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The Effects of Somatisation, Depression, and Anxiety on Eating Habits among University Students

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Abstract

While it is known that depression and anxiety are associated with poor eating habits, little is known about relationships between these common psychological disorders, somatisation and poor eating habits. The aim of this study was to investigate the effects of depression, anxiety and somatisation on eating habits across gender in university populations. University students (*N* = 167) participated in the study by completing an internet based survey. No specific gender differences were found for depression, anxiety or eating habits scores. However, females had significantly higher somatisation scores. Higher somatisation scores were significantly positively associated with reported depression, reported anxiety and poorer eating habits. Regression analyses showed that, after controlling for demographics including gender, somatisation and depression were predictive of poorer eating habits. Since poor eating habits can influence wellbeing as well as performance, future research should focus on exploring somatisation among university students and within the general population.

Key words: somatisation, depression, anxiety, eating habits, university students, eating, food, weight, eating styles, psychopathology, psychiatric, eating disorders

Introduction

Inadequate dietary intake has been shown to affect concentration, memory and other cognitive functions (Kretchmer, Beard, & Carlson, 1996), with a decline in the performance of cognitive tasks. These, in turn, affect academic success among university students (Florence, Asbridge, & Veugelers, 2008). Students' eating habits are generally poor and lacking in adequate dietary nutritional intake (Boek, Bianco-Simeral, Chan, & Goto, 2012; Davy, Benes, & Driskell, 2006; Driskell, Kim, & Goebel, 2005; Jackson, Berry & Kennedy, 2009). While it has been found that university environments generate high levels of anxiety and depression (Dyson, & Renk, 2006; Misra, & Castillo, 2004), recent research exploring the relationships between anxiety, depression and eating habits demonstrates that there may be additional, unexplained factors which contribute to poor eating among university students (Macht, 2008). For example, somatisation has been linked with both depression and anxiety (Bitsika, Sharpley, & Melhem, 2010; Hanel et al., 2009). However, the effects of somatisation on eating habits have not been investigated. The current study explores the relationships between depression, anxiety and somatisation on eating habits in a university population, across gender.

There has been many studies investigating eating habits in university populations. However, most of the research has focused on overweight, obesity, and the intake of protein, carbohydrate, fat, fibre, energy and the basic food groups such as cereals, vegetables, fruit, milk, bean products (Madanat, Lindsay, Hawks & Ding, 2011; Mesas, Muñoz-Pareja, López-García, & Rodríguez-Artalejo, 2012). These are measured per the recommended dietary guidelines (Australian National Health & Medical Research Council, 2003) for a healthy diet, rather than the actual food choices, patterns of food intake and the underlying reasons behind these eating habits.

Starting university is an important transitional period, as students are faced with increased responsibilities. They may experience more anxiety and stress due to increased workloads, academic pressures, newfound social networks, food selection and meal planning, altered sleep patterns, limited financial resources and loneliness (Kandiah, Yake, Jones, & Meyer, 2006; Papadaki, Hondros, Scott, & Kapsokefalou, 2007; Surtees, Wainwright & Pharoah, 2002). Studies have reported that university students generally have unhealthy eating habits (Driskell et al., 2005; Grace, 1997; Jackson et al., 2009; Papadaki et al., 2007). Various factors such as adjusting to different living arrangements, costs, limited finances, shortage of time, snacking, convenience and easy access of fast convenience foods are well know determinants of poor food selection and unhealthy eating habits (Boek, Bianco-Simeral, Chan, & Goto, 2012; Davy et al., 2006; Driskell et al., 2005; Papadaki et al., 2007).

A number of factors have been reported to influence the differences in eating habits of university students across gender. These factors include shortage of time, convenience, taste, weight control, physical and social environment, cultural factors, cost and health (Davy et al., 2006; Steptoe, Pollard, & Wardle, 1995). A common trend has emerged in the literature, showing that taste and convenience are common factors which tend to influence food choices among males; whereas females' preoccupation with physical appearance, body shape and a desire for thinness creates a strong desire for weight control, heightening their sensitivity and concern about fat and calorie content (Rappoport, Peters, Downey, McCann, & Huff-Corzine, 1993; Wardle et al., 1997; Wardle et al., 2004). Females tend to practice healthier eating habits than males due to their concern over weight control (Davy et al., 2006; Deshpande et al., 2009; Kwan, 2011; Li et al., 2012; Santos, 2009; Steiger, Stotland, Ghadirian & Whitehead, 1995), whereas, males have little interest in learning about nutrition or cooking, give lower priority to health concerns and are not concerned about their weight, hygiene or diet (Li et al., 2012). In addition, females' attempts to control weight often leads to restrained eating styles whereas, males' desire for a more muscular body shape is often associated with unrestrained eating styles (Oliver, Wardle, & Gibson, 2000).

