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The Effects of Self-Esteem and Stress on Eating Behaviours in Females

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Abstract

Past research has shown that stress, along with other moderating variables, leads to a desire to consume calorie-dense foods. Females are particularly prone to increase their appetites in response to stress. To further examine this issue, the current study was designed to observe the effects of stress and self-esteem on eating behaviour in females. Forty females were tested in one of four conditions in terms of stress (stress vs. no stress) and self-esteem (high vs. low). Self-esteem was assessed using the Rosenberg Self-Esteem Scale (Rosenberg, 1965) and a median split determined self-esteem scores. Stress was induced by having participants complete a timed math test and a speech task. For the no stress condition, a personal preference questionnaire was completed. To measure eating behaviour, participants were instructed to choose as many candies as they wanted from a bowl located outside the testing room. Contrary to predictions, no main effects of self-esteem and number of candies taken were found, and participants in the stressful condition with low self-esteem did not grab more candies relative to the other groups. Limitations, scientific implications and directions for future research are discussed.

Keywords: self-esteem, stress, eating, females.

It is no secret that obesity is a major health concern in today’s society and stress combined with subsequent negative emotions may be a potential explanation. The busy schedules that many individuals face on a daily basis might have helped contribute to an emerging health problem. Stress is a physiological response to stressors and affects almost everyone, from the exceedingly pressured executive to the hectic student. Consequently, stress has been widely documented in the literature and is said to have an influence on many behavioural tendencies. Specifically, experts have found that stress
leads to a strong desire to consume calorie dense foods that are high in sugar and fat. This is said to occur due to the fact that junk food triggers an identical physiological reaction to that of drugs and offers the brain a temporary sense of relief. Thus, when an individual experiences high levels of stress, the body resorts to palatable comfort foods in order to deal with the stressor (Fraser, 2013). Self-esteem has also been commonly discussed in the literature as a possible modifying variable for various behavioural inclinations.

With regard to the emotional nervous system and its effect on emotional eating, Dallman (2009) asserts that response signals are created by emotional brain networks in an attempt to respond to stressors. These responses are then what trigger a desire for emotional eating. Additionally, she mentions that when an individual is stressed, chemicals in the brain that increase motivation for food are stimulated. Dallman also adds that consuming unhealthy, pleasurable food is a source of stress relief, which reinforces more eating of these palatable foods.

In a recent study by Cartwright, Wardle, Steggles, Simon, Croker and Jarvis (2003), they examined associations between psychological stress and dietary practices in a large sample of adolescents. Researchers had participants complete a Perceived Stress Scale and Food Frequencies questionnaire. What they found was that participants with higher perceived stress were more likely to indicate a higher caloric intake, especially with foods high in fat. High levels of stress were also associated with the intake of less fruits and vegetables as well as a greater likelihood of skipping breakfast. This study demonstrated that the stress and eating relationship may be something that develops early on in life.
While continuing with the notion that high stress levels cause an increase of unhealthy, high-fat foods in an individual’s diet, Zellner, Loaiza, Gonzalez, Pita, Morales, Pecora and Wolf (2006) conducted a recent study looking at the influence of stress on food preferences in a sample consisting only of females. Researchers induced stress in participants using either solvable (no stress condition) or unsolvable (stressed condition) anagrams. Researchers then presented participants with four varieties of snacks, providing them with sweet and salty (M&M chocolate candies, potato chips, peanuts) options and one healthy option (grapes). Foods were placed in front of the participants and researchers recorded how much food the participants consumed. Researchers found that participants in the no stress condition consumed more grapes than those in the stressed condition. No significant differences were indicated for the peanuts and chips. In a second experiment, Zellner and colleagues examined gender and had both males and females take the Eating-When-Stressed Questionnaire, which asked about their eating behavior under stress. What the researchers found was that females indicated higher occurrences of increasing their food intake when stressed in comparison to males.

