The Plymouth Student Scientist - Volume 07 - 2014 The Plymouth Student Scientist - Volume 7, No. 2 - 2014

2014

An investigation into whether snack choices differ between emotional eaters and non-emotional eaters

Adams, J.

Adams, J. (2014) 'An investigation into whether snack choices differ between emotional eaters and non-emotional eaters', The Plymouth Student Scientist, 7(2), p. 3-16.
http://hdl.handle.net/10026.1/14066

The Plymouth Student Scientist
University of Plymouth

*The Plymouth Student Scientist, 2014, **7**, (2), 3-16*

An investigation into whether snack choices differ between emotional eaters and non-emotional eaters

Jessica Adams

Project Advisor: Gail Rees, School of Biomedical and Healthcare Sciences, Plymouth University, Drake Circus, Plymouth, PL4 8AA

Abstract

Eating patterns and behaviour have been linked to the increasing incidence of weight-related health risks. Understanding the motivations behind certain food choices, particularly high energy-dense foods is therefore of importance. The purpose of this research was to get a better understanding of the snack choices of emotional eaters and how these compared to non-emotional eaters. Participants, 100 male and female students, completed a questionnaire to determine emotional eating and snacking habits. Analyses of the data collected revealed that there was a weak, yet statistically significant correlation between the consumption of sweet snacks and emotional eating score, but no significant difference was found between fast food, savoury snacks or fruit. There was a significant difference in the emotional eating scores between genders (males mean score 15.2 ± 1.7, females mean score 24.6 ± 2.4) with females showing more prevalence towards being emotional eaters. The main conclusion drawn is sweet snacks were consumed more frequently by emotional eaters and females were more likely to have higher emotional eating scores.

Introduction

The incidence of obesity is increasing at an alarming rate and obese individuals are at a greater risk of developing certain chronic diseases including diabetes, cancer and cardiovascular disease (Bennet, Greene & Schwartz-Barcott, 2013). Weight gain is associated with both metabolic and behavioural risk factors, and is a result of long-term positive energy imbalance, where energy intake is consistently higher than energy expenditure (Schembre, Greene & Melanson, 2009). The importance of a healthy diet is widely accepted, and is not only made up of balanced food and nutrient composition, but also a well-balanced eating behavior. This consists of eating when hungry and at regular intervals to allow for physiological growth and energy expenditure (Michels, Sioen, Braet, Eiben, Hebetreit, *et al,* 2009). However, a trend of eating in the absence of hunger involving intermittent snacking is becoming more common in the eating patterns of Western society, as a result of urbanisation, industrialisation and the convenience of processed foods (Kim & Kim, 2010). Therefore, gaining an understanding of the motivational factors that influence food consumption and choice is of great importance in addressing not only the obesity epidemic but also its associated health risks, as food intake is a significant factor impacting both their development and treatment (Grimme & Steinle, 2010, McNaughton, 2012).

There are a number of factors that motivate food intake, the most obvious being that food is essential for life and maintaining basic homeostasis. However, eating behaviour is not only guided by homeostatic regulation, other influencing factors include food advertising, social norms, social economic status, and emotions (Kemp, Bui & Grier, 2011). Eating in response to an emotion, such as anxiety, depression or stress, is referred to as emotional eating and it is thought that the act of eating is used as a coping response to negative affect (feeling or emotion), by increasing positive affect (Bennet *et al*, 2013). To either maintain or change the experience of an affective state or emotion, some individual's behavioural approach is the use of self-reward. Therefore, a heightened reward response to food intake is one suggested theory as to why some individuals consume food in response to negative affect. Kringelbach *et al* (2012) explain how this reward response can have both a hedonic impact, which refers to the liking of, or the pleasure related to the reward (such as the experience of eating) and incentive salience, which refers to the wanting or desire to obtain the reward. There is evidence that those individuals who self-report themselves as emotional eaters show a greater activation of the brain's reward system in response to certain foods whilst experiencing negative mood, whereas self-reported non-emotional eaters showed a decrease in the activation of the reward region (Bohon, Stice, & Spoor, 2009). Therefore, suggesting that emotional eaters use food to nurture and excite in response to the pleasure and wanting of the reward (food) and this may explain why they are more likely to indulge in 'comfort foods' such as those high in fat and sugar (Kemp *et al,* 2011).

