



Are you eating your emotions?: An investigation into perceived stress and trait anxiety as predictors of binge-eating behaviour

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ABSTRACT

With the rising prevalence of eating disorders within the United Kingdom and the current equivocal findings regarding negative affect and disordered eating, the present research aimed to assess the predictive capacity of perceived stress and trait anxiety on binge-eating behaviours within the general population ($N = 115$).

Via opportunity sampling, 32 males and 83 females took part in a questionnaire comprising of 3 separate well-established questionnaires, the Perceived Stress Scale, the IPIP HEXACO E:Anxi scale and the Three-Factor Eating Questionnaire.

Pearson's correlation coefficients and multiple regression analyses were computed. Findings indicated moderate significant positive correlations between the independent variables of perceived stress and trait anxiety and the dependent variable of disinhibition. However, multiple regression analyses did not replicate such results.

Inconsistent with previous research, it can be concluded that perceived stress and trait anxiety are not significant predictors of binge-eating behaviour. The results are discussed regarding previous research and future research implications.

KEY WORDS:	PERCEIVED STRESS	TRAIT ANXIETY	BINGE EATING	NEGATIVE AFFECT	DISORDERED EATING
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Introduction

Over the past thirty to forty years, the prevalence of eating disorders has risen dramatically with the current estimate of around 1.1 to 1.6 million people suffering within the United Kingdom today (Disordered Eating, 2013; Beat, 2010).

Of these eating disorders, Binge Eating Disorder, despite the little knowledge surrounding it (Fairburn & Harrison, 2003) and having only just been classified as a distinctly separate clinical syndrome within the DSM-V (American Psychiatric Association, 2013), is considered to be the most prevalent within one's lifetime with around 3.5 per cent of females and 2 per cent of males experiencing it (Hudson et al., 2007). Binge Eating Disorder is characterized by reoccurring binge-eating episodes combined with a lack of control and distress about such episodes, as well as tendencies to eat when alone and more rapidly than usual (Kring et al., 2013; Binge Eating Disorder Association, 2013). Although there are distinct similarities to the disorder of Bulimia Nervosa with regards to the binge-eating episodes, it is highly distinguishable due to the lack of compensatory behaviours in order to prevent the increase in weight, such as purging and excessive exercising. Thus, Binge Eating Disorder can be directly associated to obesity (Butcher et al., 2010; Yanovski, 2003). However, obesity is not included within the DSM-IV-TR criteria for Binge Eating Disorder, therefore, suggesting it may occur within the average weight population (Holmes, 2010; American Psychiatric Association, 2000).

The aetiology of such disorders can be a result of various converging factors such as genetics, sociocultural pressures and family influences (Kring et al., 2013; Polivy & Herman, 2002). However, with reference to the present research, it is the factors of negative affect and personality that are of the utmost importance.

With regards to personality, particular traits have been examined and identified within the onset, maintenance and expression of symptoms among eating disordered individuals (Cassin & von Ranson, 2005). Neuroticism has been widely established to be directly associated to eating disorders as findings indicate that eating disordered individuals obtain higher scores than those of controls on the Neuroticism scale (Díaz-Marsá et al., 2000). Trait anxiety, distinguished as a general predisposition to act anxiously in response to a stressor (McNally, 1989, cited in Reiss, 1997) and closely related to Neuroticism, has yet to be established in that sense; however, the little research conducted has found that patients with a higher frequency of Binge Eating Disorder have greater scores of trait but not state anxiety (Matos et al., 2002; Pinaquy et al., 2003), with some exceeding scores retrieved from an anxious patient sample (Antony et al., 1994). Despite this evidence, such research has mainly focussed on obese or clinical populations, thus, it would be of interest to conduct further research within the general, average weight population so as to gain more generalizable findings.

Within the area of negative affect, the concept of stress has been widely researched, yet still proven exceptionally difficult to define due to its subjective nature. However, the most universally accepted definition was provided by Lazarus & Folkman (1984:19) in which they define it as:

a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being.

Stress is commonly understood to influence eating habits, leading to either under or overeating and more crucially it is thought to play a major role in the maintenance of eating disorders (Berking & Wupperman, 2012; Greeno & Wing, 1994). Such contributions to the stress-eating phenomenon can be delineated by the physiological stress response (Epel et al., 2001; Torres & Nowson, 2007; Ogden, 2000). Activity within the sympathetic nervous system (SNS) has been associated with a decrease in appetite and is considered as the 'natural' response. However, it is the hypothalamic-pituitary adrenocortical system (HPA) that is considered as having the primary role in overeating as it stimulates the secretion of cortisol from the adrenal cortex, the stress hormone known to stimulate feeding and hunger (Adam & Epel, 2007; Gluck, 2006; Mathes et al., 2009). Despite this, the subjective cognitive appraisal of the stressor also plays a vital role in determining the extent of the physiological response (Lazarus & Folkman, 1984; Harvey et al., 2010). Therefore, it is of interest to consider measuring the stress one perceives oneself to be experiencing.

