A Hierarchical Multiple Regression Analysis investigating the association between Religion, Mindfulness and Personality on Stress and Anxiety.

Delia Khaffaf

Supervised by: Hazel McMurtrie April 2017

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ABSTRACT

The psychological field of stress and anxiety has been extensively explored; nonetheless it is argued that in order to fully understand a construct, individual differences that introduce variance to the stress and health domain must be examined. Literature has investigated confounding variables and the likes of religiosity, mindfulness and personality traits have indicated associations with stress and anxiety.

Consequently, using a correlational survey design, the current study investigated relationships between the predictor variables; religiosity, mindfulness and the big five personality traits on the criterion variable; stress and anxiety, using a student volunteer sample (N = 114) (Female = 78, male = 36) with an age range of 19-24. An 85- item questionnaire was posted online and participants were recruited through an online participation pool and a private group on social media.

Pearsons correlation coefficients indicated negative correlations between the variables of religiosity, mindfulness, agreeableness, extraversion, contentiousness and openness on the criterion variable, a positive correlation was observed for neuroticism on stress and anxiety. Hierarchical multiple regression analyses revealed that, within religion and mindfulness, only mindfulness was a strong predictor of stress and anxiety. When the big personality traits were added to the model, mindfulness became non-significant and the only strong predictor of stress and anxiety was neuroticism, suggesting an indirect relationship between mindfulness, neuroticism, stress and anxiety.

These findings confirm the importance of these variables in reducing stress and anxiety and some findings were consistent was previous literature. The limitations, further implications and directions for future research are discussed.

KEY WORDS:	RELIGIOSITY	MINDFULNESS	PERSONALITY	STRESS	ANXIETY

Introduction

The sustenance of life is deemed critically reliant on maintaining a constant internal milieu (Bernard, 1967). The term 'Stress' represents the effects of physical, occupational and affective stimuli that compromise this maintenance or 'homeostasis' (Selye, 1976). Arguably, stress has evolved as an adaptive response by aiding our ability to detect danger, however; sustained exposure can seriously damage health and result in psychophysiological disorders such as anxiety (Schneiderman 1983; Smith et al., 2007). This issue has been of interest to many psychologists, however the crisis still prevails today (Beddington et al., 2008).

The complexities surrounding the multi dimensional stress response has yielded research with multiple foci (Robinson, 1991). While studies have highlighted the importance of biological vulnerability such as the effects of genetics as a predisposition to stress (Kendler et al., 2010; Stein et al., 2002), further research has brought about the undeniable significance of environmental factors such as neonatal experiences as studies have suggested highly nurtured infants develop into low anxiety adults (Levine, 1957). However, it has been implied that it is not the effect of the biological or environmental factors alone, but also the interplay between other individual differences that lead to psychological disorders (Khan et al, 2005). Consequently, literature has investigated confounding variables within this field and the likes of religiosity, mindfulness and personality traits have indicated associations with stress and anxiety. Hence, addressing these differences is fundamental to facilitate the understanding of the core biases that introduce variance to the stress and health domain (Hagger, 2009).

Religion

Religion is generally referred to as an integrated system of faith and worship (Corbett, 1990). Associations between religious involvement and psychological well-being has been a focus of study for many psychologists, while findings are not unanimous, literature has illustrated that religion is linked with positive mental health (Lim and Putnam, 2010; Childs, 2010).

Recent studies demonstrate that religion is related to powerful sources of hope and comfort, which have been known to reduce distress and promote positive health outcomes (Brewer-Smyth and Koenig, 2014). Literature has justified the positive effects of religion through the influence of prayer, maintaining a personal relationship with God (Pollner 1989; Wikstrom 1987) and through the regular attendance of religious services (Ellison and Levin 1998; Levin and Chatters 1998). It is suggested that these practices enhance positive cognitions by impacting judgments towards stressful events as part of a divine plan or by providing confidence in ones ability to cope with problematic situations (Pargament, 2010).

Experimental based research by Finney and Maloney (1985) demonstrated this relationship between religion and well-being by investigating the effects of engaging in prayer for 20 minutes a day on anxiety. After 14 weeks, engaging in prayer significantly reduced anxiety. Although this reveals an interesting relationship with a

potential to further the effectiveness of interventions, this study can be criticised for a severe lack of psychometrically sound measures. The use of the Batson Inventory of Religiosity, an unpublished scale with no documented psychometric properties, limits this studies comparability to other research findings (Shreve-Neiger and Edelstein, 2004). Hence results can only be established tentatively and illustrates the importance of using measures with well-reported validity and reliability estimates.