This relationship between emotions and eating behaviour has received much interest (Canettie, Bachar & Berry, 2002). A number of studies have focused

their investigations on specific emotions, and some have actually attempted to induce feelings of stress on their subjects, to then observe their subsequent eating behaviour (Loxton, Dawe & Cahill, 2011, Wallis & Hetherington, 2009, Macht & Mueller, 2007). The findings of such research have shown that negative mood may play a role in the tendency to overeat highly palatable foods. However, this association was only observed in those that had a habitual tendency towards disinhibited eating or scored highly as emotional eaters. It is worth noting that the majority of these studies only used female subjects, and it has been noted that females are more likely to be emotional eaters (Kemp *et al*, 2011, Hou, Xu, Zhao, Lu, Zhang *et al, 2013*).

Research has also been carried out to assess perceived levels of various emotions and the intake of various foods, to assess any associated relationship, with the use of self-reported questionnaires. Stress again appeared to have a bearing on eating behaviour and was reported as the primary trigger in females to overeat (Bennet *et al*, 2013, Mikolajczyk, Ansari & Maxwell, 2008).
Males on the other hand appeared to turn to food more as a distraction from boredom and anxiety. Both genders reported that during emotional episodes they chose what they considered as unhealthy foods (Bennet *et al*, 2013). This association between unhealthy eating and perceived feelings of stress and anxiety is well supported by various studies. The common findings are that such feelings are associated with an increase in consumption of high energy-dense, palatable snack foods (Nguyen-Michel, Unger & Spruijt-Metz, 2007, Michels *et al*, 2012, Konttinen, Mannisto, Sarlio-Lahteenkorva, Silventoinen & Haukkala, 2010, O'Connor, Jones, Conner & McMillan, 2008).

As mentioned the majority of studies have concentrated on female subjects and, therefore, it would appear that there is a need to conduct further investigations that involve both genders, especially as it has been proposed that females are more likely to be emotional eaters and the ability to compare the outcome measures between genders may help to clarify any differences. Also, most of the previous research has looked at the association between emotional eating and food consumption based on food frequency questionnaires that cover a vast array of food types or in contrast concentrate on one food type for example chocolate to discover its affect on mood enhancement (Oliver, Wardle & Gibson, 2000). Nguyen-Michels *et al*, (2007) appear to have conducted one of the only other studies to investigate the association between emotional eating and associated choices in certain snacks in both female and male adolescents and thus this current study may offer further insight into an area with limited research.

It is apparent that understanding the motivations to eat certain foods is an area of interest in attempting to prevent and intervene with the increasing incidence of obesity and weight-related health risks. If certain individuals are consuming unhealthy foods in response to their emotions then this allows for possible interventions to be implemented that place an emphasis on working with the root cause of the emotions experienced, and thus eliminating the desire to eradicate such feelings or comfort with food.

Therefore, the primary aim of this study was to identify whether those categorised as emotional eaters had a tendency to consume more of a certain type of snack compared to non-emotional eaters. Based on the outcomes of the literature presented, it was hypothesised that emotional eating would be associated with a higher consumption of high-energy dense snacks with a preference for sweet tasting foods.

Method

Subjects

A convenience sample of 100 undergraduate students was recruited for this research. Participants differed in gender, age and physical activity levels. The types of courses studied also varied.

Procedure

Survey material and procedures were reviewed and approved by the Faculty of Science and Environment, The University of Plymouth Ethics Board. Recruitment took place on campus at Truro and Penwith College, Truro, either during class or break-time interaction. During this time an explanation of the study was given. Subjects willing to take part then completed a questionnaire, and submission was accepted as consent.

Measures

Emotional Eating

Emotional eating behaviour was assessed using the Dutch Eating Behaviour Questionnaire. This 33-item questionnaire is designed to identify three types of eating behaviour, restrained, external and emotional (van Strien, Frijters, Bergers & Defares, 1986).