Research exploring gender differences in eating habits among university populations appears to be inconsistent. For example, several studies (Guagliardo, Lions, Darmon, & Verger, 2011; Wardle et al., 1997; Wardle et al., 2004) have reported that female students eat more fruit, try to consume more fibre, eat less red meat and avoid high-fat foods. In contrast, male students consume more high-fat foods, eat fewer fruits and vegetables, eat fewer low-fat foods, choose fewer high-fibre foods, and consume more soft drinks than women do. Interestingly, studies have consistently reported that during stressful periods, females and restrained eaters eat more snack-type foods (sweets and ready-to-eat food) than meal-type foods (meat and vegetables), consuming more calories and fat (McCann et al., 1990; Oliver & Wardle, 1999), while males and unrestrained eaters have a reduction or little difference in food intake during stressful periods (Bellisle et al., 1990; Grunberg & Straub, 1992).

Prolonged periods of stress are associated with anxiety and depression and are evident among university populations worldwide (Bayram & Bilgel, 2008; Horstmanshof, Punch, & Creed, 2008; Stader & Hokanson, 1998). A decline in mental health among university students has been associated with academic stress-perceived events such as exams, elevated workload or cognitive tasks (Bayram & Bilgel, 2008; McCann, Warnick, & Knopp, 1990; Michaud et al., 1990; Pollard et al., 1995;

Yannakoulia, et al., 2008) as well as a lack of family and social support, financial strain and limited cooking skills (Gan et al., 2011).

Global research confirms that these emotional states influence changes in eating behaviours in humans (Greeno & Wing, 1994; Macht, 2008; Michels et al., 2012; Oliver et al., 2000; Pollard et al., 1995). University environments precipitate high levels of stress, anxiety and depression that may contribute to poor eating habits (Dyson, & Renk, 2006; Misra, & Castillo, 2004; Oliver et al., 2000). Anxiety and depression have been linked to changes in appetite, with a decline in healthy food choices and eating habits (Fulkerson et al., 2004). However, findings in the literature regarding the impact of depression and anxiety on eating habits have been conflicting. For example, one study reported that anxiety had no influence on eating habits or food preferences (Bellisle et al., 1990), while other studies reported that depression and anxiety significantly influenced food choices and energy intake that impacted upon eating habits (Oliver et al., 2000; Zellner et al., 2006). It appears that stress-perceived events such as exam-stress, elevated workloads and cognitive tasks are what result in increases in energy intake (Chaput & Tremblay, 2007; McCann, Warnick, & Knopp, 1990; Michaud et al., 1990; Pollard et al., 1995).

Barsky, Wyshak and Klerman (1990) found that depression and anxiety foster somatisation. where physical symptoms exist, suggesting there is an underlying medical condition, however no medical condition can be found or the medical condition does not entirely account for the level of functional impairment. Somatisation is commonly considered a psychiatric disorder, often occurring in combination with other psychiatric disorders (Hanel et al., 2009; Oyama et al., 2007). High rates of comorbidity are reported between somatisation, depression and anxiety (Hanel et al., 2009; Henningsen, Zimmermann, & Sattel, 2003; Leibbrand, Hiller & Fichter, 1999; Oyama et al., 2007), although is unclear whether somatisation is a predictor of depression and anxiety or vice versa (Henningsen et al., 2003). The term somatisation is included under the umbrella of somatoform disorders, where there is the presence of physical symptoms suggesting there is an underlying medical condition, however no medical condition can be found or the medical condition does not entirely account for the level of functional impairment (American Psychiatric Association, 2000; DSM-IV-TR; Lock & Giammona, 1999). Physical symptoms experienced by the individual are real and not imaginary or intentional (So, 2008) and the symptoms must cause significant distress or impairment in occupational, social or other areas of functioning to become a diagnosable disorder (Lock & Giammona, 1999). Somatisation disorder is polysymptomatic in nature; is characterised by a combination of pain, gastrointestinal, sexual and pseudo-neurological symptoms; and begins before age 30, lasting for several years (American Psychiatric Association, 2000; DSM-IV-TR).]