Conversely, a small body of research proposes an opposing assertion that religion exacerbates rather than alleviates the detrimental effects of stress (Watters, 1992). According to this line of argument, individuals who view God as a punitive being yield more negative effects of mental health (Exline et al., 2001). Thompson and Vardman (1997) investigated six types of religious coping strategies among 150 family members of homicide victims. Interviews indicated that high religious coping activities were related to significantly more psychological distress in participants. This claim conflicts with more recent research by Inzlicht et al., (2009) who conducted an experiment which involved observing electroencephalographic neural activity in the Anterior Cingulate Cortex (ACC), which is a cortical system involved in the experience of anxiety, while 28 participants from diverse religious backgrounds completed a Stroop task. Results revealed that stronger religious beliefs were related to reduced ACC activity; hence religiosity acts as a buffer against anxiety.

Investigations into religiosity and its' influence on psychological well-being has yielded great dispute (Ano and Vasconcelles, 2005), although within recent years a more favourable conclusion has been met. However, despite advances in this psychological field, researchers are yet to fully determine which mental health outcomes are associated with religious factors (Ellison et al., 2001) as the association between religion and the debilitating construct of anxiety has received much less attention (Shreve-Neiger and Edelstein, 2004), hence stress research would benefit from further investigations into this relationship.

Mindfulness

Another concept which has been argued to have the potential to aid psychological well-being and stress is mindfulness (Williams, 2010; Farb et al., 2010). In the last two decades, mindfulness has received a surge of attention (Černetič, 2016; Gallego et al., 2014), it is defined as; a self-regulation of attention and a focus concerning the present characterized by acceptance (Creswell and Lindsay, 2014; Bishop et al., 2004; Kabat-Zinn, 1990). It has been conceptualized as a *state* experienced in mindfulness yoga and meditation (Lau et al., 2006) and as a *trait,* in terms of one's predisposition to be mindful in daily life (Baer et al., 2006).

Without intervention, trait mindfulness seems to be constant over time. However, research such as Vesa et al., (2016) which investigated the effects of a web-based mindfulness programme on 70 participants, illustrated that mindfulness-based interventions are advantageous in adopting changes in trait mindfulness, and are associated with low stress and anxiety levels (Britton et al., 2011; Shapiro, 2008). This conclusion has been observed in a range of literature, which has employed the Mindfulness Attention Awareness Scale (MAAS) (Brown and Ryan, 2003) and

Mindfulness-based Stress Reduction programmes (MBSR) (Vøllestad et al., 2011). Hence, this demonstrates the strength of the association displayed across a range of methods and provides further support for the claim that that mindfulness is related to improved psychological functions (Shapiro, 2008; Shahar et al 2011).

Consequently, mindfulness-based interventions have become a popular method of psychotherapy (Černetič, 2016; Gallego et al., 2014) however; little is known of its efficacy (Hoffman et al., 2010). A meta-analysis by Khoury et al., (2013) attempted to address this issue by systematically reviewing a total of 209 studies utilizing 12,145 participants. Results revealed that mindfulness-based methods were effective in pre-post comparisons at decreasing anxiety, as effect sizes were strong and sustained throughout follow-up. Thus, there is a clear agreement from a range of laboratory-based and correlational studies, all of which imply that mindfulness is associated with improved psychological health (Keng et al., 2011).

The premise behind mindfulness is that emphasizing the present can alleviate the effects of stressors, as an excessive focus concerning the past or future can be linked to anxiety (Kabat-Zinn, 2003). Additionally, individuals often react automatically, by avoiding or repressing unwanted experiences when faced with highly stressful situations (Keng et al., 2011), mindful individuals respond to stress more reflectively, which can prevent these avoidance strategies (Hayes et al., 2006). This allows for distancing from adverse cognitions, emotions, or negative physical sensations, favouring greater psychological flexibility (Langer et al., 2010).

Farb et al., (2010) conducted fMRI scans on 36 participants enrolled in MBSR programs to demonstrate this framework, mindfulness interventions revealed marked changes in neuronal responses influencing cognitive-affective processes (Goldin and Gross, 2010), as the emotion regulation ability seemed to be enhanced (Williams, 2010). Thus enabling individuals to better manage adverse feelings associated with stressful situations. However, this study could be criticised due to its lack of comparisons against control groups, as this would have eliminated the effects of confounding variables such as group support which is unrelated to mindfulness training (Farb et al., 2010) allowing for more valid results. Nevertheless, this study highlighted underlying mechanisms to mindfulness training and contributed to the mounting evidence of support for this concept (Kang et al., 2009). However, mindfulness research is still in its infancy (Giluk, 2009), hence further research is examining mindfulness in conjunction with other novel variables is essential to fully comprehend the validity of this theoretical construct (Cronbach and Meehl, 1995).

The Big Five Personality Traits

Particularly within the last decade, it is believed that vulnerability to stress and the strength of the stress response is highly dependent on personality (Lecic-Tosevski et al., 2012; Ferguson, 2001). The Big Five by Costa and McCrae 1992 is currently the most established model for describing personality; it delivers a comprehensive framework for the taxonomy of personality (Vollrath, 2001; Feizi et al., 2015). It is composed of five factors: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (Leandro and Castillo, 2010). Studies (Hayes and Joseph, 2003; Malkoç, 2011) have elicited that these personality traits

play a fundamental role on an individuals' subjective well-being and the significance of these traits on stress and coping processes has been confirmed in countless research articles (Ferguson, 2001; Vollrath, 2001).