For this study only the emotional eating (eating in response to negative emotions) section was used. This 13-item subsection has been used previously and is recommended for general assessment of emotional eating (Michels *et al*, 2012, Raspopow, Abizaid, Matheson & Anisman, 2010). The questionnaire asks individuals about their desire to eat in response to both diffuse (for example lonely, bored) and clearly labeled negative emotions (anxious, cross). Response options were ‘never’ (0), ‘seldom’ (1), ‘sometimes’ (2), ‘often’ (3), ‘fairly often’ (4) or ‘very often’ (5). Previous studies have used a mean score to distinguish emotional eaters when using the DEBQ (Oliver *et al,* 2000). However, this resulted in a score of 16, which was considered too low to represent an emotional eater, as the minimum score possible was 0 and the maximum 65. Therefore, it was decided that a total score of 32.5 or above would represent an emotional eater for this study. This score is the median of the overall minimum and maximum scores.

Snack choice

Subjects were also asked to report on the frequency of consumption of four different snack types (fast food, savoury snacks, sweet snacks and fruit) in a typical week, using the following response options: ‘never/less than once a week’ (0), ‘1-3 times a week’ (0.25), ‘4-6 times a week’ (0.5), ‘1 a day’ (1), ‘2 a

day' (2), '3 a day' (3) or '4 or more a day' (4). This information was collected in the same way as previous studies (Michels *et al, 2012*). A frequency of consumption score per day (represent in brackets) was calculated for each snack category and was assessed without quantifying portion sizes. From this data a score for total snack consumption per week was also calculated.

Food consumption frequency
To assess overall frequency of food consumption subjects were asked to indicate on a typical weekend and weekday if they consumed food at: breakfast, mid-morning, lunch, mid-afternoon, dinner, evening, bedtime. A separate total score was obtained for an average weekday and weekend day. These scores were also added together to give an average for the week.
The purpose of this was to assess whether the reported consumption of snacks were in addition to main meals.

Physical activity level
Subjects were asked to report on the amount of physical activity undertaken in an average week. It was decided that those that completed below the recommended daily amount of 30 minutes a day would be considered non-active, and those that completed the recommended amount or more would be considered active.

Perception of body weight
Subjects were also asked whether they considered themselves to be underweight, normal weight or overweight.

Statistical analysis
Statistical analyses were performed in SPSS version 21. Means and frequencies were used to obtain the descriptive statistics of the participants. Data was explored to establish whether it followed a normative or non-normative distribution. Spearman's correlation coefficient was performed to establish whether there was a significant correlation between the frequency of certain snack choices and emotional scores. Emotional eating was the independent variable with snack choice as the dependent variables. A Mann Whitney U Test was used to compare whether there was a difference in emotional eating scores between genders (non-normally distributed data). To note if there was a difference in the perception of body weight and emotional eating score a one-way ANOVA test was used.

Results

Descriptive characteristics
Table 1 shows the descriptive characteristics of the recruited participants.

Table 1: Descriptive characteristics of the sample (N = 100)

Variable	
Female	47
Male	53
Mean Age (years)	24.7 ± 8.0
Health related course	65
Non-health related course	35
Physically active	69
Not physically active	31
Perception of weight	
Underweight	5
Normal weight	79
Overweight	16

Emotional eating scores

Figure 1 shows how the results from this study are non-normative, as they do not follow a natural bell curve, and are skewed. Therefore, the decision was taken to undertake non-parametric statistical tests on this data.