Evidenced-based and peer reviewed literature were consulted, examining the prevalence of somatisation among university populations, and thisrevealed a paucity of studies.. There appears to be no previous research investigating the association between somatisation and eating habits among university populations. Scaloubaca, Slade and Creed, (1988) appears to be the only study indicating that adverse life events lead students to seek medical attention. Because somatoform symptoms often lead to anxiety and depression (Oyama et al., 2007), it was of interest in this study to further explore these issues among university students, to investigate the effect on eating habits. High levels of psychological distress and poor nutritional intake from unhealthy eating habits affect students' ability to concentrate and learn new material and threaten their academic success. The additional contribution of somatisation symptoms in this group is of interest.

The purpose of the current study was to investigate eating styles/eating habits across genders in a university population and to further examine the association of anxiety and depression on eating styles/habits, and include the effects of somatisation on eating habits in a university population. With the inconsistencies that have emerged in previous literature, and the lack of understanding about the impact of somatisation, it is anticipated that the current study would provide a clearer understanding of

the eating habits among university populations. The specific focus of the present study was to examine the association between depression, anxiety and somatisation and the eating styles/habits across gender in university students.

Hypotheses

On the basis of existing research and theory the following hypotheses were formulated:

1. There would be gender differences in somatisation, depression, anxiety and eating habits. It was predicted that females would self report better eating habits (as indicated by the Eating Styles Questionnaire (ESQ; Scherwitz & Kesten, 2005), higher somatisation scores (as indicated by The Patient Health Questionnaire-15; PHQ-15; Spitzer, Kroenke, & Williams, 1999), higher anxiety and higher depression scores (as indicated by The Depression, Anxiety, Stress Scales (DASS21; Lovibond & Lovibond, 1995) than males.
2. It was also hypothesized that higher self-reported levels of somatisation (on the PHQ-15) would be associated with higher self-reported levels of depression and anxiety (on the DASS21) and poorer self-reported eating habits among all university students.
3. It was hypothesized that higher scores on somatisation would predict poorer eating habits among all university students, and that somatisation would explain more variance in eating habits than would depression or anxiety.

Methods

Participants

A total of 199 participants initiated the survey, however 27 (13.6%) contained partial or fully incomplete responses. An additional two cases were excluded as they were under 18 years old. After excluding missing data (N=3) and cleaning of the data, 167 participants provided useable responses for the study, including 121 females (72.9%) and 46 males (27.1%), ranging in age between 18 to 52 (M = 22.34, SD = 5.82). Some participants were recruited from a sample of first year psychology students from Bond University who received course credit for participating, while others were recruited using social networking websites.

Demographics

The research included demographic questions such as gender, education level, race, and relationship status as well as the quantitative demographic variable of age. One hundred and forty participants (89.7%) identified themselves as Caucasian, with a smaller number of Asians (7.1%), African Americans (1.3%), Indigenous Australians (1.3%), and Pacific Islanders (0.6%).

Eating Styles Questionnaire

The seven eating style subscales developed by Kesten et al., (2005) and example items include: (1) Sensory-Spiritual Nourishment (Cronbach's α = .92), *I focus solely on food and the experience of dining*; (2) Emotional Eating (Cronbach's α = .85), *I eat because I feel anxious*; (3) Fresh Food, Fast Food (Cronbach's α = .84), *I eat meals that are homemade*; (4) Food Fretting (Cronbach's α = .90), *I feel anxious about the "best" way to eat*; (5) Task Snacking (Cronbach's α = .78), *when I eat, I am driving*; (6) Eating Atmosphere (Cronbach's α = .79), *the social atmosphere in which I prepare food is hectic*; and (7) Social Fare, *I celebrate special occasions with others with festive foods* (Cronbach's α = .74). The frequency of these factors and their influence on eating and nutrition are determined, while identifying eating patterns linked to overeating, overweight and obesity. The scale consists of 76 items, with a five-point scale with some sections having positive (+) number scoring and others negative (-) number scoring. The scores (regardless of positive or negative orientation) were: 0 indicating *never,* +/- 1 indicating *rarely*, +/- 2 indicating *sometimes*, +/- 3 indicating *usually*, +/- 4

