2011

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Recommended Citation
Cukier, Michelle (2011) "The Effects of Stress and Body Type on Hunger Levels," The Huron University College Journal of Learning and Motivation: Vol. 49 : Iss. 1 , Article 2.
Available at: https://ir.lib.uwo.ca/hucjlm/vol49/iss1/2

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The Effects of Stress and Body Type on Hunger Levels

Michelle Cukier
Huron College

Undergraduate students were tested to examine the effects of a stressful situation and body type on hunger levels. Twenty-eight participants were randomly presented with a booklet containing either a stressful or neutral story, and were instructed to read the story and complete the subsequent questionnaire. From the questionnaire, each participant's body mass index (BMI) was calculated, along with a hunger level which was derived from the 7-point Likert Scale presented. It was found that the predictor variables, stress and BMI, did not demonstrate a main effect. Similarly, there was no interaction between stress and BMI with respect to the outcome variable hunger. Possible reasons as to why such results occurred are discussed.

Many research papers have been conducted to determine the relationship between an individual's perceived level of stress, body weight, and the effect that they have on an individual's eating habits. A common feeling possessed by popular media outlets and researchers alike is that the relationship between body perception, stress and eating habits tends to pose itself as a mainly female issue, clearly demonstrated through various studies.

A study by Woods, Racine, and Klump (2010) used 497 undergraduate female students to examine the relationship between major and minor stressors on dietary restraint, and binge eating. They hypothesised that dietary restraint and binge eating would be strongest in individuals who demonstrated high levels of both major and minor stressors. Minor stressors were events which had negatively impacted an individual's daily life, such as a traffic violation, where major stressors were classified as events
which impacted an individual's overall life, such as a career change. Binge eating, which had been shown to be a symptom of dietary restraint, such as in the context of eating disorders, was thought by the researchers to be the uncontrolled eating of an individual. Woods et al. (2010) recruited only female participants on a voluntary basis from a university campus, and used a computer to administer all tests. A series of three measures were used to assess the relationship between stress and eating behaviours: a binge eating measure, a restraint measure, and a stress measure. To measure an individual's tendency towards binge eating, the Bulimia subscale of the Eating Disorder Inventory-2 (EDI-2) was used. Subjects completed a series of seven items which focused on the individual tendency towards engaging in or thinking about binge eating behaviours. Subsequently, the Restraint Scale was used to measure an individual's tendency towards food restriction. The scale consisted of 10 self-report items centering on the idea of dieting. Two measures of stress were also used. First, the Social Readjustment Rating Scale was used. This scale was used to measure an individual's major life stressors. Participants responded to 43 questions regarding whether they had felt specific stressors in the past year of their lives. The higher the rating, the higher the level of stress the individual felt throughout the past year. The second measure of stress was the Daily Stress Inventory (DSI), which was used to measure participants' levels of minor stressors. The DSI was a self-report questionnaire that required individuals to answer 58 questions which were rated based on their experience with each item over the past 24 hours.

The results from the study by Woods et al. (2010) showed that the relationship between all measures - restraint, minor stressors, major stressors, and binge eating, was both significant and positive. More specifically, the relationship between minor...
stressors and binge eating was found to be more significant than the relationship between binge eating and major stressors. Therefore through the many measures completed by Woods et al. (2010) in their study, it was concluded that when individuals demonstrated higher levels of eating restraint, in a combination with daily life stressors, they possessed a higher tendency towards binge eating compared to an individual who did not demonstrate any stressors.

A second study by Adriaanse, de Ridder and Evers (2011) aimed to examine the connection between an individual’s emotions and their eating habits. Adriaanse et al. (2011) used 134 female students with an average BMI of 21.3, a normal weight, and a mean age of 19.7 (SD = 1.61). The researchers compared four different feeling regarding an individual’s eating habits: worries about eating behaviours; monitoring one’s eating behaviours; perceived control over one’s eating behaviours; and motivation for healthy eating behaviours. These four measures were compared to a predictor variable, of emotionality which measured how an individual emotionally feels with regards to their eating habits. All of these items were measured using a 7-point scale on which participants could record their answers.

