

Preference for High/Low Calorie Food

Dependant on Mood, Personality Traits

and Perceived Stress

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ABSTRACT

Objectives: To see if Mood (PANAS-X ‘sadness’ and ‘fatigue’), Personality traits (‘conscientiousness’ and ‘openness’) and Perceived Stress had an effect on preference for high calorie, fatty foods/low calorie, low fat foods. **Method:** Sixty participants aged between 18-49 were tested for scores on Mood, Personality and Perceived Stress scales which were then correlated with scores that participants gave when rating 24 food images of; 12 high calorie, fatty foods and 12 low calorie, low fat food images. **Results:** High scores for Sadness were related to higher rating scores for the high calorie, fatty food images ($p = .002$). **Conclusions:** Sadness is linked to a preference for high calorie, fatty foods. The negative affect of this mood (sadness) leads to a craving for the high calorie, fatty foods, which results in a higher rate of consumption of these types of food.

INTRODUCTION

Digestive behaviour is an unconscious process occurring continuously throughout daily activities. It is subjective to biological regulatory factors in the digestive system and brain, such as insulin, growth hormones and sex steroids, with the hypothalamus being an important structure in carrying out actions influenced by these aspects of ingestion. However, other important factors influencing the hypothalamus are cognitive factors e.g. attention, memory, reasoning etc. Pleasure (or its absence) is often in control of eating behaviours and the emotions and associations people relate to certain foods are a major aspect of diet selection (Suzuki, Simpson, Minnion, Shillito & Bloom, 2010; Bellisle, Blundell, Dye, Fantino, Fern, Fletcher, Lambert, Roberfroid, Specter, Westenhofer & Westerterp-Plantenga, 1998). Therefore, it stands to reason that mood, personality and stress hold a strong influence in the regulation and selection of food. The selection and consumption of food is of vital importance among all animals and in particular having the correct diet plays a huge role in health outcomes (Emlen, 1966). Hence understanding the factors affecting selection and consumption of food are hugely imperative in developing our understanding of dietary behaviours.

A considerable amount of research has been done in order to investigate the effects that food can have on mood, yet few studies have been composed to observe the effects of mood on the food that we chose to consume. This imbalance of research has presented the relationship between mood and food in a unidirectional manner, when it is in fact, bidirectional (Christensen & Brooks, 2006). As Lyman (1989) stated “just as foods determine our moods so do our moods determine what we eat” (p. 44). Despite the lack of investigations into this relationship, some research has found that cravings for food are indeed strongly correlated with a variety of moods and psychiatric symptoms such as depression, tension and fatigue (Christensen & Pettijohn, 2001).

Similarly, little research has investigated the effects that personality traits have in relation to food preference. Yet, there is a growing amount of evidence that points to the notion that personality differences can play a major part in many health outcomes (Deary, Weiss & Batty, 2010). One of the most consistent predictors of health outcomes is conscientiousness (Bogg & Roberts, 2004). Although, other traits such as openness, have also been found to have a link to health outcomes (Deary et al., 2010). Openness, in particular, has been found to have a substantial association to dietary patterns (Mottus, McNeil, Jia, Craig, Starr & Deary, 2013).

Stress, quite oppositely to the previous two concepts, has been extensively documented to cause over-eating, coining the phrase 'comfort-eating'. As food science literature would suggest: many comfort foods have a high fat or sugar content that provides a short term physiological boost (Bell, Mary, Bhargava, Soriano, Laugero, Akana & Dallman, 2002). Nevertheless, research into stress related eating behaviour is somewhat contradictory, with some research pointing to the idea that stress induces the consumption of high calorie, sugary, fatty foods (Ng & Jeffery, 2003), while other research suggests that it merely involves picking types of food different from ones normal diet, be it healthy or otherwise, purely seeking a change from what is familiar (Wood, 2009).

LITERATURE REVIEW

Mood and Ingestive Behaviour

Very little research has studied the effect of mood on diet, with most food and mood related studies focusing more so on the effects that consuming food has on mood. Mood is generally divided into two distinct categories of emotional experience; either Positive Affect or Negative Affect. Positive Affect includes emotions such as joviality, self-assurance and attentiveness; while Negative Affect includes emotions such as sadness, guilt, hostility and fear (Watson & Clark, 1999). While research has regularly demonstrated a relationship of food affecting moods, little has been done to investigate and confirm the relationship in the reverse direction (Christensen et al., 2006). The current hypothesis represents a cyclical relationship between mood and food, whereby emotional distress e.g. sadness, fatigue, guilt etc. causes cravings for high calorie, sugary, fat rich foods which then in turn causes a temporary mood improvement until a negative state returns and so the cycle continues (Christenson, 2001). It has been found that among depressed individuals there is a significantly higher consumption rate for high calorie, sweet foods than non-depressed individuals (Christensen and Somers, 1996). A study of women with severe premenstrual symptoms found that drinking a sweet, carbohydrate rich drink reduced self-reported depression, anger and confusion (Sayegh, Schiff, Wurtman, Spiers, McDermott & Wurtman, 1995). Another study conducted by Chua, Touyz & Hill (2004) found that exposure to a sad film resulting in a decrease in mood i.e. a more negative mood, resulted in eating significantly more food. A similar study by Cools, Schotte & McNally (1992) had found that participants exposed to a horror film consumed nearly double the food intake compared to that of participants exposed to a comedy film and over seven times the food intake compared to those watching a neutral film. This only adds to the support for the cyclical nature of the mood food relationship. Granted, evidence in support of such behaviour is still scarce but as

pointed out by Crum & Corbin (2011) “Evidence continues to point to the idea that one’s state of mind influences the body, and we cannot easily separate the interdependence of mind and body” (p. 424). Concluding from such research, it is hence reasonable to assume that certain moods such as sadness and fatigue may play a role in the selection and consumption of higher calorie, fatty or carbohydrate rich foods and therefore aspects of mood are of interest to the current study. Sadness is of particular interest because of the above studies, which show depressed and negative moods as having some effect on food preference. Fatigue is also of interest as it would be rational to believe that individuals feeling symptoms of fatigue would crave the higher calorie, fatty foods (due to being carbohydrate rich and having higher sugar content) in order to alleviate fatigue, just as the mood food cyclical relationship would suggest.