Initial findings highlight that of the five personality factors; extraversion, neuroticism and conscientiousness are most closely linked to stress (Vollrath and Torgersen, 2000; Ebstrup et al., 2011). A cross-sectional study by Feizi et al., (2015), examined data from 3180 Iranian participants. Findings indicated that of the five traits; neuroticism, extraversion and contentiousness most strongly predicted stress and anxiety respectively. This study controlled for a wide range of confounding variables, such as sex and age, alleviating threats towards the validity of the proposed claim (Pourhoseingholi et al., 2012), as both these variables have been illustrated to influence stress (Folkman et al., 1987; Verma et al., 2011).

However, the reliability of this study is highly questionable as only agreeableness and openness had considerably low Cronbachs alpha scores of 0.48 and 0.59. Furthermore, Chu et al., (2015) used multiple regression models to investigate the relationship between agreeableness and the stress response within 460 participants and found agreeableness to be significantly and positively correlated with stress. Therefore, this raises the question as to whether different results would have been obtained if reliable measures had been utilized. Conversely, this finding coincides with a meta-analysis by Kotov et al., (2010) which reviewed 175 studies on the association between personality traits and anxiety disorders. Analyses revealed agreeableness and openness as largely unrelated to anxiety, with neuroticism as the strongest correlate. Therefore, this conception provides a valuable guide for psychological research and demonstrates that personality can determine the way stress is experienced in daily life and in some instances creates a predisposition to stress (Vollrath and Torgersen, 2001). Further investigations could aid the effectiveness of interventions for stress and anxiety that are more suited to an individual's personality; which may in turn be a more effective method of treatment (Karimzade and Besharat, 2011).

Rationale

Meanwhile a substantial body of literature exists and continues to expand in terms of personality, stress and anxiety, the investigation of religion and anxiety has received much less attention (Ellison et al 2009; Shreve-Neiger and Edelstein, 2004). Similarly, further collaborative investigation is required to improve understanding of mindfulness as a contemporary concept (Keng et al., 2011). Importantly, despite recent advances in this area, there is little literature that investigates these three variables collectively; this is surprising considering the breath of literature supporting associations between these variables on stress and anxiety. Therefore, the focus of this review is to investigate these constructs, to expand upon previous literature by furthering knowledge in terms of their effects on stress and anxiety. This is to gain insight into new outlooks on this psychological field in order to improve this stress and anxiety pandemic in the modern world (Beddington et al., 2008).

Methodology

Design

This quantitative online questionnaire-based study employed a correlational design. The seven predictor variables were: 'Religion', 'Mindfulness' and the Big Five Personality traits; 'Agreeableness', 'Contentiousness', 'Extraversion', 'Neuroticism' and 'Openness' (Costa and McCrae, 1992). The criterion variable was 'Stress and Anxiety'.

Participants

The volunteer sample was composed of students, by reason of accessibility, whom were recruited via an online Participation Pool and a private social media group (Appendix 2). Individuals with diagnosed stress or anxiety disorders were excluded from this study to avoid negative emotions. The research supervisor granted this study ethical approval (See Appendix 1 for full ethics form).

Given the increased amount of concern in relation to the statistical power of studies (wood and Percy, 2009), it was determined that Green's (1991) formula; $N > 50 + 8m$ (where m is the number of independent variables) would be used to identify the number of participants required for this study. This formula suggested a sample of 106 participants was the lowest possible number of participants required to detect a statistically significant outcome (Austin and Steyerberg, 2015). The final sample employed for this study was 114 students (Female = 78, Male = 36) aged 19-24.

Measures

Eight formerly published scales in the public domain were obtained via the 'International Personality Item Pool' (IPIP) and 'American Mindfulness Research Association' (AMRA), all of which were scored from 1 to 5 on a Likert scale from 'Strongly agree – Strongly disagree'. The scales were compiled to form an eighty-five-item questionnaire, (See Appendix 4).

The criterion: Stress and Anxiety

The Costa and McRae (1992), revised NEO-Personality-Inventory (Neo-PI-R) was selected as this measure. It is a revised version of Costa and McCrae's (1978) NEO Personality Inventory. High internal consistency levels were reported; the Cronbachs Alpha score for this scale was .83. The item numbers for this sub-scale is items 1-10. An example of the items stated in this section is; *"I get stressed out easily."* Items 6, 7, 8, 9 and 10 were reversely scored. Low scores demonstrated higher levels of Stress and Anxiety.

Predictor Variable 1: Religion

The Peterson and Seligman (2004) Values in Action (VIA) inventory assessed 'Religiosity'. This scale illustrated a high internal consistency level; the Cronbachs Alpha score for this scale was .91. The item numbers for this sub-scale is items 11-

20. An example of the items stated in this section is; *"I believe in a universal power or God."* Items 18, 19 and 20 were reversely scored. Low scores demonstrated higher levels of Religiosity.

