Running Head: PSYCHOSOCIAL FACTORS AND FOOD CONSUMPTION

Perceived Stress, Perceived Social Support, Depression and Food Consumption Frequency in College Students

Jaclyn S. Wainer

Carnegie Mellon University

Abstract

People in the United States are gaining weight at a rate higher than in the past. Because the eating habits people develop in college are similar to the eating habits people will have for the rest of their lives it is imperative that researchers understand more about why people gain weight in college. The purpose of the proposed survey-based study was to explore the relationship between perceived stress, perceived social support, and depression as it connects to weight changes and food choices in college students who are normal and abnormal eaters. We hypothesized that those who are stressed, depressed, and lacking in social support would eat differently and have higher body mass indexes than people who do not suffer from these symptoms. Results from this study indicated that there was a relationship between perceived stress, perceived social support, and depression and this was correlated with restrained eating patterns. There was also a positive correlation found between perceived stress and soda consumption. A correlation was not shown between abnormal eating patterns and overall weight. Implications from this study are that college food service providers should provide healthy, easy to eat food.

Perceived stress, perceived social support, depression and food consumption frequency in college students

More than one third of U.S. adults and 16% of U.S. children are considered. Obese, obesity rates for adults have doubled and obesity rates for children have tripled. Obesity rates among all groups in society have increased markedly and, in 2000, obesity-related health care costs totaled an estimated $117 billion (CDC, 2009). Lack of exercise and poor eating baits have been blamed for the rising obesity rates. People's eating habits and food choices are not only the result of class, culture, media, or gender but also individual intention and personal agency. Perhaps more alarming is the fact that people in college are gaining significantly more weight during their first year of college, infamously termed the "Freshman 15", than the average American gains at any given time. During freshman year alone, the average weight gain for freshman males is four pounds and the average weight gain for freshman women is three and a half pounds (Holm-Denoma, Joiner, Vohls, & Heatherton, 2008). Proposed reasons for this weight gain center around many of the lifestyle changes one makes when he or she goes to college including eating (and often overeating) in buffet style cafeterias, using free time to participate in activities other than exercise, increased alcohol consumption, eating with other people, and making poor food choices regarding what to eat, when to eat, and how much to eat (Hoffman, Policastro, Quick, & Lee, 2006; Castro & Brewer, 1994; Chaiken. & Pliner, 1990; Wansink, 2004).

Previous research has shown that there is a connection between what people eat and how people feel (Oliver, Wardle, & Gibson, 2000). Moreover, associations have been shown between unhealthy food consumption, depressive symptoms and perceived stress amongst female students (Mikolajczyk, Ansari, & Maxwell, In Press). People use food to cope with problems unrelated to

hunger or nourishment including stress and life tension (Wardlea, Steptoeb, Olivera, & Lipsey, 2000). In some people stress can induce overeating and in others, overeating can induce stress (Oliver & Wardle, 1999). The results of studies on stress and eating are mixed (Stone & Brownell, 1994; Bellisle, Louis-Sylvestre, Linet, Rocaboy, Dalle, Cheneau, et al., 1990). For example, in one experimental situation, women who were in a high-stress condition preferred sweet and fattening foods whereas women in the low stress condition ate more low fat food than high fat food (Habhad, Sheldon, & Loeb, 2008). Research, nevertheless is lacking in determining the connection between the different types of eating patterns people follow and perceived stress, perceived social support, and depression. This study was designed to fulfill this current void in the current food psychology literature.

Some people use food as a coping mechanism. Weight-related studies have found that obese individuals increase their food intake as a response to negative emotions, including depression (Arnow, Kenardy, & Agras, 1992; Liberman, Wurtman, & Chew, 1986), perceived social support, (Provencher, Polivy, Wintre, Pratt, et al., 2009), and stress (Gibson, 2006; Greeno & Wing, 1994; Macht, 2008; Torres & Nowson, 2007). Results of this finding are mixed, as exemplified in a study of adolescents in which depressive symptoms were positively associated with health-compromising attitudes (i.e., weight concerns) and depressive symptoms were negatively associated with health-promoting behaviors (i.e., eating breakfast), but most associations between depressive symptoms and dietary micronutrients were not statistically significant (Fulkerson, Sherwood, Neumark-Szainer, & Story, 2004). More research must be conducted in this area to resolve this controversy. For example, emotion is often related to stress, which can mediate a variety of different eating outcomes (Macht, 2008). In his five-way model of how emotions relate to eating, Macht (2008) proposed that eating (a) may be a way for

individuals to regulate their negative emotions and (b) may be caused by the stress-induced disruption of individuals' cognitive self-regulation. One area that may give insight into why people eat food is by comparing people with abnormal eating habits to people who are normal eaters.