A wealth of theory has been proposed in order to understand such a phenomenon. The early psychosomatic theory of obesity (Kaplan & Kaplan, 1957) proffered that binge-eating occurs when obese individuals experience feelings of negative affect, such as anxiousness, with such processes acting as emotion regulators to lower their anxiety. Contrastingly, the restraint hypothesis (Herman & Polivy, 1980) argued that self-control exerted by restrained eaters, individuals who attempt to cognitively refrain from the desire to overeat (Ogden, 2003), is temporarily disrupted by 'disinhibitors', such as strong emotional states, limiting one's cognitive ability to maintain restriction of intake enabling the binge-eating episodes.

More recently, Macht (2008:7) proposed a five-way model to predict adjustment of eating behaviour induced through emotion. Alongside the categories of 'impairment of cognitive eating controls' and 'eating to regulate emotions', encompassing both early restraint theory (Herman & Polivy, 1980) and psychosomatic theory (Kaplan & Kaplan, 1957), other categories conversely predicted a decrease in eating through emotions such as, 'emotional suppression of food intake', inferring that some emotions may be associated with physiological responses decreasing the want to eat and 'emotion-congruent modulation of eating', suggesting negative emotions decrease the palatability of food and motivation to eat and vice versa for positive emotions.

Extensive research has been conducted in order to determine the definitive influence of negative affect on eating behaviour (Habhab et al., 2009; Nishitani & Sakakibara, 2006; Stein et al., 2007; Rutters et al., 2009), with varying outcomes. Kuijer & Boyce (2012) investigated the impact of emotional eating on patterns of eating behaviour prior to and after an earthquake. Among a sample of middle-aged to older women, those who indicated elevated levels of distress after the earthquake also reported an elevation in overeating. Such research considering a naturally occurring major life event has greater ecological validity than the majority of previous research using stressors induced within a laboratory. This study also supports Kaplan & Kaplan's (1957) theory as emotions are seen to be regulated by eating.

Moreover, Weinstein et al. (1997) examined the association between alterations in food consumption and psychological determinants. Fifty-two females and forty-nine males completed 5 questionnaires each, including the state-trait anxiety inventory and the eating inventory (TFEQ). They found that overeating more than normal throughout particular stressful periods correlated notably with greater scores on the TFEQ disinhibition factor (thought to involve losing control of eating following a breach of one's own principles) amongst females ($r = 0.51, p < .001$), but not males. They concluded that females, who throughout stressful periods overeat, may do so due to eating behaviours distinguished by a lack of ability to retain control over principles set by oneself and suggest that the TFEQ disinhibition factor is linked to binge-eating behaviours and one should consider it as contributing to the maintenance of certain eating disorders. This research is consistent with Herman & Polivy's (1980) theory in that emotions impaired the control one exerted over their intake.

However, measures of self-report were used among both studies which may have led to social desirability in which respondents attempt to show themselves in a favourable light. This causes bias potential issues, as well as the likelihood of relationships between variables being disguised (Podsakoff et al., 2003; King & Bruner, 2000).

Furthermore, qualitative research (Bennett et al., 2013) has also provided support for the stress-induced eating hypothesis. Interviews conducted with 16 participants revealed that stress, amongst females ($N = 8$), and anxiety or boredom amongst males ($N = 8$), was considered as the initial cause of their emotional eating. This provides more ecologically valid and in-depth data as participants are able to explore and talk freely about their own experiences in greater detail (Seidman, 2013). However, due to the small sample such findings may only be applicable to those cases and, thus, may not be generalizable to the entire population.

Despite this, not all research is in accord. Sproesser et al (2014), to investigate whether eating behaviour may change in the face of positive, negative or neutral valence, allocated participants to conditions of social-inclusion, social-exclusion, or neutrality whilst assessing habitual stress-induced eating. Two categories were identified, stress hyperphagics, who in reaction to stress commonly eat more, and stress hypophagics, who in reaction to stress commonly eat less, with an obvious outcome of stress hyperphagics consuming significantly more than stress hypophagics in the social-exclusion condition. Such results are consistent with other comparable research (Oliver & Wardle, 1999; O'Connor et al., 2008) in which almost equal numbers of individuals either overate or ate little in response to stress. Moreover, this research supports Macht's (2008) theory as it links to both the categories encompassing restraint theory (Herman & Polivy, 1980) and psychosomatic theory (Kaplan & Kaplan, 1957), as well as the opposing categories of 'emotional suppression of food intake' and 'emotion-congruent modulation of eating'.