indicating *almost always*, +/- 5 indicating *always*. Example questions were “I eat only when I am hungry” and “I overeat”. All scores are totalled for each section, with sub-totals for negative scores subtracted from sub-totals of positive scores, providing totals for these sections. Each section has a scoring key for interpreting score totals for each section, with the highest scores of 131 or over identifying ‘excellent’ eating habits as being, while scores of -15 and below defining eating habits that ‘need improvement’ . Several items in the questionnaire are reverse-scored to avoid response bias. The reliability of the questionnaire is excellent, with significant correlations between the items (see Scherwitz & Kesten, 2005). The Eating Styles Questionnaire
for the present study had a Cronbach's Alpha of .91.

Depression, Anxiety, Stress Scales (Dass21)

The DASS21 (Lovibond & Lovibond, 1995) was included to measure levels of depression, anxiety and stress. The DASS 21 is a shorter version consisting of 21-items from all subscales of the DASS. The Depression scale measures low positive affect, low self-esteem, and hopelessness (e.g. “I felt sad and depressed”); the Anxiety scale assesses physiological hyper-arousal, autonomic arousal and fearfulness, (e.g., “I felt I was close to panic”); and the Stress scale measures tension, irritability, and negative affect, (e.g. “I found that I was very irritable”; Clara, Cox, & Enns, 2001; Lovibond & Lovibond, 1995). A four-point severity/frequency scale is used to indicate the extent to which the emotional symptoms were experienced over the previous week, with 0 = did not apply to me at all, 1 = applied to me to some degree, or some of the time, 2 = applied to me to a considerable degree, or a good part of the time, 3 = applied to me very much, or most of the time . The totals from each scale must be multiplied by two before the interpretation stage. Scores for each scale are interpreted using a scoring template for severity ratings, with depression ranging from 0-9 (Normal) to 28+ = extremely severe; anxiety 0-7 = normal) to 20+ = extremely severe; and stress ranging from 0-14 = normal) to 34+ = extremely severe (Crawford & Henry, 2003; Lovibond & Lovibond, 1995). For the purpose of this research, only the depression and anxiety scales were utilized.

Studies on the psychometric properties of the scale showed high reliability (Brown, Chorpita, Korotitsch, & Barlow, 1997) and longitudinal studies also demonstrate good test-retest reliability (Brown et al., 1997; Nieuwenhuijsen, de Boer, Verbeek, Blonk, & van Dijk, 2003). Correlational analyses between the DASS scales and the Beck scales (Beck Depression Inventory; BDI and the Beck Anxiety Inventory; BAI) revealed good construct validity with high correlations between the corresponding scales (.65 and .75) and significantly lower correlations between non-corresponding scales (range -.22 to .07) establishing both convergent and discriminant validity (Antony et al., 1998; Nieuwenhuijsen et al., 2003). Cronbach's alpha scores rate the Depression scale at 0.91, the Anxiety scale at 0.84 and the Stress scale at 0.90 (Lovibond & Lovibond, 1995).

Somatisation

The Patient Health Questionnaire-15 (Spitzer, Kroenke, & Williams, 1999) was also included in the research, to assess somatic symptom severity and the potential presence of somatisation. The questionnaire consists of 15 items, which were measured on a three-point scale (0 indicating *not bothered at all*, 1 indicating *bothered a little*, 2 indicating *bothered a lot*). Scores are totalled and interpreted using the level of somatic symptom severity rating scale.

Studies on the psychometric properties of the questionnaire showed high reliability (Kroenke, Spitzer, & Williams, 2002). The internal consistency of items was excellent, with Cronbach’s alpha ranging between .80 to .87 and test-retest reliability of .65 (Kroenke, Spitzer, & Williams, 2002; Han, Pae, Patkar, Masand, Kim, Joe & Jung, 2009). It has also been found that the scale has good construct validity with item correlation of .48 (Han et al., 2009). Literature on the psychometric properties of the PHQ-15, also supports the validity of the PHQ-15. Correlational analyses between the PHQ-15 and the Beck Depression Inventory (BDI; r =.56) and The General Health Questionnaire (GHQ; r =.43) revealed good construct validity, establishing convergent validity (Han et al., 2009).

