 not often true 2 sometimes true sometimes not true 3 often true 4 very often or always true 5

1	I'm good at finding the words to describe my feelings	*DS*	
2	I can easily put my beliefs, opinions, and expectations into words	*DS*	
3	I watch my feelings without getting carried away by them	*NR*	
4	I tell myself that I shouldn't be feeling the way I'm feeling	*/NJ*	
5	it's hard for me to find the words to describe what I'm thinking	*/DS*	
6	I pay attention to physical experiences, such as the wind in my hair or sun on my face	*OB*	
7	I make judgments about whether my thoughts are good or bad.	*/NJ*	
8	I find it difficult to stay focused on what's happening in the present moment	*/AA*	
9	when I have distressing thoughts or images, I don't let myself be carried away by them	*NR*	
10	generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing	*OB*	
11	when I feel something in my body, it's hard for me to find the right words to describe it	*/DS*	
12	it seems I am "running on automatic" without much awareness of what I'm doing	*/AA*	
13	when I have distressing thoughts or images, I feel calm soon after	*NR*	
14	I tell myself I shouldn't be thinking the way I'm thinking	*/NJ*	
15	I notice the smells and aromas of things	*OB*	
16	even when I'm feeling terribly upset, I can find a way to put it into words	*DS*	
17	I rush through activities without being really attentive to them	*/AA*	

18	usually when I have distressing thoughts or images I can just notice them without reacting	*NR*	

.

never or true 1 not often true 2 sometimes true sometimes not true 3 often true 4 very often or always true 5 very rarely

19	I think some of my emotions are bad or inappropriate and I shouldn't feel them	*/NJ*	
20	I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow	*OB*	
21	when I have distressing thoughts or images, I just notice them and let them go	*NR*	
22	I do jobs or tasks automatically without being aware of what I'm doing	*/AA*	
23	I find myself doing things without paying attention	*/AA*	
24	I disapprove of myself when I have illogical ideas	*/NJ*	

APPENDIX 2

Westside Test Anxiety Scale

Rate how true each of the following is of you, from extremely or always true, to not at all or never true.

5	4	3	2	1
extremely always true	highly usually true	moderately sometimes true	slightly seldom true	not at all never true

Top of Form

1) The closer I am to a major exam, the harder it is for me to concentrate on the material.
5 4 3 2 1

2) When I study, I worry that I will not remember the material on the exam.
5 4 3 2 1

3) During important exams, I think that I am doing awful or that I may fail.
5 4 3 2 1

4) I lose focus on important exams, and I cannot remember material that I knew before the exam.
5 4 3 2 1

5) I finally remember the answer to exam questions after the exam is already over.
5 4 3 2 1

6) I worry so much before a major exam that I am too worn out to do my best on the exam.
5 4 3 2 1

7) I feel out of sorts or not really myself when I take important exams.
5 4 3 2 1

8) I find that my mind sometimes wanders when I am taking important exams.
5 4 3 2 1

9) After an exam, I worry about whether I did well enough.
5 4 3 2 1

10) I struggle with writing assignments, or avoid them as long as I can. I feel that whatever I do will not be good enough.
5 4 3 2 1

APPENDIX 3

1.)Bottom of Form
Do you feel that anxiety around test taking impacts upon your your exam performance?

- Yes
- No

2.) If yes you answered yes to the above question, please briefly describe in what way test anxiety impacts upon your exam performance.

3.) Do you feel that anxiety around test taking impacts upon your psychological wellbeing?

- Yes
- No

4.) If you answered yes to the above question, please briefly describe in what what test anxiety impacts upon your psychological wellbeing.

5.) Have you ever taken steps to reduce your exam anxiety? (attending courses, relaxation techniques etc)

- Yes
- No

6.) If you have taken steps to reduce your exam anxiety, please comment on what you used and how effective you found this method.

APPENDIX 4

1.) Have you ever used mindfulness meditation/training techniques before?

-Yes -No

2.) If yes, what was your main motivation for using mindfulness?

-To improve physical health

-To reduce stress or anxiety

-To enhance psychological wellbeing

-A general interest in benefits of mindfulness

-It was recommended by a friend/family member

-Other (please specify)

3.) For those who have used mindfulness meditation/ training techniques before which of the statements below would best describe your mindfulness practice.

-I have done some guided meditations once or twice

-I use mindfulness training techniques when I feel I need them (e.g. when I am feeling anxious or depressed)

-I practice mindfulness regularly (e.g. on a weekly basis)

-I practice mindfulness meditation everyday

-I am currently taking part in a mindfulness based stress reduction course
Other (please specify)

4.) Are you currently taking part in a mindfulness based stress reduction course?