Predictor Variable 2: Mindfulness

The scale chosen for the final variable 'Mindfulness' was the Trait Mindful Attention Awareness Scale (MAAS) by Brown and Ryan (2003). Internal consistency levels are generally high with Cronbachs alpha scores ranging from .80-.90. The item numbers for this sub-scale is items 21-35. An example of the items stated in this section is; *"I find myself preoccupied with the future or past."* All items were reversely scored, with low scores indicating high levels of Mindfulness.

Predictor Variable 3: Agreeableness

The predictor variable 'Agreeableness' was assessed in terms of the Costa and McRae (1992) NEO Five-Factor Inventory (NEO-FFI). This is a shortened version of the (Neo-PI-R) scale. High internal consistency levels were demonstrated; the Cronbachs Alpha scores for this scale was .77. The item numbers for 'Agreeableness' in this sub-scale is items 36-45. An example of the items stated in this section is; *"I accept people as they are*." Items 41, 42, 43, 44 and 45 were reversely scored. Low scores demonstrated higher levels of Agreeableness.

Predictor Variable 4: Contentiousness

The predictor variable 'Contentiousness' was assessed in terms of the Costa and McRae (1992) NEO Five-Factor Inventory (NEO-FFI). This is a shortened version of the (Neo-PI-R) scale. High internal consistency levels were demonstrated; the Cronbachs Alpha scores for this scale was .81. The item numbers for 'Conscientiousness' in this sub-scale is items 46-55. An example of the items stated in this section is; *"I am always prepared*." Items 51, 52, 53, 54 and 55 were reversely scored. Low scores indicated high levels of Contentiousness.

Predictor Variable 5: Extraversion

The predictor variable 'Extraversion' was assessed in terms of the Costa and McRae (1992) NEO Five-Factor Inventory (NEO-FFI). This is a shortened version of the (Neo-PI-R) scale. High internal consistency levels were demonstrated; the Cronbachs Alpha scores for this scale was .86. The item numbers for 'Extraversion' in this sub-scale is items 56-65. An example of the items stated in this section is; *"I feel comfortable around people*." Items 61, 62, 63, 64 and 65 were reversely scored. Low scores indicated high levels of Extraversion.

Predictor Variable 6: Neuroticism

The predictor variable 'Neuroticism' was assessed in terms of the Costa and McRae (1992) NEO Five-Factor Inventory (NEO-FFI). This is a shortened version of the (Neo-PI-R) scale. High internal consistency levels were demonstrated; the Cronbachs Alpha scores for this scale was .86. The item numbers for 'Neuroticism' in

this sub-scale is items 66-75. An example of the items stated in this section is; *"I have frequent mood swings*." Items 71, 72, 73, 74 and 75 were reversely scored. Low scores demonstrated high neuroticism.

Predictor Variable 7: Openness to Experience

The predictor variable 'Openness to Experience' was assessed in terms of the Costa and McRae (1992) NEO Five-Factor Inventory (NEO-FFI). This is a shortened version of the (Neo-PI-R) scale. High internal consistency levels were demonstrated; the Cronbachs Alpha scores for this scale was .82. The item numbers for 'Openness to experience' in this sub-scale is items 76-85. An example of the items stated in this section is; *"I have a vivid imagination*." Items 81, 82, 83, 84 and 85 were reversely scored. Low scores depicted high extraversion levels.

Procedure

Data collection commenced after participants fully understood and accepted the participant information sheet (Appendix 5) and consent form (Appendix 5). The participant's sex and age was then recorded (appendix 9) to examine any discrepancies within the data. Subsequently, an eighty-five-item questionnaire was completed taking approximately twenty minutes (Appendix 4). This questionnaire was delivered through "Qualtrics" (Appendix 3) - an online questionnaire generator. This method was adopted, as it is believed to be an easy tool for participants to input their responses, but also for the researcher to compose the questionnaire and later extract the data for analysis. Upon the completion of the questionnaire, the de-brief sheet was read (Appendix 7) and a unique participant code was created (Appendix 8). Lastly, participants' were thanked for their involvement.

Data Analysis

Pearsons Correlation Coefficient

All statistical analyses were completed using SPSS- 21.0. Firstly, a Pearsons correlation coefficient (*r*) was conducted to investigate the extent of association between variables and the degree of variation (Creswell, 2002) ranging between -1.00 and +1.00 (Cooper and Schindler, 2014). The relationship between the criterion and predictor variables was displayed via a correlation matrix, which can be found at Table 1.