Additionally, Stone & Brownell (1994) conducted a study investigating the association between eating behaviours and stress of 158 participants. Over 84 days, participants recorded their eating and stress levels. They found that, across all stress levels, males and females tended to consume less as opposed to more with the probability of decreased eating rising significantly when severity of stress increased,

which, with regards to females, tripled when reaching the highest stress level. The methodology employed here provides greater reliability than the self-report measures used within the previous research as such methods require retrospective accounts in which individuals do not always accurately recall information. This research also supports Macht's (2008) theory as it relates to the category of 'emotional suppression of food intake'. However, such equivocal findings throughout previous literature led Stone & Brownell (1994) to coin this phenomenon as the stress-eating paradox.

Aims/Hypotheses

Thus, following the consideration of previous theory and research, the present study aimed to investigate the predictive capacity of perceived stress and trait anxiety on binge-eating behaviours whilst assessing the pitfalls of previous research by recruiting men and women of differing ages within the general population as opposed to those who have eating disorders or are considered overweight. The present research hypothesised that the higher the level of perceived stress or trait anxiety the more elevated the binge-eating behaviour score will be.

Method

Design

A within-subjects design was implemented in which each participant took part in the same standardized questionnaire, thus, receiving the same questions in the same order. It comprised of seventy-five questions within three separate already established questionnaires so as to measure the independent variables of perceived stress (PSS; Cohen et al., 1983) and trait anxiety (IPIP HEXACO E:Anxi; Goldberg et al., 2006), and the dependent variable of binge-eating behaviour measured via the disinhibition subscale of the Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985). The demographic variables of age and gender and the two further subscales included on the TFEQ (hunger & cognitive restraint) were also included in the subsequent analyses.

Self-report methodology was employed as it is considered a better assessment method than that of interviews when measuring aspects of eating disorders that are more complex, for example binge-eating behaviours (Fairburn & Beglin, 1994). Furthermore, it ascertains greater levels of anonymity, and biases, that may be apparent through the introduction of an interviewer, can also be avoided (Marks, 2004; Staples, 1991).

Materials

The questionnaire comprised of three separate already established questionnaires which have been applied within previous research and are considered to have good psychometric standing with regards to validity and reliability. Each questionnaire took between five and ten minutes to complete and all responses were recorded on likert scales pertaining to each questionnaire. The cover sheet briefed participants on what was expected of them and the content of the questionnaire and asked for the demographics of age, gender and occupation. Personal identification numbers were

also provided on the debriefing sheet to assure data remained anonymous and consent was obtained on completion of the questionnaire (See Appendix 2).

Perceived Stress Scale

The perceived stress variable was measured via the Perceived Stress Scale constructed by Cohen et al. (1983). The scale has been validated (in several languages) and has acquired sufficient reliability as well as test-retest reliability (Remor, 2006; Cohen et al., 1983). This contains 14 items on a likert scale of 0-4, where 0 is never and 4 is very often (E.g. 'In the last month, how often have you been upset because of something that happened unexpectedly?' and 'In the last month, how often have you felt nervous and 'stressed'?'). Items 4, 5, 6, 7, 9, 10 and 13 were reverse coded and responses on each item were then summed to give a score of perceived stress, ranging from 0 to 56 (See Appendix 2.2).

IPIP HEXACO E:Anxi Scale

The trait anxiety variable was assessed through the IPIP HEXACO personality inventory (E:Anxi) scale (Lee & Ashton, 2004) constructed by Goldberg et al. (2006). The scale has adequate reliability and construct validity as it correlates highly with the original HEXACO (E:Anxi) personality inventory scale (Goldberg et al., 2006; Ashton et al., 2007). This comprises of 10 items on a likert scale of 1-5, where 1 is very Inaccurate and 5 is very accurate (E.g. 'Get stressed out easily' and 'Often worry about things that turn out to be unimportant'). Items 4, 2, 6, 7, and 9 were reversely keyed and responses on each item were then summed to give a score of trait anxiety, ranging from 10 to 50 (See Appendix 2.3).