The results of the study found that an individual’s emotional eating habits were a good indication of how they were feeling. Furthermore, it was found that there was a significant relationship between participants’s who demonstrated high emotional eating habits and those who recorded increased levels of worrying, monitoring, and motivation of their eating habits. Conversely, it was demonstrated that these same participants showed a lower perceived ability to control one’s eating behaviours when emotional.

Often in popular media, eating disorders pose them self as a mainly female issues. Both of the previously mentioned studies, along with a study by Laugero,
Falcon, and Tucker (2011) aimed to examine the effects of stress on the eating habits of women. It was believed that individuals who demonstrated higher stress levels would have a lower intake of healthy foods, such as fruits and vegetables. The study by Laugero et al. (2011) used women of Puerto Rican descent, as it was decided that individuals of both cultural and ethnic minorities tended to encounter higher levels of stress than those not belonging to such minorities. They found that stress had a tendency to be an attributing factor towards an individual’s habit to binge eat on unhealthy foods. Laugero et al. (2011) used 1336 adult females between the ages of 45-75 years who had identified themselves of Puerto Rican decent and who were currently residing in Boston, Massachusetts, USA. Food intake, along with its nutritional value was recorded from questionnaires given to each participant. As well, to measure levels of stress, a translated version of the Perceived Stress Scale (PSS) was used. This scale measured participants’ level of stress with regards to a number of different variables, including life events, social support, and feelings of depression. A covariate analysis of variance was used to examine the relationship between stress, food intake, BMI, and other related variables. From this study, it was found that there was an association between a person’s perception of any form of stress and those who endured unfortunate life events. This result indicated that a participant’s admittance to stress truly stemmed from stressful events that had taken place throughout their lives. Similarly, they found that participants’ perceived stress levels were associated with an increase in their level of BMI. Therefore, the more stressed individuals were, the higher their BMI’s tended to be. Furthermore, they associated those with high BMI to have a lower intake of perceived healthy foods, and a higher intake of unhealthy foods, seemingly what contributed to their high BMI.
The study by Laugero et al. (2011) determined that those individuals, who were placed in a stressful life situation, tended to be less healthy with their eating habits, producing an increased intake of unhealthy food, further inducing a higher BMI.

The present study aimed to examine if participants who were exposed to a stressful situation, presented in the form of a story, would produce higher hunger levels, than those presented with a similar neutral story.

Methods

Participants

The participants chosen were 28 undergraduate students who agreed to take part in a study conducted as part of Psychology 2280E. Participants were chosen from a greater population of Huron University College, and University of Western Ontario Main Campus undergraduate student. These participants were all acquaintances of the researcher and included only females whose ages ranged from 19 to 23 with a mean value of 20.68 (SD = 1.02). Participants’ education level varied slightly depending on their age, and in which year of undergraduate studies they were currently enrolled. The sample was chosen on a level of convenience to the researcher.

Materials

Twenty-eight booklets contained a consent form, a letter informing participants of the study’s procedures, a questionnaire, and one of two stories. Each questionnaire asked the age, height and weight of the participant and is presented in Appendix A. The rest of the questions were answered using a 7-point, Likert scale. Each booklet contained either a stress-inducing story, or a neutral story. Both stories centered on Emma, an undergraduate student, who either had a seemingly terrible day or a fun and happy day. Both stories are presented in Appendix B. The stories were obtained from a
previous study by Gordon (2006), and were found to be both reliable and valid. The stressful story was attached to half of the booklets, while the other half contained a neutral story. As part of the questionnaire, participants were first asked to record their age in years, height in inches, and weight in pounds, and were then asked to rate, using the 7-point scale, how they were feeling after reading their allotted story. Although the ratings were counter-balanced as to the positive and negative feelings associated with low or high ratings, the only scale truly being measured was the low/high hunger rating. Furthermore, the height and weight information was used to calculate each participant's BMI through the formula:

\[ \text{BMI} = \frac{\text{Weight in Pounds}}{\text{Height in Inches}^2} \times 703 \]


Procedure

This study was conducted as part of a class requirement for Psychology 2280E. The booklets were passed out at the convenience of the researcher to acquaintances around Huron University College and Western University Main Campus. Participants next voluntarily completed a consent form, allowing for usage of their testing results in the study. Half of the participants were randomly assigned to the neutral story condition, while the other half was involved in the stress-inducing condition. Conditions were randomly determined by the booklet which the participant received. Participants were given instructions to read the set story and to subsequently complete the attached questionnaire. Upon completion, booklets were detached from consent forms and were return to the researcher for calculations. BMI was calculated, and using a median split, participants were assigned to either the high or low BMI group. These calculations and
Stress, Body Type, and Hunger

their results are presented in Appendix C. Participants were not restricted with regard to
the time allotted to complete the story and questionnaire.