Abnormal Eating Patterns

Many different abnormal eating patterns have been discovered and diagnosed in both women and men. Eating disorders such as anorexia nervosa, bulimia, and binge eating, which are clinically recognized in the DSM-IV, are all characterized as eating or not eating to extremes. It is estimated that ten million women and one million men have eating disorders (Crowther et al., 1992; Fairburn et al., 1993; Gordon, 1990; Hoek, 1995; Shisslak et al., 1995 as cited by National Eating Disorder Association, 2005). This number, however, does not include people who demonstrate abnormal eating patterns. Such eating patterns can influence weight gain and weight loss, but are not extreme enough to classify for a diagnoses. Considering there are about 3,500 calories in a pound, a college student can gain 15 pounds his or her freshman year by simply consuming an extra can of soda or half of a large, sugar-filled energy drink each day.

Eating habits and disordered eating are especially relevant in the college population because when one transitions to college he or she is living in a different environment from the one he or she grew up in, often experiencing new emotions and eating with different people. The transition to college may affect different eaters differently. For example, emotion is often related to stress, which can mediate a variety of different eating outcomes (Macht, 2008). In his five-way model of how emotions relate to eating, Macht (2008) proposed that eating (a) may be a way for individuals to regulate their negative emotions and (b) may be caused by the stress-induced disruption of individuals' cognitive self-regulation. This is of primary importance in

restraint eaters (those who overeat after breaking their diet), emotional eaters (those who eat in response to emotional arousal states such as fear), and external eaters (those who eat in response to external food cues such as smelling food), because each of these types of eating patterns is largely dependent on the environment one is currently in and how they are able to cope with changes in their environment. Moreover, these abnormal eating patterns are linked to obesity, bulimia nervosa, and binge eating disorders which are linked to dissatisfaction (Delinsky & Wilson, 2008; Gluck, 2006).

One type of abnormal eating pattern, which differ from clinically diagnosed eating disorders, is restraint eating. This is overeating after a period of restraint when one's resolve to dieting is abandoned (Herman & Polivy, 1975). Restrained eaters tend to be chronic dieters and are also likely to severely overeat when they break their diets. Studies using dieting preloads (i.e., a calorie dense chocolate milkshake) have shown that restrained eaters, but not normal eaters, will eat a significant amount of calories after a preload compared to if they were not given a preload. Normal eaters, on the other hand, will adjust their caloric intake and eat less after a preload compared not preload given. This highly counterintuitive effect, that restrained eaters eat more after violating their diet has been called the *disinhibition effect* and this effect has been shown with many stimuli and different participant groups (for a summary, see Herman & Polivy, 1984). Given that the college environment is often filled with temptations, such as free food and unhealthy food at every eatery, it is almost certain that restrained eaters are likely to face more obstacles in college than before.

Similarly to restraint eaters, emotional eaters are also likely to have greater difficulty coping with their food struggles in college than beforehand. The new college environment along with the abnormal hours and irregular schedules that college student keep contribute to many

diverse and distinct emotions. This, paired with the physical transition away from family and long-term friends, whose social support it critical to coping with new emotions, can make people turn towards food as a means of support. Moreover, the lack of friends and feeling of homesickness, especially during the first years of college, can contribute to excessive eating, especially of comfort foods and cause weight gain (Brook & DuBois, 1995; Paul & Brier, 2001; Wansink, Cheney, & Chan, 2003). People who score high on emotional eating questionnaires are likely to exhibit such abnormal eating habits.

A third abnormal, but not clinically recognized type of eating is called external eating. External eaters commonly eat in bouts catalyzed by positive social contexts in combination with high aromatic or high visually salient food (Galef, 1981; Wansink, 1994). Other triggers for an external eater include the number of palatable food cues present and even the time of day (Schachter, 1971). A common reason for an external eater to eat a food is simple, "because it is there." External eaters must be very careful of their food environment because they are likely to use external food cues, such as food being available, as opposed to internal food cues, such as their current hunger level when deciding whether or not they should have something to eat. This is of critical importance to somebody in college, like restraint eaters, because the availability of food (i.e., large variety of food in college dormitory buildings) along with college norms that anything is free is good can influence an external eater to eat more than a normal eater.