Furthermore, a study by Macht and Mueller (2007) demonstrated how consuming sweet food leads to the reduction of stress. In this study, film clips that were sad, happy or neutral were used in order to induce a particular mood. Then groups were divided and one group was given a piece of chocolate and the other was given a sample of spring water. Participants were then required to indicate their mood. Results specified that the negative mood, but not the positive or neutral moods, was immediately improved by eating the chocolate. Experimenters claim that this outcome was due to the chocolate’s
palatability. The instant gratification experienced when eating these types of sweet foods is what perpetuates the consumption of such foods as a rapid stress reliever.

Researchers, Grunberg and Straub (1992), examined food intake and gender in response to stress. In their experiment, they had four separate groups consisting of stressed/unstressed men and stressed/unstressed women. Stress was induced by requiring participants to view a film pertaining to an industrial accident. While watching the film, both groups had access to snack foods that were either sweet, salty or bland. After the film, participants answered questions pertaining to their food preferences. Researchers found that participants preferred sweet food more than salty and bland food. In regards to gender differences, male participants who viewed the stress-inducing movie were more likely to decrease their food intake, while women were more likely to increase their intake. Additionally, women consumed twice as much sweet food in the stressed group than in the unstressed group. Ultimately, these results suggest that gender and the specific food type available may be important factors in controlling food consumption under stress.

In regards to self-esteem, widely known psychologist Rosenberg (1965), defined self-esteem as a favourable or unfavourable attitude toward the self. High self-esteem is recognized as being present in an individual who takes pride in their accomplishments, is self-motivated, takes control of their lives, has confidence and is optimistic. Low self-esteem, on the other hand, is associated with pessimistic attitudes, negative thoughts about oneself as well as feelings of worthlessness. As a result of this, it could be argued that individuals battling low self-esteem could potentially be more likely to suffer from abnormal eating behaviours, such as binge eating or emotional eating.
Very few known studies directly examine self-esteem as a moderating variable in combination with stress and eating. However, Abouerie (1994) was interested in investigating the relationship between self-esteem and stress. In the end, his results indicated that participants with high self-esteem exhibited less stress than those identified as having low self-esteem. Additionally, Cartwright et al. (2003) found that low self-esteem, among additional variables, was related to unhealthy eating behaviours.

More research is required to establish a clearer understanding of the stress and eating relationship. The literature indicates a lack of consistency between stress and eating as there are many possible moderating variables. As such, the present study was designed to extend and expand on previous findings concerning the effects of stress on eating behaviours and to further investigate modifying variables that may influence these dietary habits. Specifically, it sought to determine whether high or low self-esteem, combined with a stressed or unstressed mood induction, would have an effect on eating behaviours.

The current study implemented a sample that was limited to females as many of the candies used for the ensuing experiment were sweet, which females have previously indicated a higher preference toward (Grunberg & Straub, 1992; Christensen and Brooks, 2006) and it was anticipated that this would produce more significant results. On the basis of the studies described above, it was predicted that low self-esteem would lead to a greater desire for unhealthy foods. Due to the fact that unhealthy foods tend to alleviate negative moods, it is anticipated that low self-esteem individuals will overeat in an attempt to relieve themselves of the negative feelings that they hold about themselves. In accordance with the previous literature, it is predicted that there will be a main effect of
stress, such that participants exposed to the stressful condition will consume more sweet foods than participants in the no stress condition. Accordingly, it is anticipated that there will be a significant self-esteem and stress interaction such that participants who are in the stressful condition and score low on the self-esteem scale will desire more healthy foods. Since stress is said to have a greater effect on those with low self-esteem, it was predicted that these participants would engage in a higher degree of emotional eating.

**Method**

**Participants**

A sample of 40 females was recruited based on availability and were all acquaintances of the researcher. The ages of the participants ranged from 19 to 33 years ($M_{age} = 24.5$ $SD = 3.49$). All females appeared to be of normal-weight. Through random assignment, half of the participants were exposed to the high stress condition and the remaining half participated in the low stress condition.