Hierarchical Multiple Regression

To investigate how much variance in Stress and Anxiety is accounted for by religiosity and mindfulness in the presence and absence of personality factors, a two-stage hierarchical multiple regression using the enter method was deemed a suitable method of analysis (Darren and Paul, 2012). Prior to conducing the analysis, relevant assumptions of this statistical analysis were examined. Tests concluded that the data met the assumptions for no multicollinearity (Coakes, 2005; Hair et al., 2014) and no independent errors (Durbin-Watson = 2.02). A further analysis of standard residuals identified that the data obtained no outliers (Std. Residual Min = -

1.57 Std. Residual Max = 2.58), and scatter plots demonstrated the assumptions of linearity and homogeneity was all satisfied (Hair et al., 2014). As all the assumptions were met the hierarchical multiple regression analysis (R^2) commenced, through a fixed order of entry the extent to which the predictor variables predicted the criterion was determined, this can be viewed at Table 2.

Ethical considerations

This study was conducted in accordance to the BPS ethical guidelines and received ethical approval from the research supervisor. Participants were made aware of their confidentiality, anonymity and of their right to withdraw their data from the study (Appendix 6). Participants were fully informed of the aims and purpose of the research and were not deceived during this study (Appendix 5). All participant information was stored on a password-protected laptop at the access of only the researcher, and will be deleted after the submission of this report to ensure participant safety.

Upon the use of previously published scales during the construction of the questionnaire, the creators of these scales were informed of their use and were given the opportunity to receive the findings of the study (Appendix 1). Meanwhile the risk of potential harm was low, it was ensured that the questions used in these scales were kept broad and sensitive to personal issues, such as avoiding information regarding any diagnosed anxiety disorders, this may be considered a personal matter, which they may not wish to disclose. However, additional support services were still provided as in the debrief form (Appendix 7) as a precaution.

Results

Descriptive Statistics

Table 1

A Correlation Matrix between religiosity, mindfulness, the big five personality traits and Stress and Anxiety.

Variable	Stress and Anxiety	Religiosity	Mindfulness	Agreeableness	Contentiousness	Extraversion	Neuroticism	Openness
Stress and Anxiety		-.10	-.46***	-.31***	-.44***	-.26**	.62***	-.23**
Religiosity			.01**	.31**	.21*	.03	-.24**	.04
Mindfulness				.20*	.50***	.18*	-.59***	.35***
Agreeableness					.32***	-.10	-.30***	.03
Contentiousness						.10	-.50***	.18*
Extraversion							-.52***	.26*
Neuroticism								-.13
Openness								

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

Pearsons correlations were computed for each variable. Table 1 demonstrates the correlation matrix. A strong positive correlation between neuroticism and stress and anxiety, $r(114) = .62$, $p < .001$ was observed. Additionally, there was also a strong negative correlation between mindfulness and stress and anxiety, $r(114) = -.46$, $p < .001$. Furthermore, contentiousness $r(114) = -.44$, $p < .001$, agreeableness $r(114) = -.31$, $p < .001$, extraversion $r(114) = -.26$, $p < .01$, openness $r(114) = -.23$, $p < .01$, and religiosity $r(114) = -.10$, $p = .16$ were negatively correlated with stress and anxiety, however religiosity was not statically significant.

To investigate the extent to which religiosity, mindfulness and the big five personality traits predicted Stress and Anxiety, a separate two-stage hierarchical multiple regression was conducted. Religiosity and mindfulness were entered at stage one of the regression as the main predictors, to observe their effects on stress and anxiety and further knowledge into these relationships. Next, the big five personality traits were entered at stage two; this order seemed plausible to investigate the influence personality traits may have on these relationships. See table 2.

Hierarchical Regression analysis

Table 2

A table providing a summary of the hierarchical regression analysis between the seven predictor variables on stress and anxiety.

Variable	B	*SE B* (std. Error)	β	*t*
Stage 1				
Religiosity	.01	.05	.02	.17
Mindfulness	-.36	.06	-.47	-5.37***
Stage 2				
Religiosity	.06	.05	.10	1.34
Mindfulness	-.04	.08	-.06	-.58
Agreeableness	-.20	.13	-.12	-1.49
Contentiousness	-.11	.09	-.11	-1.24
Extraversion	.05	.09	.06	.62
Neuroticism	.49	.11	.53	4.39***
Openness	-.14	.09	-.14	-1.67

Note: For step 1: $R = .46$ $R^2 = .21$ $\Delta R^2 = .20$, $p < .001$; for step 2: $R = .67$ $R^2 = .45$ $\Delta R^2 = .41$, $p = .01$; * $p < .05$, ** $p < .01$, *** $p < .001$.