Three Factor Eating Questionnaire

The binge eating behaviour variable was measured via the Three Factor Eating Questionnaire constructed by Stunkard & Messick (1985). Validation and acceptable reliability have been provided for this questionnaire (Stunkard & Messick, 1985; Siervo et al., 2005). This contains 51 items separated into two parts. The first part consists of items 1-36 on a True/False scale (E.g. 'Dieting is so hard for me because I just get too hungry' and 'When I feel lonely, I console myself by eating'). The second part consists of items 37-51 of which all except item 50 are on a likert scale of 1-4 where each item has a different statement associated with each number (E.g. How conscious are you of what you are eating? 1- not at all, 2- slightly, 3- moderately, 4- extremely/ How frequently do you avoid 'stocking up' on tempting foods? 1- almost never, 2- seldom, 3- usually, 4- almost always). Item 50 is on a likert scale on 0-5 where 0 is eat whatever you want, when you want it and 5 is constantly limit food intake, never 'giving in'. Each item within the questionnaire pertains to 1 of 3 factors. Factor 1 is 'cognitive restraint of eating', factor 2 is 'disinhibition' and factor 3 is 'hunger'. Item 47 was reverse coded and responses on each item were then summed to give a score on each factor, with scores ranging from 0 to 21 on Cognitive Restraint, 0 to 16 on Disinhibition and 0 to 14 on Hunger. However, 'disinhibition' was the main focus, as it has been found to accurately measure binge-eating behaviours (Weinstein et al., 1997; Lawson et al., 1995), although all factors were included in the analyses (See Appendix 2.4).

Participants

In order to obtain a diverse sample, participants were recruited via opportunity sampling in which individuals were approached directly and asked to take part. The social networking website, Facebook, was also used to email digital copies of the questionnaire. Following this, 115 participants completed the questionnaire within the North-West region of England, of which 83 were females and 32 were males, and their anonymity was ensured throughout. The mean age among this sample was $M = 25.07$, ranging from 19-73 years of age, with a standard deviation of $SD = 11.91$.

Procedure

Once the psychometric measures to be implemented were decided upon and ethical approval had been granted by Manchester Metropolitan University, questionnaire production and data collection could be initiated. A pilot study was then performed consisting of 5 participants, enabling the time taken to complete the questionnaire to be noted (5 to 10 minutes) and any preliminary flaws or ambiguities in the information to be ironed out. However, no issues were raised.

Following this, participants were then recruited. Initially, the questionnaire was created as an online survey within Google Documents allowing for direct emailing to individuals via Facebook. However, very few respondents were obtained this way; thus, paper versions were produced and distributed by directly approaching individuals within the researcher's home town in the North-West of England, as well as within Manchester Metropolitan University. In order to control for response bias, participants were left alone whilst completing the paper questionnaire so as to not be affected by the researcher's presence.

Once all responses were completed, SPSS-19.0 (IBM Corp, 2010) was used to input the data and perform subsequent analyses. Descriptive statistics were computed for all the variables including the demographics. From this normal distribution of the data was determined via the appropriate graphs and statistics and due to skew, transformations were conducted. So as to examine relationships between the variables, correlational analyses were performed using Pearson's correlation coefficient. Lastly, in order to determine the predictive power of perceived stress, trait anxiety and the demographic variables of age and gender on the main dependent variable of disinhibition, multiple regression analyses were computed, with subsequent multiple regression analyses performed on the variables of hunger and cognitive restraint.

Ethics

The present research was completed according to the British Psychology Society's Code of Ethics and Conduct. No vulnerable individuals were involved in the present study and at no point were they subjected to physical or psychological harm. Each participant was briefed on what was required of them and their right to withdraw their data and the debrief confirmed the full nature of the study and provided them with organisations to contact if they felt they had been affected by any issues raised with the research. So as to assure anonymity no signature was required and each participant was given a personal identification number which they could use to withdraw their data if they wished, consent was gained on completion of the questionnaire (See Appendix 1).

Results

Questionnaire data was inputted into SPSS-19.0 (IBM Corp, 2010) on an interval scale. Scores were then reverse coded and totalled on the Perceived Stress Scale, the IPIP HEXACO E:Anxi Scale and each of the three subscales on the Three-Factor Eating Questionnaire, with any missing data being replaced with the series mean for that individual question. Following this, tests of normality distribution were performed. Shapiro-Wilk and Kolmogorov-Smirnov statistical tests as well as the histograms, Q-Q plots and box plots all revealed substantial skew on every scale except the Perceived Stress Scale and the disinhibition subscale of the TFEQ, which revealed slight skew on the statistical tests but on visual inspection of the histograms and Q-Q plots they appeared approximately normally distributed. Z-scores of Kurtosis and Skewness were also computed for the skewed scales and all were significant ($p < .05$). However, none exceeded the appropriate absolute z-score for a medium-sized sample ($< +/- 3.29$; Kim, 2013). In order to correct for excessive skew transformations were performed. Due to the negative skew of the IPIP HEXACO E:Anxi scale, the power transformation was conducted. Regarding the TFEQ subscales of hunger and cognitive restraint the square root transformation was performed as both scales were positively skewed and contained values of zero, thus, a logarithm could not be computed (IBM Corp, 2010). Therefore, it remains appropriate to suggest that any conclusions drawn from the data should be treated with caution due to the remaining skew and the transformations performed (See Appendix 3).