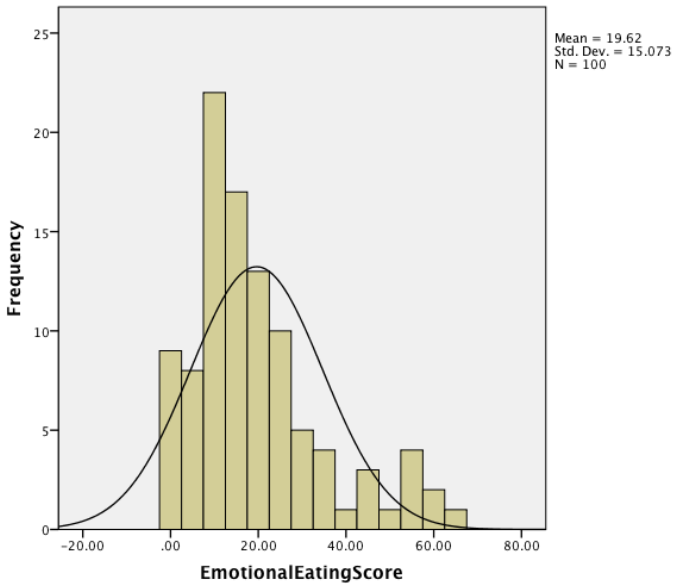

Figure.1: Emotional eating scores based on frequency

The results indicated that 16 subjects were considered emotional eaters (11 female and 5 males) and 84 considered non-emotional eaters. There was a significant difference of p=0.001 between the emotional eating scores in females and males, with means scores of 24.6 ± 2.4 and 15.2 ± 1.7, respectively. There was no significant difference in emotional eating scores between those who were active (17.7 ± 13.6) and non-active (23.8 ± 17.4) and emotional eating scores (p=0.13), neither was there any significant difference between groups when it came to perception of body weight and emotional eating score (p=0.17). Table 2 shows the mean emotional eating scores based on these different variables.

Table 2: The mean (+/- SD) emotional eating score based on subgroups of original sample

	Mean emotional eating scores
Male (n-53)	15.2 ± 1.7
Female (n-47)	24.6 ± 2.4
Active (n-69)	17.7 ± 13.6
Non-active (n-31)	23.8 ± 17.4
Underweight (n-5)	19.4 ± 22
Normal weight (n-79)	19.5 ± 14.2
Overweight (n-16)	19.6 ± 17

The minimum emotional eating score = 0 and the maximum eating score = 65

Snack choice

Table 3 shows that no statistically significant difference was found between the frequency of consumption of any of the snacks between emotional eaters and non-emotional eaters. However, the consumption of sweet snacks by emotional eaters did show an approach to significance (p=0.08) and was therefore investigated further.

Pearson's correlation showed no significant relationship but as the data is non-normative Spearman's correlation was used and this did show there was a weak, yet statistically significant correlation between emotional eating score and frequency of consumption of sweet snacks (p=0.04, r =0.20).

Table 3: The mean consumption score for various snacks for emotional and non-emotional eaters

	Mean consumption scores of snacks			
	Fast food	Savoury	Sweet	Fruit
Non-emotional eater	0.13 ± 0.14	0.58 ± 0.73	0.52 ± 0.66	1.52 ± 1.25
Emotional eater	0.36 ± 0.98	0.73 ± 1.0	1.0 ± 1.2	1.73 ± 1.2
Significance	0.85	0.59	0.08	0.47

* Significant = P <0.05

Figure 2 shows the association between the emotional eating score and frequency of consumption of sweet snacks. As the emotional score increases there appears to be an increase in the consumption of sweet snacks, however, this correlation is weak.

Food consumption

When looking at overall frequency of food consumption, emotional eaters appeared to consume food slightly more frequently than non-emotional eaters during weekdays (4.5 ± 1.5, 4.4 ± 1.5, respectively) and during weekends (4.5 ± 1.8, 4.3 ± 1.5, respectively). There was no significant difference between the two groups' total consumption of food (both week days and weekends together) or regarding the total amount of snacks consumed in a week (p=0.93, p=0.26, respectively).