**Materials**

The Rosenberg Self-Esteem Scale (Rosenberg, 1965) was administered to participants after they had given consent to participate in the study. This is a 10-item scale that measures global self-worth by evaluating both positive and negative feelings about the self. Participants responded using a 4-point Likert scale that ranges from strongly agree to strongly disagree. The scale consists of questions such as, “I feel that I have a number of good qualities” and “all in all, I am inclined to feel that I am a failure”. This survey instrument has demonstrated a high degree of reliability and validity. Test-retest correlations of the Rosenberg scale are said to range from .82 to .88 with a coefficient alpha ranging from .77 to .88, indicating a high degree of internal consistency.
The scale is also found to have adequate convergent validity as it was closely associated with similar measures (e.g. the Coopersmith Self-Esteem inventory).

In testing, the treated sample of subjects received a variation of the Trier Social Stress Test (Kudielka, Hellhammer and Kirschbaum, 2007) in which participants were required to solve 15 arithmetic problems (APPENDIX A) in 1 minute and then recite a 3-minute speech (APPENDIX B). The arithmetic problems consisted of adding, dividing, subtracting and multiplying three numbers and were said to be of easy to moderate difficulty as indicated by inquiring with individuals not involved in the study. The speech task required participants to recite a speech pertaining to their favourite novel. Participants were instructed to give a brief plot summary and provide reasons as to why the novel is his/her favourite. The other sample, in which stress was not induced, was given a personal preference survey (APPENDIX C) which they were required to fill out in 10 minutes. This survey asked participants about their favourite season, holiday, movie genre, etc.

The final questionnaire given to participants was one that assessed their level of stress after the manipulation had occurred (APPENDIX D). Participants were asked to rate their current level of stress on a scale of 1 to 10. Participants then provided the researcher with their age and gender.

The food chosen by participants following the completion of the experiment consisted of miniature, pre-wrapped candies, which were situated in a large bowl outside the testing quarters. The specific candies selected for this study were, a Mars Bar, a Nestlé Kit Kat bar, a Snickers Bar, M&M’s, Reese’s Peanut Butter Cups and Skittles.
Efforts were made to ensure that each candy contained an equivalent amount of calories and accordingly, all candies contained around 80 calories.

**Procedure**

Upon recruitment, participants were presented with a letter of information that detailed the specifics of the study. Once agreeing to participate, subjects signed a consent form. Participants took part in individual sessions and experiments were predominantly carried out in the researcher’s home. In an attempt to acquire individuals who were experiencing similar levels of hunger, sessions were conducted between the hours of 12 P.M. and 1 P.M. as hunger is said to peak around this time.

Participants were randomly assigned to either the high stress or low stress group via a random number generator. All participants were then given The Rosenberg Self-Esteem Scale (Rosenberg, 1965) before they were confronted with the experimental manipulation. Once completed, the researcher collected the participant’s finished self-esteem scale, and then handed them either an arithmetic test or a personal opinion questionnaire, depending on the condition that was assigned to them. With the arithmetic test, the experimenter told the participant that only 1 minute would be allotted to complete this task. To help ensure that this task was stressful, the experimenter watched the participant attentively as the task was completed.

After the allotted time for the task had passed, the experimenter handed participants a piece of paper that instructed them to perform a 3-minute speech and outlined the various elements to be included in their speech. Participants were not given any time to prepare their speech and it was articulated on the spot. The experimenter carefully listened to the speech and pretended to be jotting down notes about the speech.
This was done in an effort to make the situation more stressful. For the participants in the low stress condition, they were simply given the personal opinion questionnaire and were given 10 minutes to answer it. It was foreseen that this questionnaire would not be stressful to the participants in any way.

After this, participants were given a short questionnaire whereby they rated their current level of stress and provided the researcher with some demographic information. Upon completion of the study, the researcher told participants that a bowl of treats was situated outside the experimental room. Participants were encouraged to take a snack as an appreciation for participating in the study. The researcher emphasized that participants could take as many treats as they desired and emphasized that an abundant supply of candies was available. This was all done to encourage participants to actually take as many treats as they wanted rather than limiting themselves. Unbeknownst to the participants, the candies had been carefully counted prior to the participant’s arrival. A confederate gave participants a debriefing form on their way out while the researcher discreetly counted and recorded the number of candies the participant took.