Personality and Ingestive Behaviour

It is becoming increasingly apparent that personality traits are related to numerous health outcomes and health related behaviours, however there is little literature on the direct influence that personality traits may have on dietary behaviour (Mottus et al., 2013). Personality is conceptualized from a variety of theoretical perspectives of varying levels and scales. One of the most commonly renowned measures of personality traits is Ocean’s ‘Big 5’, Personality traits, which categorizes five main traits; conscientiousness, openness, agreeableness, neuroticism and extraversion (John, Donahue & Kentle, 1991; John, Naumann & Soto, 2008). It is often identified that the personality trait of conscientiousness (being orderly, disciplined, deliberate, considerate etc.) is the most constant predictor of health outcomes, although the other remaining traits of neuroticism, extraversion, openness and agreeableness are also associated to aspects of health (Deary et al., 2010). In a study by Bogg

& Roberts (2004), conscientiousness was linked to a range of health related behaviours including excessive alcohol use, drug use, risky driving, tobacco use and unhealthy eating. Thus there is suitable reason to assume the association between personality traits and dietary habits. Studies by Mottus, Realo, Allik, Deary, Esko & Metspalu (2012) and Mottus et al. (2013) both found evidence to suggest that conscientiousness and openness (openness comprising of concepts such as; imagination, aesthetic sensitivity, intellectual curiosity, attentiveness to inner feelings and a preference for variety (John et al., 1991; John et al., 2008) – the last item being of particular interest in this case) had a significant effect on dietary behaviour. These studies found high scores on conscientiousness as being associated with the avoidance of fats and that higher score for openness were associated with the avoidance of fats and lower levels of fibre consumption. In review of the few studies into this area of health related behaviour, it appears that openness is the personality trait with the strongest and most consistent correlate to dietary patterns, with agreeableness and conscientiousness being the next most influential traits but less consistently. From this information it can be concluded that people with high levels of openness and conscientiousness are more likely to practice a health aware diet, suggesting that these individuals may be swayed towards a preference for low calorie, low fat foods (Mottus et al., 2012; Mottus et al., 2013). A low level of openness implies less willingness to change a diet and hence stick to the same diet, particularly one that may include higher calories, fat, sugar etc. understanding if such a correlation exists between openness levels and food preference could potentially lead to new ways in dealing with dieting, eating disorders etc. in terms of an individual's own aspect of personality. The same can be said of conscientiousness. Increasing these aspects of personality may be of benefit for many health related behaviours and not just in the case of food selection and consumption, therefore there is good reason for further investigation into this relationship.

Stress and Ingestive Behaviour

The relationship between stress and eating behaviours is notoriously widespread and generally, scientifically accepted (Greeno & Wing, 1994). The concept of stress induced eating is particularly apparent in everyday life with concepts such as comfort food and comfort eating. However research into stress and eating behaviour is often times contradictory, with stress being linked to both an increase (hyperphagia) and a decrease (hypophagia) in eating, and has also been the cause of debate as to what individual or situational factors moderate the relationship (Robbins & Fray, 1980). Greeno & Wing (1994) inferred that acute and milder stressors were the cause of hyperphagia, while chronic stressors were the cause of hypophagia. Quite a few studies have demonstrated a positive relationship between high stress levels and a less healthy diet, involving an increased fat intake (Hellerstedt & Jeffery, 1997; McCann, Warnick & Knopp, 1990) and a greater consumption of snacks and fastfood (Grunberg & straub, 1992; Pak, Olsen & Mahoney, 2000). However, Wood (2009) found results suggesting that in times of stress individuals seek food types different from their usual diet be it unhealthy or healthy. Consequently, despite the unanimity of some literature, the current evidence still remains to some extent inconclusive (Cartwright, Wardle, Steggle, Simon, Croker & Jarvis, 2003), thus more detailed research into the topic determining whether food selection during stress is purely for the high levels of fat, sugar etc. seems applicable to the present study. It is unlikely that low levels of perceived stress will result in an increased preference for the low calorie, low fat foods. Since the complete lack of a stress variable itself would mean that there is no influence upon the dependant variable, it can be assumed that no affect will be had if mild, lower levels of stress are experienced. The logic behind this is that stress is an aspect of life that can never be completely diminished; therefore a small amount stress will likely always be present in people as it is a reflexive response. This would imply people are used to these mild stresses and become habituated to

deal with lower levels of stress so that it does not have much of an effect in daily activities, including eating behaviour (Grissom & Bhatnagar, 2008). There is also no prior evidence to demonstrate or even suggest that low levels of stress in particular, influence food preference in anyway. In a study by Kandiah, Yake & Willet (2008) it was found there was a significant increase in the variety of foods selected when under stress compared to when not stressed i.e. under normal conditions. Again, this implies that low levels of stress will show no significant relation to food preference. Therefore the current research does not intend to find any relationship of this kind (This information only helps to exemplify the complicated nature of the relationship between stress and food preference/consumption) and hence it appears more than likely that low levels of stress will have no effect on preference. Thus it is likely to be found that there will be no preference between high calorie, fatty foods or low calorie, low fat foods, in individuals with low levels of stress.

Rationale for current study

Examining the above information in detail, it is clear that many relationships between food selection and consumption exist, and that the cognitive factors involved in moderating this relationship still remain somewhat ambiguous. The research appears to point in favour of certain claims; however the scarcity of tried and tested studies are of detriment to the overall concept. Thus, continuing with further research into this area is clearly necessary and important to clear up these issues. Following through with the guidelines from previous studies that generally swayed towards the opinion of mood, personality and stress as being some of the most important cognitive factors that affect health related behaviours, and potentially ingestive, dietary behaviours, it would only seem logical to test them on sample of individuals, particularly ones that fall into no distinct categories i.e. a sample consisting of

both males and females, a broad age range, etc. In this way it will be possible to apply the results gained from this study to the general population and not just any one subset or category of individuals alone.