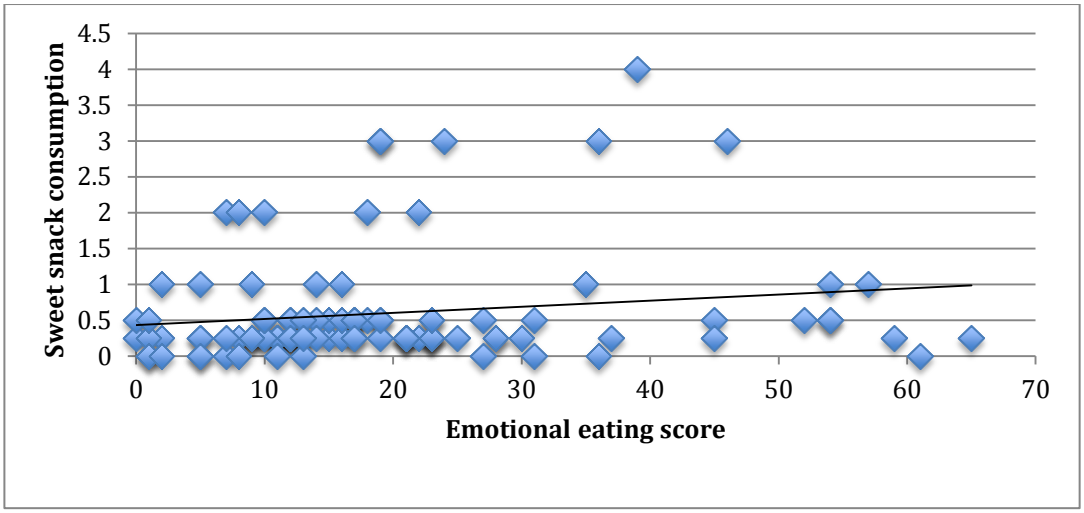

Figure 2: The correlation between emotional eating scores and consumption of sweet snacks.

Discussion

Emotional eating score

Our results show that a very small sample of those recruited fell into the emotional eating category (n=16). A possible explanation for this may be that people are actually unable to assess their own emotional eating behaviour. It is suggested that many people are poor at perceiving their own traits (Evers, de Ridder & Adriaanse, 2009). There are also limitations to using a retrospective style questionnaire, as used within this study, as the results are then subject to recall bias, including under/over estimation of emotions. Also, not only does the questionnaire used within this study require the individuals to recall their emotions and their food intake, but also their association between the two. It is possible that the current emotional state of the individual at the time of reporting may also bear an influence on their response, as previous research has found that inducing a negative affect on subjects substantially increased the level of self-reported emotional eating (Bekket, Van de Meerendonk & Mollerus, 2004). As the current emotional state of the individuals was not considered this may represent a further limitation to this study.

Open-ended questionnaires have been used in previous studies and may have been more appropriate, as subjects are then asked to report on daily emotions and subsequent eating behaviour, thus, not restricting the questioning to a limited amount of emotions in a generalised manner (O'Connor et al, 2008). This would allow for observation of snacking behaviour related to certain events and emotions as opposed to a tendency towards snacking, making the results more specific. However, open-ended questionnaires may be considered more of a commitment and more time consuming and may have affected adherence rates.

Another possible explanation for the small number of subjects scoring highly on the emotional eating scale is that the questionnaire focused on negative emotions alone, and did not include questions relating to eating in response to positive emotions. There is evidence to suggest that eating in response to positive emotions may occur as frequently as eating in response to negative emotions within some individuals (Macht, Haupt & Salewsky, 2004). Worth noting, however, is that these findings were also limited to a small sample size and were based on 'normal' eaters as opposed to emotional eaters. Of interest, however, is that when eating behaviour was studied in relation to positive emotions a tendency to consume healthy foods was observed (Lyman, 1982). Therefore, the role of eating in response to both positive and negative emotions in both emotional and non-emotional eaters warrants further investigation. Using the same study design and protocol would allow for comparisons to be made. If the findings are consistent and it does appear that positive emotions do increase healthy eating behaviour and negative emotions promote unhealthy eating behaviour then interventions can be developed that focus on improving an individual's emotional state and subsequently their nutritional intake.

Following gender stratified analyses it was revealed that a significant difference existed between the amount of males and females showing as emotional eaters. This is consistent with previous findings which have shown women to be more likely to use eating to numb, distract and soothe their emotions (Kemp *et al*, 2011, Hou *et al*, 2013, Oliver *et al* 2000).

However, there are also some studies that have found that it is not always the case that gender differences result in dietary intake differences (Nguyen-Michel *et al*, 2007). There are limitations within the mentioned study, as 76% of the subjects were female, and therefore, the sample representing males was a minority. There were also more males in the sample group with incomplete data than those with completed data, suggesting that the findings may not be a true representation of the male population. Both the mentioned study and this current study used the emotional eating subscale of the DEBQ, which focuses only on negative emotions. This may be another reason for a low number of males being categorised as emotional eaters, as research has found that males have been shown to consume more food in relation to positive emotions (Christensen & Brooks, 2006). Therefore, accepting the findings from this current study as supporting the theory that females are more likely to be emotional eaters should be done with caution and further investigation in this area, including a larger sample sizes, and incorporating both negative and positive emotions would be recommended.