-Yes -No

5.) Have you taken part in a mindfulness based stress reduction course or a similar programme in the past?

-Yes -No

6.) If you answered yes to the above question please provide briefly the details of the course and when you completed it.

7.) Are you currently participating/signed up for/considering signing up for any workshop or other training aimed at reducing exam anxiety before the the next examination diet?

-Yes -No

18. If you answered yes to the above question please provide briefly the details of the course. If possible provide information about the title of the program, who it will be provided by and the dates this will be running.

APPENDIX 5

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This study will be exploring test anxiety and potential protective practices for University students. This research is organized by the University of Glasgow and is part of an undergraduate project. Participation is entirely voluntary and you have the right to withdraw from the study at any time without giving any reason for doing so. All information that you provide during the study including names will be kept confidential. When completed the findings from the study will be used in a psychology undergraduate project. Some participants may be asked if they would be willing to take part in follow up research.

Please take time to answer all of the questions thoughtfully and honestly.

If you would like any more additional information please feel free contact Hannah Lyall at 2030922L@student.gla.ac.uk.

Thanks again for your participation in this research

1. I have read the information above and agree to take part in this study: Yes/No

APPENDIX 6

DEBRIEF

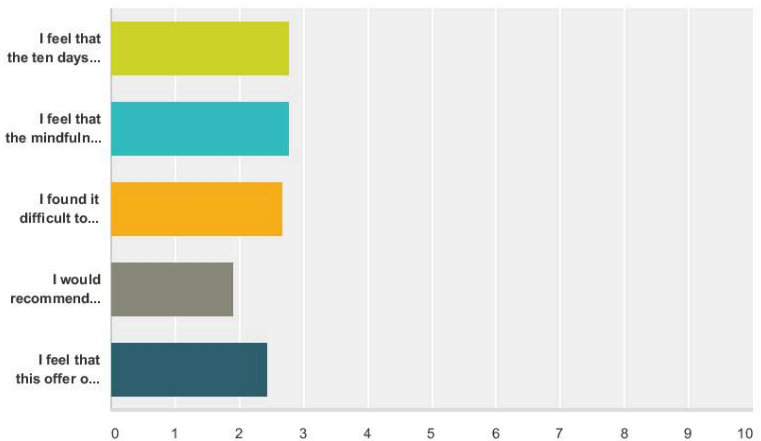
The purpose of this questionnaire is to explore the link between mindfulness and test anxiety among university students. What is mindfulness? Mindfulness is a mental state achieved by focusing one's awareness on the present moment, while calmly acknowledging and accepting feelings, thoughts, and bodily sensations. Mindfulness allows us to become more aware of the stream of thoughts and feelings that we experience and to see how we can become entangled in that stream in ways that are not helpful. The results from this questionnaire will be analysed to look at relationships amongst test anxiety, present mindfulness, and the use of mindfulness training in the past and opinions of how effective this was found to be. This is with a view to offering mindfulness training leading up to exams

APPENDIX 7

Mindfulness intervention + Test anxiety follow up

Q12 Please think carefully and rate how much you agree or disagree with the following statements

Answered: 9 Skipped: 0



	Strongly gree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Total	Weighted Average
I feel that the ten days of mindfulness meditation helped to reduce any exam anxiety I had during the December exams?	0.00% 0	55.56% 5	22.22% 2	11.11% 1	11.11% 1	9	2.78
I feel that the mindfulness training would have better reduced my exam anxiety, had i started the training sooner.	11.11% 1	22.22% 2	44.44% 4	22.22% 2	0.00% 0	9	2.78
I found it difficult to put aside ten minutes every day, during my revision to complete my meditation.	22.22% 2	22.22% 2	22.22% 2	33.33% 3	0.00% 0	9	2.67
I would recommend 'Headspace' or another similar digital guided meditation application to a friend suffering from exam anxiety	22.22% 2	66.67% 6	11.11% 1	0.00% 0	0.00% 0	9	1.89
I feel that this offer of a mindfulness intervention was a good match for reducing my exam anxiety	22.22% 2	33.33% 3	22.22% 2	22.22% 2	0.00% 0	9	2.44

APPENDIX 8

Test anxiety and protective practices

Q8 If you have took steps to reduce your exam anxiety, please comment on what you used and how effective you found this method.