Each of these abnormal types of eating are different and each of them can cause superfluous stress in the lives of the people who have these behaviors. Even so, the connection between abnormal eating patterns and weight is not clear because individuals may react to being overweight by consciously restricting food intake regardless of the type of eater they are (Rodin, 1975; Rodin & Slochower, 1976). Some people may diet to lose weight. Even so, many

researchers believe that each person has his or her own range of body weight that is regulated by their body (Herman & Polivy, 1980). This means that even though some people have abnormal eating habits, many of which are do to lack of dietary control in the first place, abnormal eating habits is one among many factors that connects to weight. It is likely that college student who display abnormal eating habits are more likely to be overweight than their normal eating counterparts. Specifically, due to the transition to college, the freedom to eat whatever one wants, the constant availability of food, and the plethora of emotions students must cope with, restrained, emotional, and external eaters will, on average, weigh more than those who do not exhibit these eating patterns.

Perceived Stress and Weight

People do not use food solely for its nutritious properties. Food is also used to cope with stressful life events and life tension (Wardlea, Steptoeb, Olivera, & Lipseyb, 2000). People use food as a tool to modify their feelings of both mood and temperament (Folkman & Lazarus, 1980). Even so, results of stress and eating studies are mixed. Some studies have found that stress induces overeating, mainly by eating high fat and calories dense foods, and other studies have found no significant differences in food intake under varying lengths of time and ages of participants of stressful and control periods (Michaud, Kahn, Musse, Burlet, Nicolas, & McJean, 1990; Weidner, Kohlmann, Dotzauer, & Burns, 1996; Oliver & Wardle, 1999; Stone & Brownell, 1994). The emotional response one has towards stress plays an important role in how stress should be considered when promoting healthy behaviors.

In one study that measured stress during times of high academic demand and low academic demand the researchers found that during periods of high academic demand negative emotions increased and positive emotions decreased while nutrition and healthy behavior

worsened (Weidner, Kohlmann, Dotzauer, & Burns, 1996). In this study, decreases in amount of exercise and self-care behaviors correlated with high periods of academic stress. Importantly, decreases in the quality of nutrition were linked to decreases in positive emotions and increases in negative emotions, suggesting that emotional responses to stress establish an important role in health behavior change. Therefore, stress should be considered when promoting nutrition programs, especially during life stages when stress levels are constantly changing. Based on the fact that stress induces poor nutritional habits and lack of exercise it is likely that there will be a positive correlation between perceived stress and weight. We also expect that there will be an association between perceived stress and abnormal eating patterns because eating is one of the ways people may cope with stress.

Perceived Social Support and Weight

The transition from high school to college and the years one spends in college are often filled with changing relationships and new social pressures. In longitudinal studies, this is a period that has previously been associated with weight gain (Levitsky, Halbmaier, & Mrdjenovic, 2004; Holm-Denoma, Joiner, Vohls, & Heatherton, 2008). College students are going through a very tumultuous time in their lives, which makes them prime candidates for those who use food as a coping mechanism and are emotional eaters. Eating may serve as a distraction from one's worries and eating may provide comfort similar to the support students got from their collocated relationships before their transition to college. Theories behind the reasons why people partake in emotional eating posit that eating is a way, even if only temporarily, to relieve distress and mask emotions one is trying to avoid (Polivy, Herman, & McFarlane, 1994). The side effects of the transition to college, like any major life transition, is often a source of distress for people and this can cause people to eat more than they normally would. It is

therefore likely that freshman, due to their transition to college, will exhibit lower social support scores than upperclassman. We also believe that there will be a negative association between perceived social support and emotional eating because the less people feel like they can rely on their friends the more likely they are to turn to food.