Another area that was investigated with regard to effect on the emotional eating scores was self-perception of body weight. There was no significant difference in the three groups (under, normal or over weight). Previous research has found that overweight and obese individuals actually showed significantly lower odds of emotionally eating but higher odds of restrained eating (Hou *et al,* 2013). However, a limitation of the mentioned study is that these findings were based on the scores taken from the DEBQ, and used as a prediction that the eating behaviour would correspond to the scores, but food

intake was not observed. Although the results from this study are not consistent with our findings such a small sample size of emotional eaters does not allow for a clear agreement or disagreement to be made. Further research with a larger sample size, which included an equal amount of normal weight, overweight and obese individuals, that looked at emotional eating scores, restrained eating scores and food intake would be recommended for a more power conclusion to be drawn.

Snack choice

With regard to the frequency of certain snack choices, this current study found no significant difference in the consumption of fast food snacks, salty snacks, fruit or sweet foods by emotional eaters compared to non-emotional eaters. There was, however, a weak, yet statistically significant association with regards to the frequency of sweet snacks consumed and higher emotional eating scores. This is consistent with previous findings (Nguyen-Michel *et al*, 2007, Michels *et al*, 2012, Konttinen *et al*, 2010). The first, and, maybe most obvious explanation for a preference to sweet tasking food, is that the sensation of sweetness is innately pleasant, whereas other tastes such as bitter and sour are innately unpleasant (Gibson, 2006). It is also suggested that sweet foods may have the ability to influence mood, and this may be the key determining factor that influences food choice as a result of a negative emotion. Gibson (2006) explains that the mechanisms that govern the effect of stress on food choice may be separate from those that influence overall appetite under stress. Foods such as sweets and chocolate may be particularly useful in alleviating stress. It has been observed that stressed emotional eaters consumed more sweet high-fat foods compared to unstressed emotional eaters or non-emotional eaters (Oliver *et al*, 2000). However, this study was based in a laboratory setting and set out to induce stress on participants, which, as previously mentioned is very much dependent on the individuals reaction to certain stimuli, it is possible that not all participants experienced stress.

One suggested mechanism responsible for stressed-induced preference for sweet-fatty foods is that highly palatable foods can themselves relieve stress through the release of endogenous opioids (Oliver *et al*, 2000). Gibson (2006) explains how endogenous opioid neuropeptides are involved in rewards processes in eating behaviour, such as the stimulation of appetite by palatable foods, as well as adaptive responses to stress and discomfort. This link between opioid action, mood and sweet tasting food is offered as an explanation as to why when sweet solutions were offered to newborn babies, an immediately calming affect was observed (Smith, Fillion, & Blass, 1990). This affect appears to depend on a sweet taste rather than calories, as when non-nutritive sweeteners were offered similar observations were observed. The effect of sweetness can also be locked by opioid antagonists, which also reduce consumption of preferred foods (Gibson, 2006). In support of this, when negative mood was induced in adults, mood was immediately improved after eating palatable foods and this affect was much more pronounced in emotional eaters (Macht & Mueller, 2007). It would appear that it is the high palpability of food that elevates mood after eating, as opposed to the nutritional content of the food (Kontinenn *et al*, 2010). Thus, supporting the

trend in those scoring more highly on the emotional eating scale consuming more sweet snacks.

Worth considering when reviewing the results relating to snack choice is that additional factors other than physiological mechanisms and negative emotions are known to influence food selection, such as the individual's attitude and previous experience to certain foods (Gibson, 2006). Some individuals will make their selection based on learned behaviour, such as receiving food as comfort as a child or as a reward, or based on nostalgic memory (Kemp et al, 2011). The environment in which the consumption takes place will also have a bearing on selection, especially the college environment. Not only will the accessibility of food restrict and determine the choices available, social norm and peer acceptance may also influence an individual's food choice (Bennet *et al* 2013, Kemp *et al*, 2011). It is clear that assessing whether there is a relationship between emotional eaters and the snack choices they make is a complex area, as consumption of food is influenced by a number of factors from psychological to physiological.