Prior to conducing a hierarchical multiple regression, the relevant assumptions of this statistical analysis were tested. Firstly, a sample size of 114 was deemed adequate given seven independent variables to be included in the analysis in which Green, (1991) suggested 106 participants as appropriate via the formula: N > 50 + 8m (where m is the number of independent variables). An examination of correlations (see Table 1) revealed that some independent variables were highly correlated such as mindfulness and neuroticism. However, as the collinearity tests indicated that the data met the assumption of no multicollinearity (Coakes, 2005; Hair et al., 2014) (Religiosity, Tolerance = .55, VIF = 1.80; mindfulness, Tolerance, VIF = 1.80; agreeableness, Tolerance = .55, VIF = 1.80; contentiousness, Tolerance = .55, VIF = 1.80; extraversion, Tolerance = .55, VIF = 1.80; neuroticism, Tolerance = .55, VIF = 1.80; openness, Tolerance = .55, VIF = 1.80). Furthermore, the data met the assumption of independent errors (Durbin-Watson = 2.02). An analysis of standard residuals was carried out, which indicated that the data contained no outliers (Std. Residual Min = -1.57 Std. Residual Max = 2.58). Residual and scatter plots indicated the assumptions of linearity and homogeneity was all satisfied (Hair et al., 2014) (see Appendix 13 for all SPSS output).

The hierarchical multiple regression revealed that at stage one, religiosity and mindfulness contributed significantly to the regression model, (F(2,111) = 15.06, p < .001).The relationship between variables were strong (R = .46) and accounted for approximately 21% (ΔR^2 = 19.9%) of the variance in stress and anxiety scores. Although, mindfulness had a statistically significant impact, β = -.47, t(114) = - 5.37, p < .001, whereas religiosity did not, β = .02, t(114) = .17, p = .87. Adding stage 2 to the regression model accounted for an additional 24% (ΔR^2 = 41.3%) of variation in stress and anxiety and this change in R^2 was significant, (F(7,106) = 12.35, p < .001) and the relationship between these variables were strong (R = .67). However, of the five personality traits only neuroticism was a significant predictor of stress and anxiety (Agreeableness, β = -.12, t(114) = - 1.49, p = .14; contentiousness, β = -.11, t(114) = - 1.24, p = .22; extraversion, β = .06, t(114) = .62, p = .54; neuroticism, β = .53, t(114) = 4.39, p < .001; openness, β = -.14, t(114) = - 1.67, p < .10) and neither Religiosity nor mindfulness were significant predictors of stress and anxiety (Religiosity, β = .10, t(114) = 1.34, p = .18; mindfulness, β = -.06, t(114) = - .58, p = .56). Hence, the most important predictor of stress and anxiety was neuroticism. Together the seven predictor variables accounted for 45% of the variance.

These results provide insight regarding the research question as they illustrate that even before the big five personality traits are entered into the model, Religiosity is still unable to account for a significant amount of the variance in stress and anxiety. Moreover, it is also demonstrated from the change in the R^2 value of the model that personality traits are able to account for approximately a further 24% of variation in stress and anxiety.

As shown in Table 1, one personality trait of particular interest is that of neuroticism as an indirect effect was observed between mindfulness and stress and anxiety. A significant total effect of mindfulness is shown to consist of a direct effect (as mindfulness decreases stress and anxiety increases) (r = -.46, p < .001) and a negatively indirect effect (as mindfulness decreases neuroticism increases (r = -.59, p < .001) and as neuroticism increases, stress and anxiety increases also (r = .62, p < .00)). This relationship is evident in Table 2. as the effects of mindfulness become non-significant within Stage 2 of the model in which neuroticism is added. These results lead to a second hierarchical multiple regression being conducted to further observe this effect with mindfulness at stage 1 and neuroticism at stage 2, the results of which are presented in Table 3.

Table 3

A table providing a summary of the hierarchical regression analysis between mindfulness and neuroticism on stress and anxiety.

Variable	B	*SE B* (std. Error)	B	*t*
Stage 1				
Mindfulness	-.34	.06	-.46	-5.51***
Stage 2				
Mindfulness	-.11	.07	-.15	-1.67
Neuroticism	.49	.08	.53	5.87***

Note: For step 1: R= *.46* R^2 = .21 ΔR^2 = .21, p < .001; for step 2: R= *.63* R^2 = .40 ΔR^2 = .39, p = .01; * p < .05, ** p < .01, *** p < .001.

The second hierarchical multiple regression revealed that at stage one, mindfulness contributed significantly to the regression model, (F(2,111) = 30.36, p < .001), with a statistically significant impact β = -.46, t(113) = - 5.51, p < .001.The relationship between variables were strong (R = .46) and accounted for approximately 21% (ΔR^2 = 21%) of the variance in stress and anxiety scores. Adding stage 2 to the regression model accounted for an additional 19% (ΔR^2 = 39%) of variation in stress and anxiety and this change in R^2 was significant, (F(7,106) = 36.97, p < .001) and the relationship between these variables were strong (R = .63). While neuroticism was a significant predictor of stress and anxiety, β = .53, t(113) = 5.87, p < .001; mindfulness became non-significant, β = -.11, t(113) = - 1.67, p = .56. Together the two predictor variables accounted for 39% of the variance. Hence, this observation gives rise to an indirect effect between these variables however, further research will need to conduct a mediation analysis to be certain of this claim. A summary of this relationship can be found in Figure 1. Below.