Answered: 36 Skipped: 90

#	Responses	Date
1	Yoga and meditation. Both are helpful as long as i schedule them, if I feel I'm wasting time spending too long on them when I should be studying it makes me feel worse	11/22/2015 3:30 AM
2	f	11/17/2015 7:57 AM
3	I now sit my exams in a room on my own, which helps with some of the pressure of being in the exam hall with others. I usually struggle to remember relaxation techniques once the anxiety has progressed to a certain level.	11/16/2015 9:07 PM
4	I have tried 'tapping therapy' which I use to address various forms of anxiety, it helps to keep me more settled but doesn't overcome the stress and pressure.	11/15/2015 10:55 PM
5	Drink lots of water, I hear that it stops you from getting too anxious maybe its a placebo Realize it's going to be over soon and just do it	11/15/2015 7:01 PM
6	I am Christian so try to use meditative prayer to reduce anxiety, this does help me. I am also doing yoga now but haven't had exams since I started.	11/14/2015 6:03 PM
7	regular breaks during study to take mind off studying	11/13/2015 10:17 AM
8	Colour me mindful colouring books, yoga and deep breathing and going walks.	11/12/2015 4:06 PM
9	I tried taking valerian root supplements as they are supposed to help with anxiety and with sleep problems, but I didn't find that they worked.	11/12/2015 9:51 AM
10	relaxation	11/10/2015 2:02 PM
11	listening to music and taking breaks	11/10/2015 12:23 PM
12	Breathing techniques	11/9/2015 11:48 PM
13	meditation, yoga, medical help	11/9/2015 11:40 PM
14	i attend cognitive behavioural therapy	11/9/2015 8:24 PM
15	Yoga, herbal remedies	11/9/2015 7:40 PM
16	Mindfulness was good to centre your focus in the morning, and listening to meditation music before falling asleep help turn your brain off and helped me sleep better	11/9/2015 6:38 PM
17	yoga + student learning services workshop	11/9/2015 5:21 PM
18	I've used meditation and relaxation exercises. I find the self compassion variants to be especially effective, particularly the ones on Kristin Neff's website – self compassion variant of Buddhist loving kindness.	11/9/2015 2:41 PM
19	I received counselling for anxiety in general, but focused on exam anxiety in particularly.	11/9/2015 2:39 PM
20	I distract myself e.g watch a movie, play sports, talk about how much I'm freaking out	11/9/2015 2:01 PM
21	I took herbal stress relief tablets which were very effective	11/9/2015 1:49 PM
22	I attended an 8 week Mindfulness Meditation course at the uni, did not find it very helpful.	11/9/2015 1:43 PM
23	I've spoken to people at the university about exam stress and have been given techniques to practice etc, I felt like the anxiety really controlled my exams last year and I really don't want to feel the same this time round. I visited my GP who prescribed Propranolol (betablocker) to try and help with the build up of anxiety.	11/9/2015 1:40 PM
24	Alcohol or more food. Just effective for a wee while	11/9/2015 1:10 PM
25	Plan out breaks to do other things without feeling guilty. Helps slightly.	11/9/2015 12:54 PM

26	I try to do yoga, but it actually can be stressful to find a secure place to do it (hard to do with roommate in residence halls, expensive to go to studio, etc) I spend a lot of time outdoors which helps me, but it gets harder to do in the winter.	11/9/2015 12:53 PM
27	Relaxation techniques - sometimes useful.	11/9/2015 12:26 PM
28	Zazen meditation works magic. Also evaluation how much exactly you know and need to know helps to remain calm.	11/9/2015 12:15 PM
29	Yoga - good	11/9/2015 12:12 PM
30	Yoga	11/9/2015 11:53 AM
31	I attended a group counselling session on reducing anxiety ahead of an exam diet, and found I was pretty knowledgeable on how to study properly and keep calm during an exam, but realised I don't tend to follow my own advice. If anxiety during studying gets overwhelming I stop what I'm doing and do something relaxing for half an hour, like listening to music. When an exam starts I don't rush to start writing straight away, I take about 20 seconds to breathe and take in surroundings, which tends to get my anxiety under control at first. I try to take quick breaks to drink water and clear my head in between exam essays or when I have a mind blank or my head gets cluttered with information.	11/9/2015 11:51 AM
32	Meditation	11/9/2015 11:48 AM
33	I have gotten suggested herbal medications from health shops to help me sleep better. Honestly, I didn't find them very effective at all, but as I refused to go to the doctor since I knew they would give me sleeping pills I really only got herbal medications to humor my mum	11/9/2015 11:03 AM
34	Just try and plan and be organised, then if i know at least I've revised and tired	11/9/2015 11:00 AM
35	Mindfulness- breathing exercises, listening to relaxing music. Helped in that moment but the thoughts always come back	11/9/2015 10:52 AM
36	Breathing works Socializing also works and takes your mind off it Remember you cant change anything anymore its going to happen you're going to do it and that's it, works too	11/9/2015 10:52 AM

Q4 If yes you answered yes to the above question, please briefly describe in what way test anxiety impacts upon your exam performance.