Social Desirability Scale (SDS)

A shortened version of the self report, Marlowe-Crowne's Social Desirability Scale, measuring personal attitudes and traits was also included in the research (Ray, 1984). The questionnaire is designed to detect individuals responding to questions in a socially desirable manner that would be viewed as culturally appropriate or acceptable to others (Barger, 2002). This response bias is problematic, as it can lead to under-reporting of bad behaviour or over-reporting of good behaviour, thereby distorting test results. Therefore a social desirability measure should be included in research where self-report measures are used (Klassen, Hornstra, & Anderson; Sârbescu, Costea, & Rusu, 2012). The questionnaire consisted of eight items, which are measured on a three-point scale, 1 for "Yes"; 2 for "Not Sure"; and 3 for "No". Scores are totalled with lower scores indicating greater tendencies towards producing socially favourable responses. Four questions are reversed scored to avoid response bias.

Ray (1984), conducted analysis on the reliability of the scale, reporting good internal consistency, with Cronbach's alpha ranging between .74 to .77. It should also be noted that other shortened versions of the Marlowe-Crowne Social Desirability Scale in various studies have been reported to be reliable and valid measures (Reynolds, 1982).

Procedures

After approval from the Bond University Research Ethics Committee, an email with a unique web address containing the questionnaires was sent to interested participants. Other participants were recruited via social networking websites, where the link to the web address containing the questionnaire, was included.

Results

Statistical analyses

Data was analysed using SPSS version 19.0. Hypotheses were analysed using one-way, between-groups, Multivariate Analysis of Variance (MANOVA) and hierarchical multiple regression. Bonferroni corrections were applied for univariate tests in the MANOVA to control for inflation of family-wise error rates. All tests were considered significant at $\alpha = .05$ unless otherwise stated. Variables were inspected for missing data and out-of-range values. Of 199 initiated surveys, 27 (13.6%) contained partial or fully incomplete responses. As the sample size was large, replacement of missing values was not considered necessary (Tabachnick & Fiddell, 2007, p.80) and the results were analysed excluding the missing scores. An additional two cases were excluded as they were under 18 years old.

Prior to the MANOVA and Regression analysis, the quantitative variables of Eating Style, Somatisation, Depression and Anxiety were inspected for normality and outliers using standardized measures of Skew and Kurtosis, Histograms and Box-plots. Standardized skew and kurtosis scores were evaluated using p=.01 (i.e. z= 2.58). As would be expected for a non-clinical population, significant positive skew was identified for depression and anxiety scores. A square root transformation was undertaken, which successfully normalised the data. Therefore, the transformed variables were used for further analysis. Less severe, but significant positive skew was also identified on the Somatisation variable. On closer visual inspection, the skew appeared to be due to three univariate outliers with individual scores greater than three standard deviations from the mean. The scores were removed both individually and together to assess their impact. As the scores did impact on the analysis and appeared not to be a part of the population, they were removed from subsequent

analysis. No other univariate outliers were identified on other variables. Excluding missing data, 167 cases were available for analysis.

Additional preliminary analysis was undertaken to detect possible social desirability bias in the results. A significant proportion of the participants (n=77) scored above the mid-point of the Social Desirability Scale (SDS; Ray, 1984). To test for possible influences of social desirability, independent groups t-tests were conducted comparing those above and below the cut-off on the dependent and independent variables used in the MANOVA and the regression. The t-tests showed that there were no significant differences between participants above and below the social desirability cut-off on any of the measures with 54.7% of participants having low SD of and 45.3% having high SD of indicating that social desirability bias was not a threat to the analysis.

Correlations

Correlation between the independent variables and the dependent variable Eating Habits are shown in Table 1. The results show three of the independent variables: Somatisation (r= -.27, p<.001), Depression (r= -.44, p<.001) and Anxiety (r=-.27, p<.001) to be significantly associated with Eating Habits. The weak to moderate negative correlations indicated that those that were higher on Somatisation, Depression and Anxiety were more likely to have poorer eating habits. The other significant findings were that Somatisation was positively correlated with Depression (r=.34, p<.001) and Anxiety (r=.40, p<.001), whilst Depression and Anxiety were also significantly positively correlated (r=.57, p<.001).