Results
The data from the present experiment appear in Figure 1. The figure shows that
participants assigned the stress-inducing condition and possessed a higher level of BMI
reported slightly elevated hunger levels over participants assigned to the neutral stress
condition. A 2x2 analysis of variance was carried out and determined that neither a
main effect nor an interaction was seen to be significant. The data collected
demonstrated that neither the effect of stress nor the effect of BMI had any impact on
hunger scores, nor was an interaction between the two demonstrated.

Discussion
It was hypothesised in the present study that participants exposed to a stressful
situation would report higher hunger levels. From the data presented, it is clear that the
hypothesis was disproven. The results of the factorial analysis of variance (ANOVA)
performed produced a non-significant result for each of stress, BMI, and an interaction
between the two variables.

The scientific adequacies of the present study were subjected to sample,
measurement, and control limitations. The study by Laugero et al. (2011) had an age
bracket much older than the present study, where the studies by Woods et al. (2010) and
Adriaanse et al. (2011) both used samples of undergraduate students, a similar age
bracket as the present study. Despite these varying age brackets, all three previous
studies received significant results, where the present study did not. It could therefore
be concluded that age was not a significant factor when discussing stress levels and body
type and its effect on eating behaviours, as various age brackets have been seen to be
Figure 1: Change in hunger scores between the stress-inducing and neutral story groups of high and low BMI subjects
successful in the past. All three previously mentioned studies used a sample size which was significantly larger than the one used within the present study. As well, due to the acquisition of participants at the convenience of the researcher for the present study, it is likely that the sample chosen for the present study was not one which was representative of the undergraduate population as a whole. An implication of such an unrepresentative and small sample size may be a lead contributing factor in the results not supporting the present hypothesis, as an unrepresentative sample is not able to fully capture the feelings and beliefs of an entire population.

The use of controls within a study is an important aspect, as they ensure that the results which are obtained are reported in a way that makes them unaffected by extraneous variables. Time was one variable that was not controlled during the present study. Students were able to take as long as possible when reading the given story, and subsequently complete the questionnaire. Although each participant was indirectly monitored throughout the whole of the procedure, an allotted amount of time was never specifically outlined by the researcher. A lack of time limit could reduce participants' concentration throughout the completion of the story, leading to varied results by such participants. As feelings of stress were being elicited through the given story, a lack of concentration while reading would have caused participants to not fully achieve the desired feelings. Furthermore, as no questions were able to be directly asked to the researcher, it is possible that some participants did not fully understand aspects of the relation between the story and some of the questionnaire responses. It may have not been understood that answers were to be completed with regards to how the participant was feeling upon completion of the story, which may have resulted in the non-significant results obtained. Another control limitation was that of noise. The noise
level during the completion of the story was not eliminated through restraint, possibly posing as a negative distraction to the participants while engaging in the study. Once again, with a lack of complete concentration, the effect of the story may not have taken effect, allowing participants to simply answer the questionnaire according to their original state, and not the controlled state of stress or no stress. Another important extraneous variable which was not controlled for was the time-of-day effect. Because hunger is a very subjective measure, one person who just had lunch may rate their hunger level as moderate where another individual may rate that same feeling as completely full. Furthermore, because the present study involved the measurement of hunger levels, if participants were tested very early in the morning or close to lunch hour, the hunger levels reported could have been confounded by a natural timed hunger feeling and not an effect of the stress.