In the case of mood there is clearly a case for validity in the argument of mood affecting food choice, yet there is a lack of research to confirm and further explore this in closer detail i.e. what mood sets in particular affect our preference for high calorie, fatty foods and low calorie, low fat foods. Referring to the above literature, it is apparent that negative affect i.e. sadness, guilt, fatigue etc. would show strong connections to over-eating and the consumption of sugary snack like foods, thus testing to see if individuals who fall into these categories, specifically the categories of sadness and fatigue which seem the most relevant, would seem test-worthy, in light of the aforementioned studies.

Tying in with this, personality traits are known to have a connection to health related behaviours particularly in the case of conscientiousness, and in the case of openness there appears to be a strong relation to dietary behaviour. The literature suggests that those with a level of high conscientiousness and openness practice a more health aware diet, so to test this by seeing if those individuals who fall into the categories of high conscientiousness and openness purposefully select or prefer foods low in calories and fats, and those who score poorly in these categories would select or prefer foods high in calories and fats, would make sense. Interestingly, if it is found that personality traits do affect ingestive behaviour, it will also be possible to determine if personality traits are more influential in food preference than mood or stress. It may be possible to tell if those who fall into the high levels of conscientiousness and openness categories, but also have a negative mood or high levels of stress may be more swayed by personality in deciphering food preference than either the negative mood or high stress levels. Equally as much, perhaps the opposite may be true and negative will override personality traits and high stress levels when it comes to food

preference. Finally, in the case of stress, establishing whether high stress levels do actually result in a preference for high calorie, fatty foods will help to provide further evidence for the comfort food concept. If it is found that this relationship does not exist it may help to guide future research into investigating other relationships between stress and food, such as the idea that stress merely induces hypophagia or hyperphagia, or that it causes us to seek something different from normal dietary foods.

Thus, it would appear that research into this area of ingestive behaviour is entirely credited and worth-while, as understanding the effects of mood, personality and stress on food preference and the nature of this relationship could potentially have hugely beneficial outcomes, not only in terms of improving the knowledge of cognitive factors on dietary behaviour but also for informing public health policies, in finding a way to address the current obesogenic environment and in the treatment of eating disorders such as binge eating etc.

Fundamentally, the study will hopefully identify any significant relationships that the variables of mood, personality and stress may have with concern to food preference and it will also be possible to ascertain which of these variables has the strongest correlation, if any.

HYPOTHESES:

The following hypotheses will be tested for during this study:

Hypothesis 1: There will be a significant effect of mood, personality traits and perceived stress on food preference.

Hypothesis 2: Participants with higher scores in the PANAS-X categories of ‘sadness’ and ‘fatigue’ will have higher levels of response to images of high calorie foods, while participants with lower scores in the PANAS-X categories of ‘sadness’ and ‘fatigue’ will show no preference in levels of response to images of either high or low calorie foods.

Hypothesis 3: Participants with lower scores in the personality trait category of ‘conscientiousness’ will have higher levels of response to images of high calorie foods, while participants with higher scores in the personality category of ‘conscientiousness’ will show higher levels of response to images of low calorie foods.

Hypothesis 4: Participants with lower scores in the personality trait category of ‘openness’ will have higher levels of response to images of high calorie foods, while participants with higher scores in the personality category of ‘openness’ will show higher levels of response to images of low calorie foods.

Hypothesis 5: Participants with high levels of stress will have higher levels of response to images of high calorie foods, while participants with low levels of stress will show no preference in levels of response to images of either high or low calorie foods.

METHOD

Participants

A convenience sample of Dublin Business School students were selected to complete a 140-item survey enquiring about stress, mood, personality types and food preference. There was a total number of 60 participants (36 females, 24 males), aged between 18-49 years old ($m=24.27$, $SD=7.12$). All participants were selected from students enrolled in a full time psychology course. Participation in the study was voluntary and participants were not divided into any groups or given any different treatments, as they were all a part of the same experimental group. The participants of this study may not be entirely representative of the general population as all were psychology undergraduates, implying that some previous knowledge on the subject or other education related factors may have influenced them to answer differently. In addition to this the sample size was small inferring less external validity outside of the Dublin Business School population.

Design

A mixed methods design was used for the study being both experimental and correlational in its design. The experimental part of the design involved the presentation of food images and collecting participant responses to these images. A correlation was then tested between the independent variables and the dependant variables. The independent variables are; PANAS-X (Sadness and Fatigue), Personality Traits (Conscientiousness and Openness) and Perceived Stress. While the dependant variables were; level of response to

high calorie, high fat foods and level of response to low calorie, low fat foods. The demographic variables of age and gender were also obtained.

A within-subjects design was used as all participants were tested for the same variables. The design was also quantitative in its measurement.

Materials

Paper and pencil questionnaires were used to form a survey which collected data on participants and their scores for the independent variables. The following questionnaires were used:

The “PANAS-X” (Positive and Negative Affect Schedule-Expanded form)/Mood (Watson & Clark, 1994), consisting of 60 words and phrases to describe different emotions and feelings e.g. cheerful, angry at self, tired etc. Participants rated the extent to which they felt this way on a scale of 1-5 (1=very slightly or not at all, 2=a little, 3=moderately, 4=quite a bit, 5=extremely). These words formed parts of individual categories which when totalled would detect the level to which the participant was experiencing a certain mood e.g. Sadness, fatigue etc. (Positive Affect $\alpha = .83-.90$, Negative Affect $\alpha = .85-.90$).

The “Ocean ‘Big Five’, Personality Traits” (Donahue & Kentle, 1991; Naumann & Soto, 2008), consisting of 44 characteristics that may apply to the participant. Each item was rated on a scale of 1-5 (1=disagree strongly, 2=disagree a little, 3=neither agree nor disagree, 4=agree a little, 5=agree strongly). Each item belonged to a certain personality type which was then totalled, the higher the score the more predominant the personality type e.g. Conscientiousness, openness etc. ($\alpha = .70$).