Depression and Weight

Dietary habits influence how people live their lives and how people cope with challenges and rewards. Patterns of food consumption have been studied in the past and have investigated the relationship between ingesting carbohydrates and different emotional states (Benton, 2002; Prasad, 1998; Benton & Donohoe, 1999). Studies have shown that eating carbohydrates can reduce symptoms of depression (Wurtman & Wurtman, 1989). People, including abnormal eaters, often eat food without regard for its nutritional content when their mood changes. People will eat food to celebrate their accomplishments and they will also eat to feel better. Lack of a healthy diet has been correlated with depression (Brooks, Harris, Thrall, & Woods, 2002). Moreover, stress can mediate depression, which, in turn, can make eating and nutrition habits, especially in females, worsen (Mikolajczyk, Ansari, & Maxwell, In Press). Because people who display high levels of stress turn to carbohydrates we think this will be the case in our sample. It is also likely that there will be an connection between abnormal eating habits and stress as well as BMI.

Food Frequency

In previous research various connections have been shown between different foods people consume, changes in weight, and changes in mood. For example, carbohydrate consumption has been shown, in some cases, to reduce depressive symptoms (Wurtman & Wurtman, 1989). Men and women choose to eat different foods to comfort themselves with men

preferring meal-like foods (i.e., steak) and woman preferring sweets (Wansink, Cheney, & Chan, 2003). Other studies have found that consumption of fresh fruit, ready-to-eat food and fast food were significantly associated with depression (Liu et al., 2007). Separate studies have shown that greater stress was associated with more fatty food intake, less fruit and vegetable intake, more snacking, and a reduced likelihood of eating breakfast each day (Cartwright, Wardle, Steggles, Simon, Croker, & Jarvis, 2003). It is probable that there will be an association between the types of food people eat and they way that they feel. We believe that people who eat fatty foods and foods high in carbohydrates will report more negative feelings of perceived stress, perceived social support, and depression. Moreover, this should correlate with abnormal eating habits because emotional, restrained, and external eaters use food to cope more than normal eaters.

Study Goals and Hypotheses

The main goal of this study is to learn more about the connection between perceived stress, perceived social support, and depression as it relates to normal and abnormal eating behaviors in college students. Many studies have looked at the relationship between two of these three concepts but, to the best of our knowledge, research ascertaining the relationship between these three variables and eating patterns is lacking. A second goal of this study is to learn more about the types of foods college students are eating when they feel stressed, lack social support, and are depressed.

We predict that there will be a positive correlation between emotional, external, and restraint eating patterns. We also predict there will be a positive correlation between abnormal eating patterns and BMI (H1).

It is likely that there will be a correlation between perceived stress, perceived social support, and depression. We think that there will be a positive correlation between perceived stress and abnormal eating patterns, a negative correlation between perceived social support and abnormal eating habits and a positive correlation between depression and abnormal eating patterns (H2).

We also predict that there will be an association between perceived stress, perceived social support, and depression along with abnormal eating patterns that will be correlated with BMI. In other words, pending on the first two hypotheses being supported, we believe that lack of social support, too much stress, and depression will influence abnormal eating habits (or vice versa) which will then influence BMI (H3).

Lastly, we predict that people who are stressed and depressed will turn towards carbohydrates and fatty foods more than other foods and that men and women will eat different types of foods when they are experiencing lack of social support, too much stress, or feelings of depression (H4).

Method

Participants

A total of 183 people began this survey. However, 26 people were excluded from data analysis because they did not complete the survey, there were obvious patterns in their responses (i.e., all "1-2 Times a Week"), or they did not fill in their weight or height correctly. Thus, 157 people were included in the results. Of those, 73 were male (M age = 20.3, range = 18.3 to 23, SD = 1.147), and 84 were female (M age = 19.96, range = 18 to 22.42, SD = 1.23). As self-identified, 62.18% of the sample was white, 21.76% of was of Asian descent, 3.85% was African American, 0.4% was Hispanic, 4.53% identified with another race, and 7.25% preferred not to

answer. All participants were college students, all of whom attended Carnegie Mellon University (CMU). Students came from each class at CMU and 27.4% were freshman, 35% were sophomores, 18.5% were juniors and 19.1% were seniors. Eighty-six percent of participants were United States Citizens

All participants were recruited using the Carnegie Mellon University Undergraduate Psychology Participant Pool program. Participants were given one psychology participation credit upon completion of this study. See Table 1 for a summary of the participants.

Measures

Participants were asked about their social and psychological well being, their eating patterns, the types of food they eat, questions about their weight and general demographic questions.