Validity and reliability were both regarded when conducting the present study. A 7-point Likert scale was used within the present study to measure hunger level. A similar scale was used by Adriaanse et al. (2011) in the past, and was shown to be reliable. Because the present study used a similar version of the 7-point scale, this measure has been deemed reliable in the present study because of test-retest reliability. The lack of validity of measures for the present study was a major weakness; a simple modification to the present study, measuring hunger levels rather, from the previous study, measuring feelings of eating habits, negates previous measures of validity corresponded to those studies. Because the study was conducted with a certain lack of validity of the scales used, there could be extraneous variables that had impacted the present study. Therefore, it would be proper to conclude that only the reliability of the present study was possible, posing validity as a major limitation. For both stories used,
however, both reliability and validity were maintained, as they were used in the same method as a study conducted by Gordon (2006). Another measurement limitation demonstrated within the present study was the use of BMI as an indication of body type. It was assumed that those individuals with a high BMI would be larger, therefore consuming more food, while those with a low BMI would be skinnier, therefore consuming less food. Although only females were used within the present study, therefore controlling BMI’s lack of ability to account for sex differences, its inability to account for age differences or body type differences was not controlled, therefore acting as a large measurement limitation. As BMI only considers an individual’s height and weight, it is possible that those who are more muscular or eat more junk food may be placed in the wrong group. As it was thought that individuals of the high BMI group eat more and therefore weigh more, it may be the case that they actually just have a higher amount of muscle, or eat more protein which leaves them weighing more and not the case that they are actually overweight. Such individuals therefore do not share the believed characteristics which were assigned to individuals of both the high and low BMI group.

A few aspects of the present study could be improved upon. First, the method of sampling in the present study could be greatly improved upon. Although the participants were randomly assigned to one of the two stress conditions, participants were still chosen at the convenience of the researcher. Therefore, the majority of participants were acquaintances of the researcher, who may have shared common interests, feelings, and backgrounds, affecting the way one feels about stress and body type. With the addition of random assignment, chosen participants would be a true representation of the entire population of Huron University College and Western Main
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Campus undergraduate students. Often it is the case that due to the pressures of university and cultural norms, individuals of a common background tend to be very similar in their eating habits and body type. To improve upon this, participants could have been chosen at a set time in a specific location. This improvement would not only ensure that participants were of a random sample of the undergraduate population, but also ensure that all participants had a similar level of hunger. If all participants were tested at the same time of day, the reported level of hunger could therefore be thought of as a true indication of how the current manipulation affected participants. Furthermore, due to the pressure of fitting in that university students possess, an improvement upon the present study could be to expand the sample population to individuals who are older and out of school, where pressures to adhere to norms may be diminished. With an extra control in place, the results could be different, and may have reflected those of the previous studies. Similarly, to improve upon the extraneous variable of noise, which may have gravely affected the present results, all participants could be tested in a quiet room therefore ensuring complete concentration on the task at hand. With regards to the measurement limitations, as all of the previous studies used self-report measures to record both hunger and stress levels, it would not be appropriate to change the type of measurement used within the present study. However, to improve the validity of the 7-point scale used, the scale could be tested against an already known criterion scale to produce criterion validity associated with the 7-point scale used. Lastly, a large improvement to the present study would be through the addition of another measure of body type other than BMI. As BMI fails to consider factors other than height and weight, a better measure may have been body fat percentage. Through the comparison of body fat percentage, the researcher would be better able to categorize those
individuals into brackets of varying food consumption levels, producing a more reliable comparison.

In the future, in order to achieve a significant result, the study may be better replicated with significantly more participants. Through the addition of more participants, as seen in the three previous studies mentioned, the effect of stress and BMI may become more apparent as to their effects on eating behaviour. Furthermore, the use of other self-report measures such as those used in Laugero et al. (2011) may give the researcher a better indication of what effects stress may have on the participant's choices of food. Similarly, in the future, the present study could consider an individual's hunger levels both before and after reading the story. This addition would reduce the confounding variable of participants' potential underlying hunger or fullness which they could possess prior to completing the study. By comparing hunger levels before and after reading the story, the researcher could document the change in hunger rather than the raw hunger score, which could indicate the effect of the story on hunger levels, free of time-of-day confounding effects.

The study conducted, along with future research, could be used within the field of education. New university students often become very stressed with an overwhelming volume of work, and new pressures not experienced in high school. Such individuals tend to consume a large amount of unhealthy snack foods in an effort to expedite meal times in favour of other interests. Future research using the present study, with possibly the introduction of a food-type analysis, could help university guidance counsellors understand how stress effects hunger. Furthermore, if guidance counsellors know which types of food are most readily consumed during stressful periods, they could suggest to university cafeterias an increase in the amount of healthy foods offered.
during increasingly stressful time periods. By doing so, the cycle of stress could be reduced in order to help curb possible depressive feelings. Similarly, the average level of individuals with high BMI could be decreased throughout university campuses, creating an overall healthier campus.


http://www.whathealth.com/bmi/formula.html
Appendix A

**The Effect of Stress and Body Type on Hunger Levels Questionnaire**

Please answer the following questions by circling the number which you feel best describes your present feeling.