The “Perceived Stress Scale” (Cohen, Kamarck & Mermelstein, 1983), consisting of 10 questions gauging participants feelings and thoughts. This was rated on a scale of 0-4 (0=Never, 1=almost never, 2=sometimes, 3=fairly often, 4=very often). These items were totalled to find the level of stress that participants were experiencing ($\alpha = .75$).

The survey also contained a self-made questionnaire where participants were asked to rate images of food on a scale of 1-10 (1=least appetizing, 5=neither appetizing or unappetizing, 10=most appetizing). A copy of this presentation can be found in the appendix of this booklet.

Simple demographics of age and gender were asked in addition to these questionnaires. A copy of the survey used and the questionnaires it contains can be found in the appendix of this booklet.

Apparatus

A power point presentation displaying 24 food images was played during the course of participant testing. The presentation consisted of 12 low fat, low calorie foods and 12 high fat, high calorie foods. The images were selected based on their fat and calorie content. They were presented in random order and each image was displayed for 15 seconds. The presentation itself was displayed via an overhead projector, which projected the presentation onto a screen at the front of the room.

Procedure

During the procedure participants were required to fill in the three questionnaires examining mood, personality and perceived stress. Mood was measured using the PANAS-X questionnaire (Watson & Clark, 1994) which was used specifically to measure the levels of sadness and fatigue that an individual was feeling and this was then tested to see if it correlated with food preference. Personality was measured with the use of the Ocean 'Big 5', Personality traits questionnaire (Donahue & Kentle, 1991; Naumann & Soto, 2008), examining the levels of conscientiousness and openness and again was checked to see if a correlation existed with food preference. Stress was measured using Cohen's Perceived Stress Scale (Cohen, Kamarck & Mermelstein, 1983), with stress levels also being examined to see if they were correlated to food preference. Participants then proceeded to view a short presentation of a range of twenty-four food images; half high calorie, fatty foods, and the other half, low calorie, low fat foods. During this, participants rated the individual foods on how appetizing they found them.

The procedure for the study itself was relatively simple. Since the study was a within-subjects design all participants were tested for the same variables. All participants were asked to voluntarily participate in the study and were explained its true purpose prior to taking part, no deception was required. The purpose of the study was re-iterated on the cover page of the questionnaire, which also stated that by filling in the questionnaire participants were confirming their consent to take part. Participants had been allotted a time of up to 15 minutes to fill in the questionnaire parts of the survey. The survey then stated to await further instruction before the presentation of food images. An explanation of the presentation was then given to the participants. They were told that the presentation would play directly in front of them (via the overhead project) and that 24 food images would appear, which they were to rate on a scale of 1-10, where; 1=least appetizing, 5=neither appetizing or

unappetizing and, 10=most appetizing, participants were reminded they could use any score between 10 (i.e. 1, 2, 3, 4, 5 etc. up to 10). Participants were also told each image would appear on screen for 15 seconds each. When the presentation was completed all surveys were collected.

All participants were given the option to withdraw from the study which was clearly stated on the cover page of the survey that they were entitled to do so. On the last page of the survey contact numbers and email addresses for appropriate helplines and for the experimenter were provided in case any participant was negatively affected by the procedure or had any further questions. A copy of the survey can be found in its entirety in the appendix of this booklet.

RESULTS

Descriptive Statistics

Table 1: Frequency Table of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	24	40	40	40
	Female	36	60	60	100
	Total	60	100	100	

A total of 60 participants took part in the study (male = 24, female = 36), all of whom completed the survey. Participant ages ranged from 18-49 years, with the majority in their early twenties (See figure 1.).

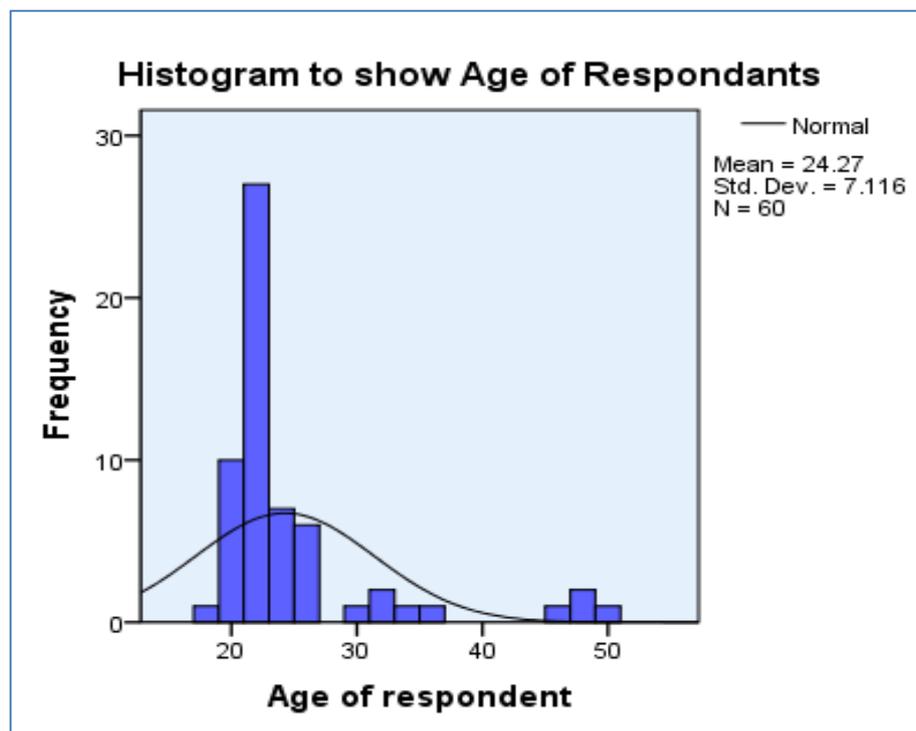


Figure1.