**Results**

By way of a median split, participants with a self-esteem score less than 17.5 were regarded as having low self-esteem and those with a score higher than 17.5 were perceived as having high self-esteem.

**Manipulation checks.** A t-test was conducted to determine the effectiveness of the experimental manipulation. Subjects’ level of stress after completing the math and speech task contributed to significant differences in stress between the two conditions, $t (38) = 6.02, p < .001, d = 3.60$. Participants in the stress condition ($M = 7.85, SD = 1.81$)
were more likely than those exposed to the no stress condition \((M = 4.25, SD = 1.97)\) to indicate that the math and speech task raised their stress level.

**Primary analysis.** A 2x2 between subjects ANOVA was conducted with stress (stress vs. no stress) and self-esteem (high vs. low) as the independent variables and number of candies taken as the dependent variable. Contrary to the hypotheses, results indicated that there was no main effect for stress, \(F (1, 36) = .62, p > .05, \eta^2 = .017\). Those who were in the stressed condition took similar amounts of candy as participants in the no stress condition did. There was also no significant main effect for self-esteem, \(F (1, 36) = .47, p > .05, \eta^2 = .007\). There was no noticeable difference in the number of candies taken between the high self-esteem group and the low self-esteem group. There was also no significant stress by self-esteem interaction, \(F (1, 36) = 2.21, p > .05, \eta^2 = .058\). Results indicated very little difference in the amount of candies taken between the stress and no stress conditions across both the low self-esteem and high self-esteem conditions; however, the interaction did approach significance \((p = .15)\). *Figure 1* offers a more comprehensive view of these results and presents a clearer indication of an impending interaction.

**Discussion**

The results of this study did not support the findings of previous studies. Earlier studies (Cartwright et al., 2003; Zellner et al., 2006; Macht and Mueller, 2007) found that participants exposed to a stressful condition consumed unhealthier foods. Conversely, the current study found that participants in the stressful condition took just as many candies from the bowl as participants from the no stress condition. Additionally, while no previous studies directly examined stress and self-esteem, researchers had found that low
Figure 1. The number of candies taken by high self-esteem and low self-esteem participants in either a stressful or non-stressful condition.
self-esteem led to more stress (Abouserie, 1994), which the researcher believed would affect the amount of candies taken by these low self-esteem participants. Also, Cartwright et al. (2003) had found a relationship between low self-esteem and unhealthy eating behaviours. Results also remained contradictory to these findings as it was indicated that, while insignificant results emerged, low self-esteem participants took less candies in response to stress and high self-esteem participants took more candies in response to stress.

Results were also inconsistent with past research suggesting that women consume more food in response to stress (Grunberg and Straub, 1992). In the current study, the mean number of candies taken was only 2.18, suggesting that females did not take a large amount of candy in response to stress. However, no males were tested in the current study so this cannot necessarily be inferred. Accordingly, future researchers should consider testing both males and females and analyzing the differences that arise between them.

Inconsistencies in this study can be attributed to the limitations it presented. One predominant limitation of this study can be found within the participants themselves. The fact that participants were acquaintances of the researcher may have had an impact on the data they provided the study with. They may have been subject to the social desirability bias and answered the self-esteem questions inaccurately for fear that the researcher would be able to identify their responses. Also, even though the candy bowl was located away from the experimenter, participants may still have been hesitant to take as many candies as they truly wanted. Also, despite the manipulation check, it is possible that the so-called high stress and so-called low stress groups were not all that different in regards
to stress. This may have also influenced the results. In addition, recruiting more
participants for this study may have also led to significant results.

Another culprit of the study could be the treats chosen. Most of the candy chosen
for this study was chocolate and there was only one candy option that was not chocolate.
Consequently, these particular choices may have not appealed to all participants’ tastes.
Additionally, past studies found that participants were more likely to choose between
sweet foods and salty foods when stressed (Kandiah, Yake and Willet, 2008). As a result,
a wider selection of food for this study may have been beneficial to look at, along with
other types of food options such as healthier options.