Table 1. **Correlation between the independent variables and the dependent variable Eating Habits**

	Variable	*1*	*2*	*3*	*4*	*M*	*SD*
1.	Eating Style	—				41.69	31.60
2.	Somatisation	-.30***	—			7.54	4.42
3.	Depression	-.45**	.34***	—		2.46	1.57
4.	Anxiety	-.28***	.40***	.57***	—	2.03	1.50

MANOVA

Investigation of MANOVA assumptions revealed no violation of Homogeneity of Covariance (Box's M = 15.64, p= .455). The unequal sample sizes (i.e., Male n=46 vs. Female n=121) may have reduced statistical robustness, however, this difference fell within the acceptable range and was not deemed problematic, particularly in light of the large total sample. A significant violations of Homogeneity of Variance (i.e., Levene's Test of Equality of Variance) was apparent for Somatisation, $F(1, 165) = 5.02$, p= .026. However, an Fmax test was conducted and the ratio of the largest to smallest variance was well under the cut-off value of three and was therefore not considered problematic (Tabachnick & Fiddell, 2007, p.80). MANOVA assumptions also require significant correlations between the dependent variables. The variables all four dependent variables were significantly correlated, with r values between .265 and .565, which justified the use of the MANOVA. Tolerance statistics generated from SPSS regression ranged from .586 to .802, indicating no problems with multicolinearity.

An investigation of multivariate normality was conducted using Mahalanobis distances (through SPSS regression with a critical chi-squared cut-off value of 16.27; α = .001), Cook's distance and standardised residuals. No problematic scores were identified. Means and standard deviations were calculated and are shown in Table 2.

Table 2. Means and standard deviations

	Females (n=121)		Males (n=46)	
Dependent Variables	Mean	*SD*	Mean	*SD*
Somatisation	8.66	4.37	4.74	3.19
Depression	2.52	1.56	2.32	1.60
Anxiety	2.15	1.51	1.72	1.46
Eating Style	40.82	32.87	45.74	30.14

The data was entered into one way (Male versus Female) between groups MANOVA with four dependent variables (Somatisation, Depression, Anxiety, and Eating Style). The analysis revealed a significant multivariate effect of Gender $F(5, 161) = 6.58$, $p < .001$, $\eta^2 = .17$. This represented a large effect with approximately 17% of the variance explained. Follow up univariate analyses found a significant gender difference for Somatisation $F(1, 165) = 30.72$, $p < .001$, $\eta^2 = .16$, in which Somatisation was significantly higher for females (CI_{95}: 7.93 - 9.39) than for males (CI_{95}: 3.55 - 5.93). There were no significant univariate gender differences for Anxiety $F(1, 165) = 2.73$, $p = .100$, $\eta^2 = .016$, Depression $F(1, 165) = .54$, $p = .46$, $\eta^2 = .003$ or Eating style $F(1, 165) = .78$, $p = .378$, $\eta^2 = .005$.

Hierarchical multiple regression

Hierarchical multiple regression was conducted to predict the dependent variable of Eating Habits. The main independent (predictor) variables were Somatisation, Depression and Anxiety. Prior to the regression analyses, the data was inspected for violations of assumptions and problematic scores using scatterplots, standardised residual plots, and residual scores. No scores were identified as being above significance cut-offs for Cook's distance or leverage. No scores were identified as a multivariate outlier (Mahalanobis distance > 10.82). Standardised residual plots also showed that assumptions of homoscedasticity, linearity, and independence of observations were met. For the hierarchical regression, age, education and relationship status were entered at step one as control variables. According to their theoretical importance, Gender was entered at step two, Somatisation was entered at step three, and Somatisation, Depression and Anxiety were entered at step four. The control variables, entered at step one did not significantly contribute to an explanation of eating style $F_{change}(3, 163) = 1.50$, *ns*. Gender also did not significantly contribute to an explanation of eating style $F_{change}(1, 162) = 1.05$, *ns*.

At step three, a significant amount of variance in Eating Habits (7.8%) was added by Somatisation $F_{change}(1, 161) = 14.04$, $p < .001$. Including Depression and Anxiety at step four added an additional 12% of the variance, which was also significant $F_{change}(2, 159) = 12.45$, $p < .001$. Overall, 19.7% of the variance in Eating Habits was accounted for $F(7, 159) = 6.83$, $p < .001$.

Unstandardised regression coefficients (*B*), standardised regression coefficients (β), and R^2 change for the independent variables are shown in Table 3. The significant predictors of Eating Habits were Depression and Somatisation. Inspection of squared semi-partial correlations showed that Depression ($sr^2 = .096$) was the strongest predictor with 10% of the variance in Eating Habits was explained. However, in the final model Somatisation whilst significant, was a weak predictor ($sr^2 = .02$) with only 2% of the variance in Eating Habits explained. Inspection of the direction of the relationship showed that participants who had lower Somatisation and lower Depression scores were more likely to have excellent eating habit scores.