Table 2: Statistics of Psychological Measures

Variables	Mean	Standard Deviation
Fatigue	12.65	4.29
Sadness	11.60	5.23
Conscientiousness	27.88	5.62
Openness	35.90	6.41
Stress	19.87	8.76
Response to high calorie/fatty food	78.57	18.87
Response to low calorie/low fat food	67.38	19.46

The variables of Fatigue (M=12.65, SD=4.29), Sadness (M=11.60, SD=5.23), Conscientiousness (M=27.88, SD=5.62), Openness (M=35.90, SD=6.41) and Stress (M=19.87, SD=8.76) were all examined to see if they were correlated with the variables of Response to high calorie/fatty food (M=78.57, SD=18.87) and Response to low calorie/low fat food (M=67.38, SD=19.46). All scores appeared to be normally distributed with no outliers.

*Inferential Statistics**Table 3: Correlation Table*

Variables	Response to high calorie/fatty food	Sadness	Fatigue	Conscientious- ness	Openness
Response to high calorie/fatty food	-	-	-	-	-
Sadness	.370	-	-	-	-
Fatigue	.086	.614	-	-	-
Conscientious- ness	-.022	-.367	-.373	-	-
Openness	.063	-.225	-.179	.257	-

Variable	Response to high calorie/fatty food	Stress
Response to high calorie/fatty food	-	-
Stress	.156	-

Table 4: Correlation Table

Variables	Response to low calorie/low fat food	Sadness	Fatigue	Conscientiousness	Openness
Response to low calorie/low fat food	-	-	-	-	-
Sadness	-.140	-	-	-	-
Fatigue	-.145	.614	-	-	-
Conscientiousness	-.090	-.367	-.373	-	-
Openness	-.072	-.225	-.179	.257	-

Variable	Response to low calorie/low fat food	Stress
Response to low calorie/low fat food	-	-
Stress	-.063	-

A multiple regression was used to test whether Sadness, Fatigue, Conscientiousness, Openness and Stress were predictors of response to high calorie, fatty foods. The results of the regression showed that one predictor explained 11% of the variance ($R^2 = .119$, $F(5, 54) = 2.59$, $p = .036$). It was found that Sadness significantly predicted a response to high calorie, fatty food ($\beta = .545$, $p = .002$, 95% CI = .733 – 3.196). See figure 2. for diagram of this relationship in scatterplot form.

A multiple regression was used to test whether Sadness, Fatigue, Conscientiousness, Openness and Stress were predictors of response to low calorie, low fat foods. The results of the regression showed no significant results ($R^2 = -.027$, $F(5, 54) = .69$, $p = .636$).

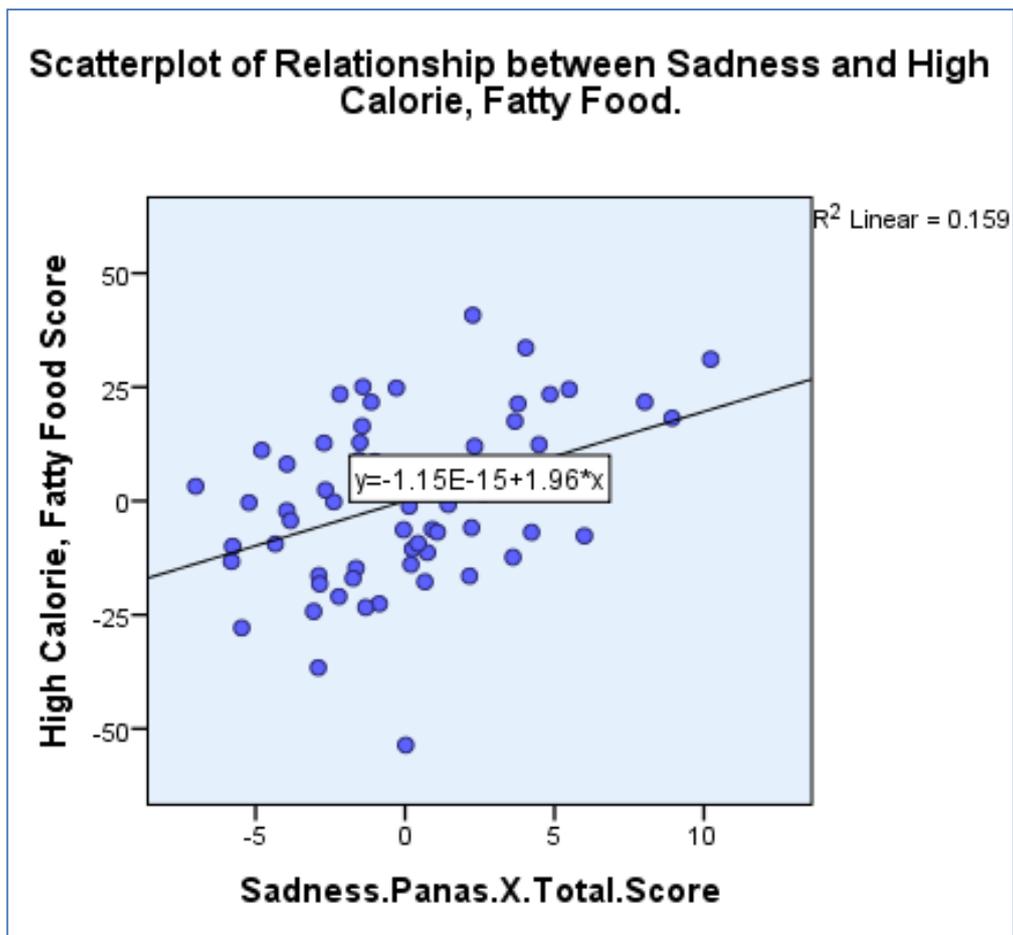


Figure 2.

DISCUSSION

The purpose of this research was to test the hypothesis that the variables of Mood (Fatigue and Sadness), Personality Traits (Conscientiousness and Openness) and Perceived Stress, had a correlation to a preference for high calorie, fatty foods or low calorie, low fat foods. It was predicted that the level at which a participant scored for the independent variables would predict the ratings that they gave to the dependant variables. In this way it would be possible to tell if these variables affected the level of preference an individual gave to a certain food and so in turn the type of food that person would be more likely to consume i.e. a person who rated high calorie, fatty foods with predominantly higher scores was assumed to consume more of those types of food in their everyday life, whereas a person who rated low calorie, low fat foods with predominantly higher scores was assumed to consume more of those types of food in everyday life.