Descriptive Statistics

Descriptive statistics calculated from the untransformed total scores obtained on each scale, including the demographic variable of age, are presented in Table 1.

The mean score for Perceived Stress ($M = 26.00$) was greater than that recorded by the author of the test manual (Cohen et al., 1983) within two separate studies ($M = 23.18$; $M = 23.67$) using similar ages and population. Furthermore, this mean score was also higher than that achieved by Remor (2006) ($M = 25.0$) consisting of a largely clinical sample, thus, suggesting higher perceived stress than expected for the present non-clinical sample.

Due to the IPIP HEXACO E:Anxi scale being one of four subscales within a larger subscale any means obtained on the scale are divided by four (Churchyard et al., 2014). The mean reported here, when divided by four ($M = 7.85$), is much larger than that recorded by Ashton et al (2007) ($M = 2.68$), indicating a highly anxious sample. However, their sample size was significantly greater ($N = 411$) than that employed here.

With regards to the subscales of the Three-Factor Eating Questionnaire, according to Stunkard & Messick (1985), the authors of the test manual, the means calculated here are within the low range for each respective subscale. This is congruent with Harden et al (2009) whose mean scores on disinhibition ($M = 6.28$), hunger ($M = 6.93$) and cognitive restraint ($M = 6.67$), within half a clinical and half a non-clinical sample, were also among the low range for each subscale with varying degrees of similarity to those presented here.

Table 1. Descriptive statistics of the total scores obtained on each variable, including the demographic variable of age.

Variable	Mean	Standard Deviation
Perceived Stress	26.00	8.32
Trait Anxiety	31.40	8.35
Disinhibition	6.42	3.60
Hunger	5.50	3.42
Cognitive Restraint	7.67	5.93
Age	25.07	11.91

Pearson's Correlation Coefficient

Pearson's correlation coefficients of the transformed data were employed to establish initially whether there were any simple linear relationships between each of the variables (Coolican, 2013). This revealed a number of significant correlations (see Table 2).

Disinhibition was significantly positively correlated with perceived stress ($r = .18$; $df = 113$; $p < .05$) and with trait anxiety ($r = .21$; $df = 113$; $p < .05$), illustrating that as one's perceived stress and trait anxiety levels increase so do their levels of disinhibition. Scores on cognitive restraint were significantly positively correlated with trait anxiety ($r = .27$; $df = 113$; $p < .01$), indicating that those high in trait anxiety also have elevated levels of cognitive restraint. Age was significantly negatively correlated with perceived stress ($r = -.25$; $df = 113$; $p < .01$) and hunger ($r = -.28$; $df = 113$; $p < .01$), suggesting that as one's age increases, stress and hunger decreases. Also, gender was significantly positively correlated with trait anxiety ($r = .32$; $df = 113$; $p < .001$) and with cognitive restraint ($r = .22$; $df = 113$; $p < .05$), indicating that women are more trait anxious and cognitively restrained than men.

Table 2. Pearson's correlation coefficients between all variables, including the demographic variables of age and gender.

Variable	1	2	3	4	5	6	7
1. Perceived Stress	-	.70***	.18*	.10	.14	-.25**	.11
2. Trait Anxiety		-	.21*	.16	.27**	-.18	.32***
3. Disinhibition			-	-	-	-.08	.17
4. Hunger				-	-	-.28**	.06
5. Cognitive Restraint						.01	.22*

6. Age	-	-
7. Gender	-	-

* $p < .05$; ** $p < .01$; *** $p < .001$

Multiple regression analyses

Multiple regression analyses of the transformed data were conducted to determine whether disinhibition, hunger and cognitive restraint respectively could be predicted by the independent variables of perceived stress and trait anxiety as well as the demographic variables of age and gender. Such analyses enable the individual and combined contribution made by each variable to be examined (Allison, 1999; Licht, 1995). Tables 3, 4 and 5 portray the unstandardized regression coefficient (B), the standardized regression coefficient (β), along with the absolute t values and significance (p) levels of each analysis. Table 6 separates these analyses by gender and displays the standardized regression coefficient (β), the absolute t values and the significance (p) levels only.