Food consumption

Subjects in this study were asked to state how often they typically consumed food (both on a weekday and weekend), and also how often they typically ate certain snacks. As can be seen from the results there was no significant difference in the response from either group.

One explanation for this may be that the subjects were asked to report on the average amount of times they consumed a certain snack per week. They were not, however, asked to comment on the portion size of the snack when consumed. This is a limitation of this study as it may well be the case that emotional eaters do consume more food overall and more of a certain snack, but as an amount as opposed to frequency. Another explanation for the lack of difference noted may be because the subjects were asked to report on their 'typical' consumption of the chosen snacks. However, it would seem obvious that for a person to consume food in response to an emotion the emotion must be triggered. Therefore, emotional eaters may well consume more food or snacks overall in comparison to non-emotional eaters, but the limitations of this study design may have failed to have of observed this by not establishing the current emotional state of the subjects, or whether the snacks they were claiming to eat were in response to an emotion. This is where laboratory designed studies that have induced emotional states and then observed the eating behaviour have an advantage (Oliver et al, 2000). However, these may also not represent a typical everyday scenario. Emotions are very subjective and inducing emotions on subjects in a laboratory setting may cause the desired effect in some but not others and, therefore, affecting the reliability of the results. It therefore appears that there are advantages and disadvantages to both field and laboratory settings and the overall aim of the research may determine which is most appropriate, and consistency is key for a comparison of studies to be made.

Conclusion

This current study adds to a growing body of research investigating the factors that influence food choice, particularly highly palatable foods. Based on the findings the main conclusions drawn are that females showed prevalence towards scoring higher on the emotional eating scale. There was also a weak, yet statistically significant correlation between emotional eating scores and the consumption of sweet snacks.

However, the number of individuals representing emotional eaters within this study was limited to a small sample size, and therefore, these findings must be taken with caution. The preference of highly palatable sweet foods in relation to negative emotions is consistent with previous findings and therefore warrants further investigation. It would be recommended that future studies include the observation or reporting of the current emotional state of the individuals, along with the actual food consumed in response to both positive and negative emotions, this would allow for a more accurate observation to be made into the link between certain emotions and certain foods. Included in these studies should be a larger sample size of emotional eaters, and also an equal mix of both genders. If a strong association is observed between emotions and eating behaviour interventions can then be developed that focus on maintaining positive emotions and methods to alleviate negative emotions in other ways than eating.

References

Bekker, M., Van de Meerendonk, C. & Mollerus, J. (2004) 'Effects of negative mood induction and impulsivity on self-perceived emotional eating', *International Journal of Eating Disorders,* vol. 36, pp. 461-469.

Bennett, J., Greene, G. & Schwartz-Barcott, D. (2013) 'Perceptions of emotional eating behavior. A Qualitative study of college students', *Appetite*, vol. 60, pp. 187-192.

Bohon, C., Stice, E. & Spoor, S. (2009) 'Female emotional eaters show abnormalities in consummatory and anticipatory food reward: A functional magnetic resonance imaging study', *International Journal of Eating Disorders,* vol. 42 (3), pp. 210-221.

Canetti, L., Bachar, E. & Berry, E. (2002) 'Food and Emotion', *Behavioural Processes,* vol. 60, pp. 157-164.

Christensen, L. & Brooks, A. (2001) 'Changing food preference as a function of mood', *Journal of Psychology*, vol. 140, pp. 293-306.

Evers, C., de Ridder, T. & Adriaanse, M. (2009) 'Assessing Yourself as an Emotional Eater: Mission Impossible?', *Health Psychology*, vol. 28 (6), pp. 717-725.

Gibson, E. (2006) 'Emotional influences on food choice: Sensory, physiological and psychological pathways', *Physiology & Behavior*, vol. 89, pp. 53-61.

Grimme, E. & Steinle, N. (2010) 'Genetics of eating behavior: established and emerging concepts', *Emerging Science*, vol. 69 (1), pp. 52-60.

Hou, F., Xu, S., Zhao, Y., Lu, Q., Zhang, S., Zu, P., Sun, Y., Su, P. & Tao, F. (2013) 'Effects of emotional symptoms and life stress on eating behaviors among adolescents', *Appetite*, vol. 68, pp. 63-68.