Conclusion of Data/Results

It was predicted that high levels of fatigue and sadness would correlate to a higher preference for high calorie, fatty foods. While this was not entirely founded there appeared to be a significant relationship between high levels of sadness and a higher rating for the high calorie, fatty foods. This implies that sadness has an effect on preference (and so the consumption) for these types of food. There were no findings to suggest that fatigue levels had any relationship to higher or lower ratings of these food types.

It was thought that participants who had lower scores for the personality trait of Conscientiousness would show higher ratings for high calorie, fatty foods, while participants

who had high scores for Conscientiousness were thought to show higher ratings for low calorie, low fat foods, however this was not the case. The results of the analysis showed that the varying scores for Conscientiousness were not reliable predictors for the ratings of high calorie, fatty foods or low calorie, low fat foods.

It was similarly thought that participants with lower scores for the personality trait of Openness would show higher ratings for high calorie, fatty foods, while participants with low scores for openness were thought to show higher ratings for low calorie, low fat foods. Again this did not appear to be the case. The results of the analysis also showed that varying scores for Openness were not reliable predictors for the ratings of either high calorie, fatty foods or low calorie, low fat foods.

The final assumption was that high levels of stress would suggest a higher rating for high calorie, high fat foods. The results of the analysis however, found no such evidence to support this idea (although as thought, low levels of stress did not affect the outcome of response scores either).

In conclusion of the results obtained from the data it appears that only one case prevailed as showing any form of significance, that being the relationship between sadness and ratings for high calorie, fatty foods, thus this hypothesis can be accepted and the null rejected. In the case of the other hypothesis, from the data provided, there are no significant relationships and the null hypothesis must be accepted.

Application to Past Research

Only one result from this study was compliant with what previous research would have suggested. That notion of a relationship between mood and food was documented in

previous research where negative affect effectively predicted higher food consumption rates. Most commonly it was found by these previous studies that those experiencing forms of negative affect (and more notably in sad or depressed individuals), they consumed high calorie, fatty foods at a higher rate than individuals not experiencing any forms of negative affect (Chua et al., 2005; Christenson et al., 1996; Sayegh et al., 1995). The current research coincides with these previous studies as in this case, individuals who had high scores for sadness (and hence can be likened to those in previous cases), showed favour in their ratings for high calorie, fatty foods, which in itself would suggest that these individuals would be more likely to consume such foods. Thus, these results can be said to support what previous studies had implied. In the case of the mood-set of fatigue there did not appear to be any relation of a preference for high calorie, fatty foods or low calorie, low fat foods. Potentially, other subscales of negative affect may be linked to a preference for high calorie, fatty foods and even positive affect may play some role in food preference and consumption. Thus in light of the success of the current research emphasizing the significance of sadness in food selection, it may be worthwhile to investigate other items in the positive and negative affect scale and the effect they may have, seeing as it is highly unlikely sadness is the only mood to influence this type of ingestive behaviour.

Previous research has suggested how Conscientiousness is one of the most reliable predictors of health related outcomes, hence why the current research assumed it would be advantageous to use in this study, since Conscientiousness involves being orderly and disciplined (Deary et al., 2010, Mottus et al. 2012, Mottus et al. 2013). Therefore, it was reasonable to assume that people who scored highly for Conscientiousness would carry through with such an attitude in their dietary habits, yet this was not the case. The scores in this study showed no consistency in predicting the preference for either high calorie, fatty foods or low calorie, low fat foods.

Openness was also linked to health related behaviours by previous research and was viewed as having the strongest links to dietary behaviour out of the personality traits, due to the fact that openness is associated with a preference for variety (Mottus et al., 2012; Mottus et al., 2013). Thus, it was logical to presume that participants with a high level of openness would rate low calorie, low fat foods higher than high fat, high calorie foods. However, the results of the analysis did not show any such evidence to indicate this as true. Following through with these findings it may be advantageous to investigate whether the remaining personality traits (neuroticism, extraversion and agreeableness) have any influence in similar circumstances.

Stress was somewhat unclear in its relationship with food preference from the literature of previous studies. While some evidence pointed towards the notion of higher stressed individuals preferring to consume high calorie, fatty foods other evidence favoured that individuals adopt a food preference for that which is out of the ordinary when under high levels of stress be it healthy or unhealthy etc. (Grunberg & Straub, 1992; Pak, Olsen & Mahoney, 2000; Hellerstedt & Jeffery, 1997; McCann, Warnick & Knopp, 1990; Wood, 2009). Thus the current research prescribed to investigate this further, attempting to see if high stress levels really did necessitate a preference for high calorie, fatty foods and hence consumption of these types of food. The results of the analysis did not find any confirmation of such a relationship. Perhaps future research would be well advised to further investigate this topic in the areas of preference for foods different from the types normally consumed or perhaps even not consuming foods at all in times of stress (hypophagia).

Weaknesses/Limitations of Current Research

The above results may not be an accurate representation of the true nature of the relationships present between Mood, Personality Traits and Stress and their effect on food preference in the current study due to some weaknesses. The first and most obvious of these is the relatively small sample size. Sixty participants may not have been a large enough sample size to detect a significant effect or represent the wider population considering the number of variables being investigated and perhaps a minimum sample size of seventy-five participants would be more appropriate if the design was to be repeated.

The presentation itself may have been somewhat of a weakness as only twenty four images were used with only twelve for high calorie, fatty foods and twelve for low calorie, low fat foods. Maybe, a more extensive number of images could have been used. This would rule out the effect of a person's personal distaste for a certain type of food and in addition to this would be more effective in general. On the subject of personal taste, perhaps individual tastes and distastes themselves i.e. for sweet, sour, spicy etc. may have been a confounding variable that future investigations may need to control for. If further research wished to investigate this more extensively, real food could be used as other senses could potentially be involved in food preference and selection, i.e. smell, taste etc.