Furthermore, another limitation of this study was the self-esteem scale. One
problem with this scale is that it only contains 10 questions and there is not much
variability between the answer choices. Some participants were confused with how to
answer a few of the statements on the self-esteem scale, one of those statements being, “I
wish I could have more respect for myself”. Other participants expressed their dislike
toward a lot of the statements and the test overall. As a result, it would be beneficial for
future researchers to adjust the questions and potentially add some more. Also, to
increase the variability of answer choices, researchers could use a 7-point Likert scale as
opposed to a 4-point Likert scale.

Future studies should consider examining other modifying variables that affect
food consumption in combination with stress. Since self-esteem is both related to
emotional eating as well as a lack of food intake, it was probably not the best modifying
variable to look at in the current study. It would be interesting for future researchers to
look at sleep instead as a lack of sleep is said to increase food intake (Chaput, 2013). It
would also be interesting to look at the differences in consumption between restrained
and unrestrained eaters who are under stress as past research has shown that strong emotional states, like stress, can cause restrained eaters to overeat. Along with this, future researchers could look at various emotional states that lead to emotional eating and see which of these emotions has a greater impact on eating behaviours.

Impending studies should also consider changing the design of the study. Instead of having participants grab the food at the end of the study, researchers could have a bowl of pre-wrapped treats in front of participants and could have them eat as they engage in some sort of stressful or non-stressful activity and then weigh the candies after to see how much the participants ate. This would be a more effective way of conducting the study because in the current study, it could not be confirmed whether or not the participants actually consumed the candies right after the experiment so this method would be more accurate and would allow researchers to actually observe the immediate effects of stress on the participants’ food consumption.

The current study provides relevance in the field of psychology. To this day, psychologists continue to study stress and eating behaviours and the modifying variables that influence them and this study may assist them in arriving at more conclusive findings regarding this topic. Evidently, this study could also be useful to people in the health field. Learning about the causes of emotional eating can assist them in finding a solution to this widespread issue. This study could also be relevant to anyone who has to deal with large amounts of stress on a daily basis, such as students. Studies like this can help to inform them about the effects of stress on eating behaviours and help them manage their eating to ensure that they remain healthy.

In conclusion, results suggest that stress in combination with self-esteem does not influence females to consume more unhealthy treats. Taken together, results indicate that
females with high and low self-esteem consume similar amounts of unhealthy food whether they are stressed or not stressed. This study remains inconsistent with past research and suggests that the study’s primary inadequacies lie in its design. Thus, by examining a different modifying variable and implementing a wide variety of food choices, future researchers will be able to gather more accurate data regarding stress and dietary habits.
References


APPENDIX A

Math Test

You have 1 minute to solve the following arithmetic problems.

1. $4 + 3 \times 3 = \underline{13}$

2. $54 - 7 \times 2 = \underline{40}$

3. $8 \times 21 \div 3 = \underline{56}$

4. $-6 \times 3 \times 3 = \underline{-54}$

5. $(10 - 7) \times 6 = \underline{18}$

6. $(4 + 3) \times 5 = \underline{35}$

7. $(31 + 9) \div 5 = \underline{7}$

8. $8 + 5 \times -2 = \underline{-2}$

9. $15 \times 2 \div 10 = \underline{3}$

10. $(24 + 26) \div 5 = \underline{10}$

11. $(31 - 6) \times 6 = \underline{150}$

12. $24 - 12 - 2 = \underline{10}$

13. $12 - 49 \div 7 = \underline{1}$

14. $16 \times 2 + 10 = \underline{36}$

15. $12 \div (8 \div 4) = \underline{6}$
APPENDIX B

Speech Task

The researcher requires you to give a 3 minute speech about your favourite book. You are required to give a very brief plot summary and discuss reasons as to why it is your favourite book – remember, your speech must only be 3 minutes long. The researcher will stop you at the allotted time.
APPENDIX C

Please answer the following questions.

At the current moment, how stressed do you feel? (1 = Not at all stressed, 10 = Very Stressed):

1  2  3  4  5  6  7  8  9  10

Age: ________

Sex (please circle):  M   F
APPENDIX E

Table 1

ANOVA Summary Table

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