Kemp, E., Bui, M. & Grier, S. (2011) 'Eating Their Feelings: Examining Emotional Eating in At-Risk Groups in the United States', *Journal of Consumer Policy*, vol. 34, pp. 211-229.

Kim, S. & Kim, S. (2010) 'Energy intake and snack choice by the meal patterns of employed people', *Nutrition Research and Practice*, vol. 4 (1), pp. 43-50.

Konttinen, H., Mannisto, S., Sarlio-Lahteenkorva, S., Silventoinen, K. & Haukkala, A. (2010) 'Emotional eating, depressive symptoms and self-reported food consumption. A population-based study', *Appetite,* vol. 54, pp. 473-479.

Kringelbach, M., Stein, A. & Van Hartevelt, T. (2012) 'The functional human neuroanatomy of food pleasure cycles', *Physiology & Behavior*, vol. 106, pp. 307-316.

Loxton, N., Dawe, S. & Cahill, A. (2011) 'Does negative mood drive the urge to eat? The contribution of negative mood, exposure to food cues and eating style', *Appetite,* vol. 56, pp. 368-374.

Lyman, B. (1982) 'The nutritional values and food group characteristics of foods preferred during various emotions', *Journal of Psychology*, vol. 112, pp. 121-127.

Macht, M & Mueller, J. (2007) 'Immediate effects of chocolate on experimentally induced mood states', *Appetite,* vol. 49, pp. 667-674.

Macht, M., Haupt, C. & Salewsky, A. (2004) 'Emotions and eating in everyday life: application of the experiment-sampling method', *Ecology of Food and Nutrition*, vol. 43, pp. 327-337.

McNaughton, S. (2012) 'Understanding food and nutrition-related behaviours: Putting together the pieces of the puzzle', *Nutrition & Dietetics*, vol. 69, pp. 80-83.

Michels, N., Sioen, I., Braet, C., Eiben, G., Hebetreit, A., Huybrechts, I., Vanaelst, B., Vyncke, K., De Henauw, S. (2012) 'Stress, emotional eating behavior and dietary patterns in children', *Appetite*, vol. 59, pp. 762-769.

Mikolajczyk, R., Ansari, W. & Maxwell, A. (2009) 'Food consumption frequency and perceived stress and depressive symptoms among students in three European countries', *Nutrition Journal*, vol. 8 (31), pp. 1-8.

Nguyen-Michel, S., Unger, J. & Spruijt-Metz, D. (2007) 'Dietary correlates of emotional eating in adolescence', *Appetite*, vol. 49, pp. 494-499.

O'Connor, D., Jones, F., Connor, M. & McMillan, B. (2008) 'Effects of Daily Hassles and Eating Style on Eating Behavior', *Health Psychology*, vol. 27(1), pp.20-31.

Oliver, G., Wardle, J. & Gibson, L. (2000) 'Stress and Food Choice: A Laboratory Study', *Psychosomatic Medicine,* vol. 62, pp. 853-865.

Raspopow, K., Abizaid, A., Matheson, K. & Anisman, H. (2010) 'Psychosocial stressor effects on cortisol and ghrelin in emotional and non-emotional eaters: Influence of anger and shame', *Hormones and Behavior*, vol. 58, pp. 677-684.

Schembre, S., Greene, G. & Melanson, K. (2009) 'Development and validation of a weight-related eating questionnaire', *Eating Behaviours,* vol. 10, pp. 119-124.

Smith, B., Fillion, T. & Blass, E. (1990) 'Orally mediated sources of calming in 1- to 3-day old human infants', *Developmental Psychology*, vol. 26(5), pp. 731-737.

Van Strein, T., Frijters, J., Bergers, G. & Defares, P. (1986) 'The Dutch Eating Behavior Questionnaire (Debq) for assessment of restrained emotional, and external eating behavior', *International Journal of Eating Disorders,* vol. 5(2), pp.295-315.

Wallis, D & Hetherington, M. (2009) 'Emotions and eating. Self-reported and experimentally induced changes in food intake under stress', *Appetite*, vol. 52, pp. 355-362.