Confounding variables may have also been of detriment to the study including, time of day, temperature and lighting. The time of day may have affected participant responses, for example, if tested just after lunch participants may have already eaten and due to a lack of hunger may have rated all images lower than if they were hungry, likewise if participants had been tested before lunch, when they had not ate and were hungry, they may have rated all images highly. Therefore, it may be wiser to test participants at set times when hunger has less influence on preference. Temperature may also be of influence as participants tested on a

cold day may opt for warmer, heavier foods as opposed to testing on a hot day when participants may chose lighter or cooler foods. Lighting may have also affected the outcome of the study as light is known to be a moderator of circadian rhythms (Wright, Lack & Partridge, 2008) which in turn moderates aspects of behaviour such as sleeping, hunger etc. Thus the severity of lighting in the room that participants were tested in could have caused results to vary.

An issue with the method by which participant scores were obtained may also account for some unreliability in the procedure. The questionnaires that were used to measure mood, personality traits and stress were self-reported questionnaires. It is possible that if others were to rate the participants in addition to the participants own self-report, they may have scored differently, particularly in the case of personality traits. Similarly, EEG could have been used to measure participant responses to food images, providing more accurate and defined scaling for the measurement of responsiveness. Such adjustments may need to be applied to future cases.

Strengths of Current Research

One of the main strengths of this research is that it has sufficiently shown the relationship between sadness and food (It also appears to be a positive correlation). Thus highlighting the nature of how sadness can affect food preference which was one of the main purposes of this study. This means that the method applied to this study was effective in determining this relationship (Although in future cases it may be in need of a few adjustments).

The experiment itself was unique in the fact that it is the only one to investigate Mood, Personality Traits and Perceived Stress in the one study. This meant that information on the three of these factors could be retrieved in the one study, as opposed to three separate studies investigating them individually.

The procedure was relatively un-invasive, with participants only having to fill in a questionnaire and view a presentation. It was also reasonably quick, only taking a maximum of twenty minutes, meaning it did not take too much time from participants and was virtually non exhaustive. The experiment did not involve any form of deception either as all participants were made aware of the nature and intent of the study. This prevents having as many possible negative outcomes or negative feelings in participants than if it were used.

The research was quantitative; hence it was possible to retrieve precise, quantitative, numerical data on the subject, from which more reliable conclusions can be drawn. Thus results from this study will possibly have more validity than if it were qualitative, when applied to the wider population.

Future Implications of Research

This research itself brings new knowledge to an area of dietary behaviour where literature is limited and scarce. It has demonstrated that cognitive factors are indeed responsible for our preference for certain foods and thus in the selection and consumption of food. With the findings of this research it enables more studies to investigate these areas further, using this as a base of which to build upon. This implies that future studies will be able to input other variables in place of the ones currently used that may play a role in food preference. Equally as much it may be of interest to repeat this experiment to see if these

results stand true in other populations, and also to apply the adjustments that have been suggested above in order to retest the current hypotheses. In general, this research will hopefully provide for a simple method as well provide information on the topic which can be built upon and improved if applied to further research.

The result of this research showing that sadness is linked to a higher preference for high calorie, fatty foods suggests that sadness is linked to a higher consumption rate of these types of food. This means that in application to the general population obesity may be as a result of sadness, depression etc. In this way it may be possible to give more insight into understanding the causes and onset for obesity and also in helping to prevent or treat cases of obesity, binge eating etc. more effectively.

Conclusion

This research found that sadness correlated to a preference for high calorie, fatty foods, essentially implying that sadness promotes the consumption of these types of food. Hence, with this information we can apply this to real world situations to show sadness as a possible reason as to why people put on weight or binge eat during times of sadness, depression etc. Understanding relationships such as this will help in finding more effective ways to combat obesity and to prevent as many cases in the future. Other variables, such as fatigue, conscientiousness, openness and perceived stress appeared to show no significant relationship for a preference of either high calorie, fatty foods or low calorie low fat, foods. From this we can assume either two explanations. The first being that these variables do not hold any influence on food preference or the second (and possibly more rational explanation), that the procedure from this experiment was not suitable to detect such a relationship. If we are to assume the second explanation it would be wise to investigate these relationships with

changes implemented to the current procedure. None the less this experiment is a good foundation for further research to branch from and investigate such relationships, which may also be well advised to introduce other variables that may influence food preference such as the remaining negative mood affects, positive mood affects and the other remaining personality traits.

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Appendix

Copy of Survey:

Includes copy of: Perceived Stress Scale questionnaire

 ‘Big 5’ Personality Traits questionnaire

 PANAS-X questionnaire

 Self-Made, ratings scale for food images in presentation

Copies of scoring sheets for each questionnaire are also included at the end of the survey.

Preference for High/Low Calorie Food Dependant on Mood, Personality Traits and Perceived Stress

My name is Benjamin Wright and I am conducting research that will explore the effects of mood, personality and stress on food preference. This research is being conducted as part of my studies and will be submitted for examination.

You are invited to take part in this study. Participation will involve completing and returning the attached anonymous surveys and then viewing a presentation of a number of food images and rating each image on how appetizing you find them. The following surveys may ask some questions that might cause some minor negative feelings; however they have been used commonly in research. If any of the questions do happen to raise difficult feelings for you, please contact the support services that are included on the final page.

Participation in the study is completely voluntary and so you do not have to take part.

Participation is anonymous and confidential. This ensures responses cannot be recognized to any one in particular. For this reason, you will not be able to withdraw from participation after the questionnaire has been collected.

The questionnaires will be securely stored and data from the questionnaires will be transferred from the paper record to electronic format and stored on a password protected computer.

It is important that you understand that by completing and submitting the questionnaire that you are consenting to participate in the study.

Should you require any further information about the research, please contact me at

or my supervisor can be contacted at

Thank you for participating in this survey.

Gender: Male Female

Age: _____

Perceived Stress Scale:

The questions in this scale ask you about your feelings and thoughts during the last month.

In each case, you will be asked to indicate how often you felt or thought a certain way.