Answered: 60 Skipped: 66

#	Responses	Date
1	If I'm only a little bit anxious I actually think it improves my performance but if get too anxious I panic and struggle to remember material	11/22/2015 3:30 AM
2	Struggle to study and often find I get distracted, ie taking this survey	11/17/2015 6:01 PM
3	f	11/17/2015 7:57 AM
4	Mind 'fog' - no matter how much I have studied, I feel like I won't be able to translate this to the examiner & properly demonstrate my understanding. It feels too much about point-scoring.	11/16/2015 9:07 PM
5	Nerves seem to get the better and hinders me having a clear mind.	11/15/2015 7:04 PM
6	I am so anxious before and during an exam that I find it very difficult to formulate my thoughts around the task at hand. It means that it's harder to concentrate, and the panic just makes me draw a blank often.	11/14/2015 6:03 PM
7	Most of the time it keeps me alert and focussed but there has been two occasions when my anxiety got so strong that i couldnt read or understand the exam questions properly because i couldnt stop worrying and focus.	11/12/2015 4:06 PM
8	I worry so much about approaching exams that I find I'm too scared to revise, which makes me worry more about the exam, and makes revising even more scary etc. As a result of this vicious cycle I never feel adaquately prepared for exams.	11/12/2015 4:05 PM
9	Lose focus and motivation to study exams as i feel i will fail anyways	11/12/2015 12:22 PM
10	I tend to think that I'm going to do terribly in the lead up to the exams and it's difficult to force yourself to concentrate on studying when you feel like you're going to do badly anyway.	11/12/2015 9:51 AM
11	My nerves might make me neglect to structure my essay properly or forget the name of an author I wanted to reference	11/11/2015 4:33 PM
12	For the first five or ten minutes I don't tend to do much of the exam because I just need to focus on calming down, I also don't eat before exams because I feel too sick	11/10/2015 6:34 PM
13	I don't manage to remember material that i know well and had studied in depth, i feel anxious and worried.	11/10/2015 2:49 PM
14	makes me jittery and unable to focus	11/10/2015 2:02 PM
15	The anxiety makes me perform better than I otherwise would do.	11/10/2015 9:54 AM
16	Poor memory before and during exam Difficulty concentration for studying Decreased motivation for studying Poor sleep so tired for studying/exam	11/10/2015 7:57 AM
17	makes me less focused	11/9/2015 11:40 PM
18	Can't plan anything out so can't organise essays in the best way and just write down what comes to mind as soon as I think it.	11/9/2015 11:29 PM
19	Too nervous to concentrate on the question and trying to understand it	11/9/2015 9:36 PM
20	I might not read the question carefully or mess up with my essay structure a bit.	11/9/2015 8:41 PM
21	I sweat and shake too much when I am in exam halls which leads to me losing out on time which adds more pressure	11/9/2015 8:24 PM
22	I can't think rationally when I am stressed	11/9/2015 7:40 PM
23	Forgetfulness in exams, extreme nervousness.	11/9/2015 6:38 PM
24	impact on sleep + anxiety makes me procrastinate	11/9/2015 5:21 PM
25	It makes it a lot harder to revise as I cannot stick to a revision plan or study schedule, and I forget details/can't go over in topics in as much depth as I'd like	11/9/2015 3:22 PM