In order to determine if Somatisation predicted above and beyond depression and anxiety which are known to predict Eating Habits, the above model was reversed. Age, education and relationship status were entered at step one and gender was entered at step two. Depression and Anxiety was entered at step three, and Somatisation was entered at step four. Again the control variables, entered at step one and two did not significantly contribute to an explanation of eating style F_{change} (3, 163) = 1.760, *ns*, and F_{change} (1, 162) = 1.04, *ns*. At step three, a significant amount of variance in Eating Habits (21%) was added by Depression and Anxiety F_{change} (2, 160) = 18.14, p <.001. Including Somatisation at step four added an additional 23% of the variance, which was also significant F_{change} (1, 159) = 4.42, p < .05. Collectively, Somatization emerged as a predictor capable of explaining a significant proportion of unqiue variance in Eating Habits, t(159) = -2.1, p < .05. T Unstandardised regression coefficients (*B*), standardised regression coefficients (β), and R^2 change for the independent variables are shown in Table 3.

Table 3. Unstandardised regression coefficients (*B*), standardised regression coefficients (β), and R^2 change for the independent variables

Predictor	ΔR^2	β	*B*	*SE B*	95% CI for *B*
Step 1	.03				
Constant			26.47	10.50	[5.74, 47.19]
Age		.10	.60	0.49	[-.37, 1.57]
Education		.06	3.68	5.41	[-6.99, 14.36]
Relationship Status		.06	4.57	6.37	[-8.02, 17.16]
Step 2	.01				
Constant			25.01	10.59	[4.09, 45.92]
Gender		.08	5.74	5.61	[-5.33, 16.81]
Step 3	.08				
Constant			42.87	11.25	[20.65, 65.08]
Somatisation		-.30***	-2.20	0.59	[-3.37, -1.04]
Step 4	.12				
Constant			56.82	10.97	[35.16, 78.49]
Somatisation		-.17*	-1.22	0.61	[-2.42, -0.02]
Depression		-.39***	-7.95	1.76	[-11.45, -4.44]
Anxiety		.03	0.66	1.90	[-3.10, 4.42]

Discussion

There was only partial support for the first hypothesis that there would be gender differences for eating habits, somatisation, anxiety and depression. As predicted, females had significantly higher somatisation scores than males. However, no specific differences between males and females were found for depression, anxiety or eating habit scores. Correlation analysis showed support for the second hypothesis, that high somatisation scores were associated with higher levels of self reported depression and anxiety scores, and poorer eating habit scores. In addition, the third hypothesis was supported. Regression analysis showed that higher somatisation scores did significantly predict

poorer eating habits, with 9% of the variance explained. Hierarchical regression showed combined somatisation, depression and anxiety scores predicted 12% of the variability in eating behaviours.

In order to determine if Somatisation predicted above and beyond depression and anxiety which are known to predict Eating Habits, the above model was reversed. Results indicated that will a significant amount of variance in eating habits was explained by Depression and Anxiety (21%), Somatisation added an additional 2% and emerged as a predictor capable of explaining a significant proportion of unique variance in Eating Habits. Therefore, Somatisation added 2% above depression and anxiety (Table 4), and depression and anxiety accounted for almost half of the association between somatisation and eating behaviours (Table 3).

This is of great interest as there is limited research on somatisation within university populations, and no research on the effects of somatisation on eating habits. The findings from the current research lends some support to the study by Scaloubaca et al. (1988), which found elevated somatic symptoms among university students, with no gender differences reported. However, these findings are inconsistent with other studies which have reported that eating habits are poorer during high periods of anxiety and depression, with females having better eating habits than males under normal circumstances (Davy et al., 2006; Deshpande et al., 2009; Kwan, 2011; Li et al., 2012; Steiger et al., 1995). The present study's findings on no gender differences for depression and anxiety lend support to a study by Gan et al. (2011), which was conducted with a sample of Malaysian university students, and found no differences between male and females on depression and anxiety. However, these findings are in contrast to an earlier study that found anxiety, but not depression, was higher among females (Eisenberg et al., 2007). Still others studies have reported that females have higher anxiety and males have higher depression scores (Adlaf et al., 2001; Grant et al., 2002).