Disinhibition

The first regression model for the prediction of disinhibition from perceived stress, trait anxiety and the demographic variables is shown below (see Table 3). It was found that such independent variables only predicted 6% of the variance and overall they did not significantly predict the dependent variable ($F(4, 110) = 1.78$).

Table 3. Multiple regression analyses to predict disinhibition scores from perceived stress, trait anxiety and the demographic variables.

Variable	B	β (Beta Score)	t	Sig. (p)
Constant	3.03			
Perceived Stress	.04	.10	.72	.471
Trait Anxiety	.00	.10	.70	.485
Age	-.01	-.02	-.21	.833
Gender	1.01	.13	1.28	.205

* $p < .05$; ** $p < .01$; *** $p < .001$

Hunger

The second regression model used the independent variables of perceived stress, trait anxiety and the demographic variables to predict the dependent variable of hunger, shown below (see Table 4). These variables predicted 10% of the variance, and it was found that they predicted a significant proportion of the variance ($F(4,110) = 3.01$, $p < .05$) of hunger values. The demographic variable of age was seen to explain a significant amount of the variance alone ($t = -2.98$, $p = < .01$), with hunger decreasing as age increases, confirming the simple correlation analyses.

Table 4. Multiple regression analyses to predict hunger scores from perceived stress, trait anxiety and the demographic variables.

Variable	B	β (Beta Score)	<i>t</i>	Sig. (<i>p</i>)
Constant	2.74			
Perceived Stress	-.01	-.11	-.87	.387
Trait Anxiety	.00	.20	1.45	.149
Age	-.02	-.28	-2.98	.004**
Gender	-.05	-.03	-.28	.781

* $p < .05$; ** $p < .01$; *** $p < .001$

Cognitive Restraint

The third regression model for the prediction of the dependent variable cognitive restraint from the independent variables of perceived stress, trait anxiety and the demographic variables is shown below (see Table 5). It was found that these variables predicted 10% of the variance and overall they predicted a significant amount of the variance ($F(4, 110) = 3.07, p < .05$) of cognitive restraint values. The independent variable of trait anxiety was found to predict a significant amount of the variance alone ($t = 1.98, p < .05$), confirming the correlational analyses.

Table 5. Multiple regression analyses to predict cognitive restraint scores from perceived stress, trait anxiety and the demographic variables.

Variable	B	β (Beta Score)	<i>t</i>	Sig. (<i>p</i>)
Constant	1.04			
Perceived Stress	-.01	-.04	-.31	.754
Trait Anxiety	.00	.27	1.98	.050*
Age	.01	.07	.76	.452
Gender	.42	.15	1.54	.126

* $p < .05$; ** $p < .01$; *** $p < .001$

Gender

In the final regression model, due to inter-correlations that may have been present, the analyses were separated by gender and the results are shown below (see Table 6).

Males

Using the independent variables of perceived stress, trait anxiety and age to predict disinhibition, the amount of variance this model predicted was only 2% and overall the variables did not predict a significant amount of variance ($F(3, 28) = .16$) of disinhibition scores. For the prediction of hunger from the independent variables as

mentioned above, the amount of variance this model predicted was 18%, however, overall the variables did not predict a significant proportion of variance ($F(3, 28) = 2.04$) of hunger values. Despite this, the demographic variable of age was found to explain a significant amount of the variance alone ($t = -2.38, p < .05$), with hunger decreasing as age increases. From the independent variables listed above to predict the dependent variable of cognitive restraint, the proportion of variance the model predicted was only 8% and these variables did not have significant predictive power ($F(3, 28) = .78$) over the cognitive restraint scores.

Females

Using the independent variables of perceived stress, trait anxiety and age to predict disinhibition, the amount of variance predicted was only 6% and overall this model did not predict a significant amount of variance ($F(3, 79) = 1.56$) of the disinhibition values. For the prediction of hunger from the independent variables mentioned above, the proportion of variance predicted by this model was 7% and overall the variables did not predict a significant amount of variance ($F(3, 79) = 2.05$) of hunger scores. However, the demographic variable of age predicted a significant proportion of the variance alone ($t = -1.96, p < .05$), with hunger decreasing as age increases. Finally, from the independent variables listed above to predict the dependent variable of cognitive restraint, the amount of variance predicted was 10% and overall the variables predicted a significant amount of variance ($F(3, 79) = 2.83, p < .05$) of the cognitive restraint values. Despite this, none of the independent variables made a significant enough contribution individually to the predictor model.

Table 6. Multiple regression analyses, separated by gender, to predict disinhibition, hunger, and cognitive restraint from perceived stress, trait anxiety and age values.