26	Anxiety is difficult to deal with in everyday life. Having an exam triples my anxiety levels and I become full of self doubt and not feeling good enough!	11/9/2015 3:15 PM
27	Worry about the exam can make it harder for me to concentrate when studying therefore I am less likely to remember information needed for the exam.	11/9/2015 3:04 PM
28	Struggle to concentrate when worrying about how well I need to do. Can spend time calculating percentages I need etc!	11/9/2015 2:59 PM
29	Test anxiety makes me feel like no matter how much I study it will not be good enough.	11/9/2015 2:45 PM
30	Test anxiety reduces my capability to think clearly and also reduces my cognitive ability, most significantly reading, but also reasoning and decision making. So to be clear, my anxiety most affects me on the run-up to exams.	11/9/2015 2:41 PM
31	My anxiety can be so intense it affects my ability to think the relevant information for the exam at hand.	11/9/2015 2:39 PM
32	When there are examinations one after the other several days apart the stress begins to prevent you from being able to focus on your next exam	11/9/2015 2:39 PM
33	There's too much information in my head, so I get distracted about what is appropriate to answer.	11/9/2015 2:34 PM
34	I begin to overthink about the consequences of me failing. Also I think of how much I don't know and then I worry and stress more, resulting in more anxiety	11/9/2015 2:01 PM
35	The pressure of the exams being the make or break of a mark when I have a bad memory.	11/9/2015 2:01 PM
36	I feel sick and black out	11/9/2015 1:52 PM
37	I usually go into the exam, sit down open the booklet and my mind goes blank, I know absolutely nothing, it takes me a good 10 minutes or so to compose myself. I've done really badly on exams where I know I should have done better.	11/9/2015 1:40 PM
38	Careless mistakes and misreading questions	11/9/2015 1:33 PM
39	Sometimes I do better because the stress makes me or I feel sick and can't think	11/9/2015 1:02 PM
40	The stress/anxiety can be a motivating force to doing better on exams themselves, but gets in the way of wellbeing.	11/9/2015 12:54 PM
41	My anxiety causes me to put off studying and preparation for it. As I get closer to my exam, I beat myself up more and more for not preparing enough. It's a sort of vicious cycle, where my anxiety causes me to avoid studying, but not studying makes me feel more anxious.	11/9/2015 12:53 PM
42	Unable to concentrate on the exam question and answer.	11/9/2015 12:26 PM
43	end up forgetting things in exam hall and also not finishing .	11/9/2015 12:23 PM
44	I struggle to focus on the material i have to cover when preparing for the exam, as it is hard for me to focus at all, because i'm worried that time is short, material to be covered too long and i won't be able to perform good, hardly even best.	11/9/2015 12:19 PM
45	blocks access to material learned	11/9/2015 12:17 PM
46	I can't eat or sleep properly because of it and it makes me feel like throwing up and does sometimes cause me to. Being tired, underfed and nervous is not a good state to be in	11/9/2015 12:11 PM
47	Not able to sleep the night before	11/9/2015 12:09 PM
48	Anxiety makes me feel like I've failed before I even try	11/9/2015 11:58 AM
49	Too busy being stressed to focus on material fully while studying. Panicking in exam stops me from recalling as much information.	11/9/2015 11:53 AM
50	Stress or anxiety over tests can frequently take over during your study time, affecting your ability to effectively study. Worrying that the way you are studying isn't right or you won't remember anything, then being anxious about the fact that you're wasting time worrying instead of studying, it can be a vicious cycle. In the test itself, you can know the answer, but articulating the answer is harder if you're anxious, or if you forget a minor part of how to answer a question the anxiety can take up more time instead of answering other questions. It can leave you feeling less confident about your capabilities.	11/9/2015 11:51 AM
51	Can't concentrate. Don't do the best I can	11/9/2015 11:34 AM
52	Sweaty hands, mini panic attacks, start to wonder where my life will go if I don't do well - waste exam time. Worry about how much time I've wasted..	11/9/2015 11:24 AM
53	Feeling unwell/sick. Panicking and working yourself up when there's no need.	11/9/2015 11:22 AM
54	When I'm stressed I sleep badly and often get sleep paralysis, so I can end up pretty tired leading up to exams	11/9/2015 11:03 AM

Test anxiety and protective practices

55	Because in psychology we have learnt that anxiety impacts our test performance I worry that it happens to me but I try and stay calm and stick to a regiment timetable so I feel in control	11/9/2015 11:00 AM
56	I feel like I worry too much about doing well that it's only that thought in my mind. I put myself down and eventually believe I wont do well so I don't do the best I can.	11/9/2015 10:52 AM
57	Tiredness General anxiety would like to do well	11/9/2015 10:52 AM
58	lack of sleep, mind blanks in exam, can't focus properly or look at the bigger picture of what the question is asking of me	11/9/2015 10:44 AM
59	In a good way, I work better under pressure and exams facilitate a condition where I work harder and more intensely.	11/9/2015 10:41 AM
60	It affects my sleep and then my mental health which stops me focussing	11/9/2015 10:35 AM

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