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Appendix B

Stress Inducing Story

The following story describes a day in the life of a female university student named Emma:

On Monday morning at 9:10 a.m., Emma woke-up to the noises of construction going on outside and she realized that her alarm had not gone off. Already, Emma was off to a late start. Knowing that she had an exam at 9:30, Emma skipped her morning shower, breakfast, and had no time to review her notes. She already felt unprepared for her exam because of time constraints. She was completely overwhelmed and bogged down with other exams and papers that were also due that week. Emma frantically arrived at her exam 15 minutes late. Her exam was a disaster, and was much tougher than she had anticipated. After her exam, Emma went to her next class, Developmental Psychology, only to find that there was a pop-quiz on a reading which she had not completed. Emma left the class feeling disappointed in herself and extremely pressed for time. She didn’t want to break her promise to meet her friend, Jessica, for lunch so she patiently waited outside University Community Centre (UCC), for 20 minutes. Because Emma got off to such a late start, she didn’t have time to check her e-mails in the morning. If she had, she would have known that Jessica had cancelled their lunch plans.

Now further behind schedule, Emma gulped down a coffee instead of having lunch. On the way to her next class, her ex-boyfriend confronted her about some unresolved issues. She explained that she didn’t have time to talk but as she rushed away he yelled out some hurtful remarks that not only lowered her self-esteem, but put her in a state of distress. When she arrived at her next class she realized that none of her friends were there. She found the class isolating, strenuous and very difficult which sent her into a state of panic about the upcoming exam in that class.

After class, Emma missed the bus and arrived at home only to learn that she had misplaced her keys. She knew that her roommates wouldn’t be home for over an hour. As Emma patiently waited for their return, her stress level intensified as she went over and over all the things that she needed to accomplish by the end of the week, let alone by the end of that night. Emma’s roommates arrived home 30 minutes later than expected, and were furious with her for being so loud in the morning. She tried to explain what happened but they didn’t want to hear her excuses. Finally, Emma got into her room, shut the door and stared at her computer screen until she was so tired she couldn’t keep her eyes open any longer.

Emma is a first-year university student and she wonders whether she will be able to make it through the year.
Neutral Story

The following story describes a day in the life of a female university student named Emma:

Emma woke up early because she knew she had an exam at 9:20 a.m. She sprang out of bed at 8:00 a.m., took a shower, ate a good breakfast and still had some spare time to review her notes. Emma could already tell that she was going to have a productive day.

Emma arrived at her exam 10 minutes early, and felt confident going into the exam. She studied extremely hard and never missed a lecture or a tutorial. Emma left the exam to go to her next class, Developmental Psychology, feeling pleased with her performance and how hard she studied. Upon entering her next class, it became apparent that there was a quiz on a reading she was to have done. Luckily, Emma had read the article and aced the quiz.

Emma left her class overjoyed with her success on the quiz and headed to University Community Centre (UCC) to meet her friend Jessica, whom she hadn’t seen in weeks, for lunch. Emma had enough time to check her e-mails that morning, and knew that Jessica was able to keep their lunch plans. They were both on time and enjoyed a relaxing lunch together.

After lunch, Emma walked to her next class. On her way, she ran into an old friend who was overjoyed to see her. They chatted and caught up on old times for a few minutes and then Emma headed off. When she got to class she was greeted by her friends who had saved her a seat. The class was a review for the exam that was in one week and Emma felt confident that she would be able to do well on that exam also.

After class Emma caught the bus early and arrived at home to be greeted by her roommates who were very proud of how well her day went. Her roommates had even baked a cake for her and made signs around her room to celebrate her accomplishments. Emma even made it home in time to attend a Yoga class where she was able to unwind and reflect on her accomplishments. She felt a sense of relief in knowing that all her hard work had paid off and that she was on the right path to accomplishing her future goals.

Emma is a first year university student and feels confident that this year will be smooth sailing for her. She is extremely proud of her efforts and knows that they will pay off in the end.
### Appendix C

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