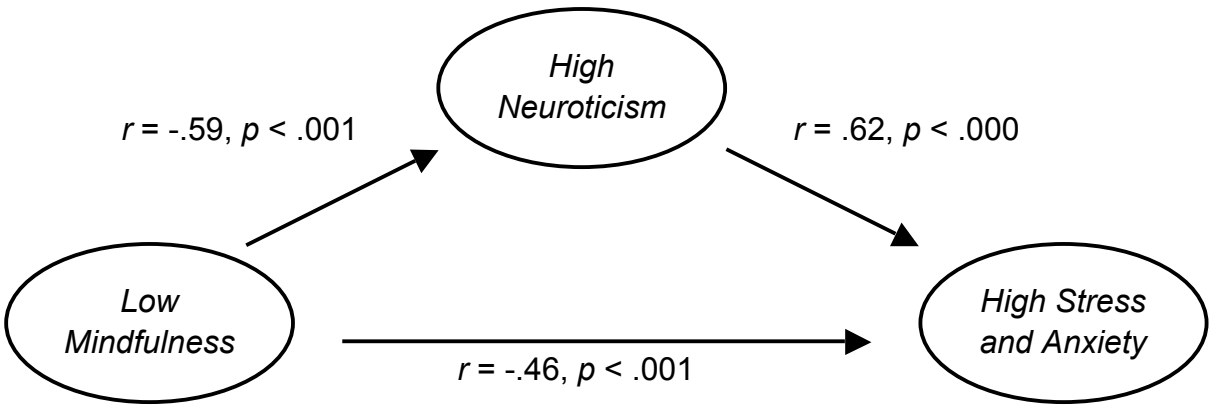

Figure 1: A diagram demonstrating the relationship between mindfulness, neuroticism and stress and anxiety

Discussion

The present research intended to investigate the effects of religiosity, mindfulness and the big five personality traits on stress and anxiety. The findings illustrated that while religiosity and mindfulness were both predictors of stress and anxiety, only mindfulness held a significant contribution. Of the big five personality traits only neuroticism was a highly significant predictor. Furthermore, a by-product of analysis uncovered an indirect effect between mindfulness and neuroticism on stress and anxiety.

Religiosity

Religiosity was found to negatively correlate with the criterion variable, revealing that more religious individuals experience lower stress and anxiety. This finding is consistent with the notion that religion alleviates stress as suggested by Finney and Maloney (1985), which found a significant association between religious practices such as engaging in prayer and reduced anxiety. Consequently, this research contradicts Thompson and Vardman's (1997) study, which illustrated that religious coping activities were related to significantly more psychological distress in the face of trauma.

However, analyses highlighted that religiosity was the weakest variable, unable to account for a significant amount of the variance within stress and anxiety even in the absence of the big five personality traits. Thus, the strength of support for this relationship is limited. Therefore, it can be argued that the simplistic scale and definition used within this study may have contributed to this non-significant result (Gorsuch and Butler, 1976). The multi-faceted nature within religion should have been taken into account as religious individuals may practice religion through different means, which impacts their psychological adjustment to stress (Ano and Vasconcelles, 2005). Future research should look more closely at particular components within religiosity such as the promotion of forgiveness or prayer, which may be more closely linked to stress and anxiety rather than assessing religiosity as a whole.

Mindfulness

The present investigation found a negative correlation between mindfulness and the criterion variable, indicating that mindful individuals experience lower stress and anxiety. This finding is in line with a comprehensive meta-analysis by Khoury et al., (2013) which found that mindfulness based therapy (MBT) is a particularly effective treatment for reducing anxiety and stress in pre-post comparisons. Furthermore, analyses demonstrated that mindfulness is a highly significant predictor of the criterion, accounting for 21% of the variance in the absence of the Big Five personality traits. This result is supported by a recent study by Vesa et al., (2016), which also found that web-based Mindfulness training significantly reduces levels of perceived stress and anxiety in participants. However, it is important to note that

Vesa et al., (2016) measured mindfulness using the five facet mindfulness questionnaire (FFMQ) (Baer et al., 2006). Therefore, it is interesting to note that even though the present study used the MAAS to measure mindfulness, the findings were still consistent with the literature above.

The Big Five Personality Traits

The current findings revealed that whilst agreeableness, contentiousness, extraversion and openness held a negative relationship with the criterion, neuroticism was positively related. Whereas all relationships were significant, neuroticism, contentiousness and agreeableness were the most significantly linked to the criterion. This partially coincides with previous literature, which also found neuroticism and contentiousness to be highly related to stress and anxiety (Vollrath and Torgerson, 2001). However, current analyses not only illustrated a highly significant association between agreeableness and stress, which previous literature such as Kotov et al., (2010) has failed to uncover, but also this relationship was found to be negative which contradicts research by Chu et al., (2015) who observed a positive relationship between these two variables. Hence, future research should further examine agreeableness and the effects it may contribute to psychological well-being.