For each question circle one of the following options:

0 = **never** 1 = **almost never** 2 = **sometimes** 3 = **fairly often**

4 = **very often**

1	1. In the last week, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2	2. In the last week, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3	3. In the last week, how often have you felt nervous and stressed?	0	1	2	3	4
4	4. In the last week, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5	5. In the last week, how often have you felt that things were going your way?	0	1	2	3	4
6	6. In the last week, how often have you found that you could not cope with all the things you had to do?	0	1	2	3	4
7	7. In the last week, how often have you been able to control irritations in your life?	0	1	2	3	4
8	8. In the last week, how often have you felt that you were on top of things?	0	1	2	3	4

9	9. In the last week, how often have you been angered because of things that happened that were outside of your control?	0	1	2	3	4
10	10. In the last week, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

'Big 5' Personality Traits:

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which **you agree or disagree with that statement.**

1 Disagree Strongly	2 Disagree a little	3 Neither agree nor disagree	4 Agree a little	5 Agree strongly
----------------------------------	----------------------------------	---	-------------------------------	-------------------------------

I am someone who...

1. _____ Is talkative
2. _____ Tends to find fault with others
3. _____ Does a thorough job
4. _____ Is depressed, blue
5. _____ Is original, comes up with new ideas
6. _____ Is reserved
7. _____ Is helpful and unselfish with others
8. _____ Can be somewhat careless
9. _____ Is relaxed, handles stress well
10. _____ Is curious about many different things
11. _____ Is full of energy
12. _____ Starts quarrels with others
13. _____ Is a reliable worker
14. _____ Can be tense
15. _____ Is ingenious, a deep thinker

16. _____ Generates a lot of enthusiasm
17. _____ Has a forgiving nature
18. _____ Tends to be disorganized
19. _____ Worries a lot
20. _____ Has an active imagination
21. _____ Tends to be quiet
22. _____ Is generally trusting
23. _____ Tends to be lazy
24. _____ Is emotionally stable, not easily upset
25. _____ Is inventive
26. _____ Has an assertive personality
27. _____ Can be cold and aloof
28. _____ Perseveres until the task is finished
29. _____ Can be moody
30. _____ Values artistic, aesthetic experiences
31. _____ Is sometimes shy, inhibited
32. _____ Is considerate and kind to almost everyone
33. _____ Does things efficiently
34. _____ Remains calm in tense situations
35. _____ Prefers work that is routine
36. _____ Is outgoing, sociable
37. _____ Is sometimes rude to others
38. _____ Makes plans and follows through with them
39. _____ Gets nervous easily
40. _____ Likes to reflect, play with ideas
41. _____ Has few artistic interests
42. _____ Likes to cooperate with others

43. _____ Is easily distracted
44. _____ Is sophisticated in art, music, or literature

PANAS-X: This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way during the past week. Use the following scale to record your answers:

1 = Very slightly or not at all 2 = A little 3 = Moderately 4 = Quite a bit

5 = Extremely

- | | | | |
|------------------------------|--------------|---------------|---------------------------------|
| _____ cheerful | _____ sad | _____ active | _____ angry at self |
| _____ disgusted | _____ calm | _____ guilty | _____ enthusiastic |
| _____ attentive | _____ afraid | _____ joyful | _____ downhearted |
| _____ bashful | _____ tired | _____ nervous | _____ sheepish |
| _____ sluggish | _____ amazed | _____ lonely | _____ distressed |
| _____ daring | _____ shaky | _____ sleepy | _____ blameworthy |
| _____ surprised | _____ happy | _____ excited | _____ determined |
| _____ strong | _____ timid | _____ hostile | _____ frightened |
| _____ scornful | _____ alone | _____ proud | _____ astonished |
| _____ relaxed | _____ alert | _____ jittery | _____ interested |
| _____ irritable | _____ upset | _____ lively | _____ loathing |
| _____ delighted | _____ angry | _____ ashamed | _____ confident |
| _____ inspired | _____ bold | _____ at ease | _____ energetic |
| _____ fearless | _____ blue | _____ scared | _____ concentrating |
| _____ disgusted
with self | _____ shy | _____ drowsy | _____ dissatisfied
with self |

PLEASE WAIT FOR FURTHER INSTRUCTIONS BEFORE CONTINUING

Food Rating Scale: You will now view 24 food images on the overhead screen. Please rate each image accordingly on how appetizing you find them using the following scale from 1-10:

Where 1 = Least appetizing, 5 = Neither appetizing or unappetizing And, 10 = Most appetizing

Please circle your answer:

Image1:	1	2	3	4	5	6	7	8	9	10
Image2:	1	2	3	4	5	6	7	8	9	10
Image3:	1	2	3	4	5	6	7	8	9	10
Image4:	1	2	3	4	5	6	7	8	9	10
Image5:	1	2	3	4	5	6	7	8	9	10
Image6:	1	2	3	4	5	6	7	8	9	10
Image7:	1	2	3	4	5	6	7	8	9	10
Image8:	1	2	3	4	5	6	7	8	9	10
Image9:	1	2	3	4	5	6	7	8	9	10
Image10:	1	2	3	4	5	6	7	8	9	10
Image11:	1	2	3	4	5	6	7	8	9	10
Image12:	1	2	3	4	5	6	7	8	9	10
Image13:	1	2	3	4	5	6	7	8	9	10
Image14:	1	2	3	4	5	6	7	8	9	10
Image15:	1	2	3	4	5	6	7	8	9	10
Image16:	1	2	3	4	5	6	7	8	9	10
Image17:	1	2	3	4	5	6	7	8	9	10
Image18:	1	2	3	4	5	6	7	8	9	10
Image19:	1	2	3	4	5	6	7	8	9	10
Image20:	1	2	3	4	5	6	7	8	9	10
Image21:	1	2	3	4	5	6	7	8	9	10
Image22:	1	2	3	4	5	6	7	8	9	10
Image23:	1	2	3	4	5	6	7	8	9	10
Image24:	1	2	3	4	5	6	7	8	9	10

Thank you for your participation in this study. If this survey has raised any issues for you please contact the following helplines:

Aware - Phone: 1890 303 102

BodyWhys - Phone: 1890 200 444