Model	Variable	Male			Female		
		β	t	Sig.(p)	β	t	Sig.(p)
Disinhibition	Perceived stress	-.09	-.31	.762	.19	1.21	.229
	Trait Anxiety	.14	.47	.643	.08	.52	.607
	Age	-.10	-.55	.590	.03	.25	.805
Hunger	Perceived stress	-.10	-.36	.723	-.12	-.79	.433
	Trait Anxiety	.20	.70	.492	.20	1.34	.186
	Age	-.41	-2.38	.025*	-.22	-1.96	.054*
Cognitive Restraint	Perceived stress	-.37	-1.23	.229	.12	.77	.442
	Trait Anxiety	.30	1.02	.319	.23	1.61	.111
	Age	.13	.69	.494	.08	.75	.459

* $p < .05$; ** $p < .01$; *** $p < .001$

Discussion

The present research aimed to investigate the predictive capacity of perceived stress and trait anxiety on binge-eating behaviours in males and females within the general population. The hypothesis to be assessed was; the higher the level of perceived stress or trait anxiety the more elevated the binge-eating behaviour score will be.

Initial Pearson's correlation coefficients indicated a significant positive association between the independent variables of perceived stress and trait anxiety and the main dependent variable of disinhibition, thus, suggesting that as levels of perceived stress and trait anxiety increase so do one's levels of disinhibition or binge-eating behaviour. This finding supports previous comparable research (e.g. Weinstein et al., 1997; Kuijer & Boyce, 2012; Nishitani & Sakakibara, 2006; O'Connor et al., 2008) also illustrating significant positive correlations between negative affect and overeating, as well as trait anxiety and overeating (Matos et al., 2002; Pinaquy et al., 2003).

However, following multiple regression analyses, perceived stress and trait anxiety along with the demographic variables of age and gender were not found to significantly predict the dependent variable of disinhibition. This was also replicated in the further multiple regression analysis separated by gender. Thus, although a basic correlational relationship was determined between the variables, it appears from the multiple regression analyses that, due to inter-correlations that may have been present, perceived stress and trait anxiety are not considerable predictors of binge-eating behaviour. Hence, the hypothesis was not supported and so the null hypothesis must be accepted.

However, due to the transformations and remaining skew of the data any conclusions drawn must be treated with caution.

The present finding is in direct contrast to previous research (Kuijer & Boyce, 2012; Rutters et al., 2009) which indicated that negative affect is a significant predictor of binge-eating behaviour. However, regarding Kuijer & Boyce (2012), who illustrated that from pre to post earthquake women high in emotional eating increased their intake, stress following a natural disaster could be classed as a chronic stressor due to the lasting victimization effects it may impose and, thus, according to the physiological stress response, this could lead to an increase in cortisol which in turn may heighten food intake (Adam & Epel, 2007). This could account for such differing findings as the perceived stressors that participants' reported during the present study may have only been acute.

Furthermore, such results are also in disaccord with that of Stone & Brownell (1994) as they found that the predominant outcome, across all stress levels, was that men and women tend to consume less as opposed to more with eating less increasing significantly as stress severity increased. However, no such relationship was reported here. The prospective nature of the methodology employed within Stone & Brownell's (1994) study may account for the variance in results as retrospective self-report methodology, found in the current study, may lead to biases in the data as participants in limited circumstances may use estimation strategies to recall information that occurred within the last month, such as their emotional state or eating behaviour (Schwarz, 2004).

Despite the incongruous finding, it is somewhat comparable to more recent research (Werthmann et al., 2014; Bongers et al., 2013) which illustrated that intake of food under negative affectivity was unable to predict emotional eating. Adriaanse et al. (2011), in explanation of such findings, suggests that self-report of one's emotional eating may prove difficult due to potential recall bias as recall can be affected immensely by strong states of emotion. However, such studies differ to that of the present research as they employed a sample of self-reported emotional eaters whereas this study focussed primarily on obtaining a diverse sample from the general population and not those with predispositions to certain eating styles.

In terms of theory these results are not consistent with the psychosomatic theory of obesity (Kaplan & Kaplan, 1957) or Macht's (2008) five-way model of the effects of emotion on eating behaviour as no predictive impact of negative affect on eating behaviour, whether positive or negative, was determined. Despite this, the psychosomatic theory of obesity is centred on obese individuals and does indicate that no such effect would occur in a normal weight sample. Thus, this may explain the inconsistent findings as the current sample was taken from the general population so it can be assumed that individuals would be of an average weight. However, this is not a certainty as weight was not assessed during the investigation.