After further analyses the current study demonstrated that the big five personality traits accounted for 24% of variation in stress and anxiety. After the big five personality traits were added to the model mindfulness became no longer significant, only neuroticism held a highly significant association to the criterion. Hence, a by-product of analyses uncovered an indirect effect between mindfulness and neuroticism on stress and anxiety. This conception demonstrated within the current study, has been observed in past research as Wenzel et al., (2015) proposed that the negative emotional reactivity related to Neuroticism is moderately due to low levels of mindfulness. In light of this, it is suggested that mindfulness influences the relationship between neuroticism and anxiety (Kong, 2015) and this framework has even been demonstrated in the face other psychological disorders such as depression (Barnhofer et al., 2011). Consequently, future research should further explore this effect perhaps by conducting mediation analyses to be more certain of these claims.

Limitations and Future Research

In addition to recommendations already proposed in relation to the findings of the present study, general limitations and suggestions are also considered below.

Firstly, the issues surrounding the sample must be brought to light. The use of students aged 19-24 is not representative of the population as research suggests a clear difference within stress and coping responses in relation to age (Folkman et al., 1987). A study suggests younger individuals experience more stress and are less able to regulate their reactions towards stressors (Birditt et al., 2005) hence, the findings brought about within the prevailing study may not be generalisable to those of older generations.

In addition, research has concluded that women have consistently higher prevalence rates of anxiety disorders (McLean et al., 2011). As women are almost twice as likely as men to be diagnosed with an anxiety disorder in the UK (MHF, 2016). This study consisted of twice as many females than males (Females = 78, Males = 36) hence results may be overstated and therefore not generalisable to males. Future research could investigate these predictor variables in relation to gender and age differences to allow for a more representative exploration within the stress and health domain.

Secondly, the methodology may be criticised for the lengthy questionnaire consisting of 85 items. Rolstad et al., (2011) found longer questionnaires result in greater 'response burden' that is; increased effort by participants to complete a questionnaire. Consequently, the extensive measure used within the present study may have lead to fatigue within the participants, which could have impacted the results. For future improvements, considering neuroticism was the only significant predictor of stress and anxiety within the big five personality traits, neuroticism should be independently explored to further understanding within stress research and improve methodology.

Results obtained via self-report measures must be interpreted with caution as social desirability bias may have occurred. This arises most often when individuals do not complete the questionnaire honestly with the goal to convey themselves in a more favourable manner. Therefore, findings may lack validity as interactions between the predictor variables and the criterion may be concealed (Podsakoff et al., 2003). Future research could conduct indirect questions which involves a projective technique requiring participants to respond to structured questions from the perspective of another, in order to mitigate the effects of social desirability bias (Fisher, 1993).

However, it is acknowledged that mindfulness research is still in its formative years (Giluk, 2009). Therefore, the current study was a valuable investigation that furthered understanding surrounding mindfulness and its relation to novel variables, which is essential to investigate the validity of theoretical constructs (Cronbach and Meehl, 1995). Although, the structural framework examined within the present study would benefit from future investigations in order to further knowledge within the stress and health domain.

Implications of the findings

The present study enhanced knowledge surrounding religiosity, mindfulness and personality on stress and anxiety, and shed light upon areas for future examination. Understanding the processes and influences within stress and anxiety is of paramount importance as anxiety disorders are one of the most predominant mental health problems, with a prevalence of approximately 7.3% worldwide (Baxter et al., 2013). While this debilitating disorder is negatively impacting lives of many, it also contributes to substantial social and economic costs. According to the Mental Health Foundation (MHF) anxiety and stress related problems constituted to 17.6 million days' sick leave taken in the UK (MHF, 2016).

Hence, the present findings of strong associations between mindfulness and stress and anxiety provide support for this relatively new concept. The knowledge of the interaction between mindfulness and neuroticism could yield preventative measures for individuals who are highly susceptible to anxiety in stressful environments such as in the workplace. For instance, some workplaces conduct personality tests to gain knowledge of the employee's strengths for their sustainability of certain roles within organisations. Upon analyses of the results of the psychometric data, employees who score highly on neuroticism, mindfulness interventions could be implemented as research suggests an association with positive psychological outcomes, which will benefit both the employees and organisations.

Another implication for this research is the relationship between religiosity and stress and anxiety. Arguably it should be interpreted with caution, as the association was deemed non-significant. However, the negative relationship highlighted some significant implications for future research and provides the potential to aid interventions. For instance, if research looked more closely into particular facets of religion, which are more closely linked with lower stress and anxiety, these components could be further studied and utilized within interventions conducted with religious patients to enhance the positive affects of religious coping as demonstrated by previous literature.

Conclusion

To conclude, the current study highlighted evidence establishing relationships between the predictor variables of religiosity, mindfulness and personality on the criterion variable of stress and anxiety. Additionally, this study has particularly enhanced knowledge surrounding the interaction between mindfulness, neuroticism and stress and anxiety. Implications for future research were proposed in order to deliver a more comprehensive and in-depth examination into this psychological field.

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