The inconsistencies between these findings may be due to the diversities of national or cultural differences; i.e. cultural differences in[experience, expresssion and/or interpretations of psychological distress may be influencing the reporting of depression and anxiety symptoms. Another explanation for the inconsistent findings in relation to gender effects may be related to workload and the timing of this and other studies. Elevated workload, difficult cognitive tasks and exam-stress have all been linked to high levels of anxiety and depression among university students (Bayram & Bilgel, 2008; McCann, Warnick, & Knopp, 1990; Michaud et al., 1990; Pollard et al., 1995; Yannakoulia, et al., 2008). The current study was conducted outside of academic deadlines or exam periods, which may provide an explanation the insignificant or lack of finding in gender differences on depression and anxiety. This factor may also account for some of the variabilities between other research reports.

The findings in regards to the association between somatisation, depression and anxiety are consistent with previous literature, which states that somatisation is often associated with high rates of comorbid depression and anxiety (Hanel et al., 2009; Henningsen et al., 2003; Leibbrand et al., 1999; Oyama et al., 2007). The finding that depression and anxiety were associated with poor eating habits is also consistent with previous literature (Fulkerson et al., 2004). As proposed in hypothesis three, higher somatisation scores predicted poorer eating habit scores, even after controlling for demographic factors (age, education, relationship status and gender). As reported in the introduction (Scaloubaca et al., 1988), very little research has been conducted in relation to somatisation among university students, and no research was found which explored a connection between somatisation and poor eating habits. The present study demonstrates that such research is needed in order to explore the relationship between these factors and any negative impact they have on issues such as academic success and coping. The notion that somatisation did indeed offer a statistically significant increment to the model in the present study indicates it needs to be considered in this student population and in relation to eating habits.

Finally, the findings that, in addition to somatisation, depression and anxiety were associated with poorer eating habits are partially consistent with earlier findings (Fulkerson et al., 2004), that depression and anxiety have been associated with a decline in healthier food choice. The current findings indicated that when somatisation and depression are accounted for, anxiety did not predict poorer eating. This is in contrast to previous literature. Lui et al. (2007) suggested that "snack-type" foods containing ingredients that are carbohydrate-rich and high in fat or energy are consumed during periods of high anxiety and depression, as a preference over "meal-type" foods, such as fruit and vegetables, meat and fish. This finding is further supported by studies reporting female university students have higher rates of anxiety, and male university students have higher rates of depression (Adlaf et al., 2001; Grant et al., 2002) and that poorer eating habits are seen during periods of high psychological distress (Chaput & Tremblay, 2007; McCann et al., 1990; Michaud et al., 1990; Pollard et al., 1995). In the present study, somatisation and depression predicted poorer eating over anxiety, therefore it may be necessary to further explore these relationships.

Several limitations were noted in the current study which may have influenced the findings. The first of these relates to the sample, which was not representative of a whole university population. Therefore, caution in generalisation of the results is necessary. Second, there was a gender imbalance in favour of females (males, *n*=46, females, *n*=121), which restricts generalisability in gender comparisons within the current study. However, it is also important to note that the gender imbalance noted in this research is a reflection of a typical gender imbalance within student populations and this trend is evident in the majority of the literature (Davey et al., 2006; DeBate et al., 2001; McLennan, 1992).

Finally, the majority of previous research on the eating habits of university students has been conducted in America, Europe and Asia. Specific patterns of eating habits, cuisine and food selection are hugely influenced by cultural differences (Mooney & Walbourn, 2001; Steptoe et al., 1995) and therefore would be different to those in Australian culture. Further, the majority of studies investigating eating habits among university students focused on areas such as obesity, eating disorders, emotional eating among other dimensions; rather than general eating habits and the ways in which depression, anxiety and somatisation may be associated with eating habits.

This research has addressed a gap in the literature relating to somatisation and eating habits among university students. However, this study only represents a first step. Long-term studies on somatic diseases and their effects on eating habits, as well as the effects of depression and anxiety on eating habits within university populations need to be investigated. The development of a multidimensional instrument to assess cultural differences and environmental factors common in university populations is also required. Hopefully, when the relationship between psychological (depression and anxiety) and physical distress (somatisation) and eating habits are more fully understood then long term, effective interventions can be developed.

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