The findings may be further delineated by the restraint theory (Herman & Polivy, 1980), which proposed that binge-eating may occur when self-control exerted by restrained eaters is temporarily disrupted by 'disinhibitors', such as strong states of emotion. Thus, individuals may need to display high restraint of eating for such negative affect to induce binge-eating. However, the cognitive restraint levels displayed within the present study were considered within the low range according to Stunkard & Messick (1985), the authors of the Three-Factor Eating Questionnaire, which may indicate why perceived stress and trait anxiety did not predict disinhibition.

Despite the inconsistent findings pertaining to the hypothesis, numerous other interesting significant results were reported. One such finding was the moderate significant positive correlation between cognitive restraint and trait anxiety, suggesting that as cognitive restraint increases so do one's levels of trait anxiety. This was replicated by the significant positive model produced in the multiple regression analysis, with trait anxiety making a significant contribution to the variance of cognitive restraint alone. Body dissatisfaction literature, so as to explain this, suggests sociocultural pressure of thinness heightened by the media and conformity to the thin ideal may lead to chronic body dissatisfaction in women (Thompson et al., 1999), which in turn may induce greater instances of dieting and anxiety (Lowe, 1993; Stice & Shaw, 2002). Consistently, research has illustrated that internalization of the thin ideal predicted body dissatisfaction growth, with such body dissatisfaction predicting an increase in dieting (Stice, 2001; Ricciardelli et al., 1997), with those dieting more reporting higher instances of anxiety (Patton et al., 1997).

Furthermore, regarding the strong significant negative correlation between hunger and age, in that as age increases hunger decreases, this was confirmed by the initial multiple regression analysis in which the model predicted a significant amount of variance, with age making an extremely significant contribution alone. On separating the analyses by gender this result was confirmed once more concerning both males and females. In explanation of this, Morley (2001), states that as males age

increases testosterone levels decline and with this comes an elevation in levels of leptin, heightening one's metabolic rate and decreasing food intake. Moreover, the decline of the senses such as smell and changes, particularly increases, in the threshold of taste as one ages can lead to a decrease in perception of food's hedonic qualities, culminating, again, in reduced food intake and hunger, and causing the development of physiologic anorexia (Morley & Thomas, 1999; Morley, 1997). Rolls et al (1995) confirm this as, within the baseline condition where no preload was given, a significant decrease in consumption was illustrated in older men compared to younger men with reduced intake congruent with subjective reports of satiety.

Thus, further research may benefit these theoretical areas, such as that of age and hunger, as the full impact of this relationship needs to be determined, especially regarding women.

Evaluation

Due to such converse results the limitations of the present study need to be considered. Firstly, this was a cross-sectional study, thus, interpretations of causal associations among the variables cannot be established. The same can also be said for the use of Pearson's correlation coefficient to analyse the data, as correlation again does not imply causation.

The sample employed was also an issue as psychology students were represented highly as this was convenient to the researcher during data collection. However, this may mean that any such findings are not generalizable to the whole population. So as to account for this in future research a randomization procedure could be employed. Moreover, a larger sample would have, ideally, been recruited, with a more equal balance of gender, in an attempt to attach greater significance to the results. However, time constraints bestowed upon data collection did not enable this.

Furthermore, as self-report measures were used within this study caution must be taken when interpreting the data as social desirability bias may occur in which individuals wish to show themselves in a favourable light and so do not answer truthfully. Thus, results may lack validity and reliability as relationships between variables may have been disguised (Podsakoff et al., 2003; King & Bruner, 2000). This was evidenced by Allison & Heshka (1993) who found that lower scores on emotional eating scales were associated with higher scores on a social desirability questionnaire.

Future Research

If time and funding permitted, future research may include a more representative and larger sample size with the addition of a clinical sample so as to compare the findings. Ideally, an experimental design would be implemented involving positive, negative and neutral mood inductions and providing a buffet of food items, both unhealthy and healthy, following the induction, so as to discern the direct effects of each situation. It would also be interesting to investigate participant's perceived eating style prior to the experiment; however, if this was conducted using self-report measures then a social desirability questionnaire could also be included.

Conclusion

The present study investigated the predictive capacity of perceived stress and trait anxiety on binge-eating behaviours among the general population. Inconsistent with previous research, it was found that neither perceived stress nor trait anxiety were predictors of binge-eating behaviour, however, any such conclusions need to be treated with caution due to the transformations and remaining skew of the data as well as the limitations already discussed. Despite this, the study has enhanced the knowledge surrounding this area, indicating that negative affect alone may not be as crucial to this phenomenon as once thought, and so as to further improve understanding future research has been suggested. Additionally, other areas of research have been outlined, such as that of age and hunger, which would benefit from more in-depth, detailed study into the phenomenon.

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