Stress. The Perceived Stress Scale (PSS14; Cohen, Kamarck, & Mermelstein, 1983) was used to measure the degree to which participants view situations in their life as stressful. The questions in this scale ask about feelings and thoughts people had in the last month. Items were designed to measure how unpredictable, uncontrollable, and overloaded respondents find their lives. Respondents answered questions such as, 'in the last month, how often have you dealt successfully with day to day problems and annoyances', 'in the last month have often have you felt that things were going your way', and, 'in the last month, how often have you been able to control irritations in your life'. Reliability for this scale was good ($\alpha = 0.81$).

Depression. The 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was used to measure current depressive symptoms during the previous week. This scale is used to measure feelings of depression in the general population. Respondents

answered questions such as, 'I felt that everything I did was an effort', 'I felt depressed', and 'my sleep was restless'. Reliability for this scale was high ($\alpha = 0.91$).

Subjective well-being. Participants were asked to complete the 5-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, Griffin, 1985). This scale is used to measure the participants assessment of their life as a whole. The SWLS is a five-item measure of global life satisfaction that uses a 7-point Likert scale with high scores reflecting a high degree of life satisfaction. Respondents answered questions such as, 'in most ways my life is close to my ideal' and 'I am satisfied with my life'. Reliability for this scale was high ($\alpha = .88$).

Perceived social support. The 12-question Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet & Farley, 1988) was used to measure the degree of social support each participant felt he or she had. High levels of perceived social support are generally associated with low levels of depression and anxiety. This self-report scale measures respondents' perceptions of the availability of various types of social support such as family, friends, and significant other. Respondents answered questions such as, 'my family really tries to help me', 'my friends really try to help me', and 'I have a special person who is a real source of comfort to me'. The reliability of this measure was high ($\alpha = .92$).

Self-efficacy. Respondents were asked to answer the General Self-Efficacy (GSE; Jerusalem & Schwarzer, 1992) Scale, a ten-question scale that was designed to measure general self-efficacy, the belief that one's actions are responsible for successful outcomes. This scale was designed to assess optimistic self-beliefs used to cope with an array of life demands. Strengths of this scale include that it is suitable for a broad range of applications, it can predict adaptations after life changes, it is suitable indictor of quality of life, and is has been used internationally for two decades. Unfortunately, this particular scale does not ask about specific

behavioral changes. Respondents answered questions such as, 'I can always manage to solve difficult problems if I try hard enough', 'I can usually handle whatever comes my way', and It is easy for me to stick to my aims and accomplish my goals'. This scale had high reliability (α = .87).

Emotional eating, external eating, and restraint eating. The 30-item Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986) was administered to participants and used to assess their degrees of emotional eating, eating in response to emotional arousal states such as fear anger or anxiety, external eating, eating in response to external food cues such as sight and smell of food, and restraint eating, overeating after a period of slimming when the cognitive resolve to diet is abandoned. Each of these nonexclusive types of abnormal eating were measured using ten question subscales. The emotional eating subscale asked questions such as, 'Do you have the desire to eat when you are irritated', 'do you have a desire to eat when you are feeling lonely', and 'do you have a desire to eat when you have nothing to do'. The external subscale asked questions such as, 'if you have something delicious to eat, do you eat it straight away', 'if food tastes good to you, do you eat more than usual,' and, 'when preparing a meal are you inclined to eat something'. The restrained eating subscale asked questions such as, 'do you watch exactly what you eat', 'how often in the evening do you try not to eat because you are watching your weight' and, 'when you have eaten too much, do you eat less than usual the following days'. The reliability for the overall scale was high (α = 0.94). The reliability for the emotional eating subscale was good (α = 0.76). The reliability for the external eating subscale was good (α = 0.83). The reliability for the restraint eating subscale was high (α = 0.95).

Dietary Intake. Dietary intake of commonly consumed foods was asked of all participants using a researcher created Food Frequency Questionnaire (FFQ). Participants were asked to report, on a scale ranging from "never" to "2 or more per day", how often they eat a variety of foods. Food groups that were questioned include, cereals, breads, snacks, meat, fish, eggs, spaghetti, mixed dishes (i.e., stir-fry), soup, dairy products, vegetables, grains, fruits, sweets, and beverages. Participants were also asked to report how often they cook meals, eat outside of the home, and eat processed foods (i.e., frozen dinners). In order to analyze this data, results were recalculated such that an answer of 'never' was translated into zero, 'less than once per month', was translated into 0.5, '1-2' per week was translated into 6, '3-4 per week' was translated into 13, '5-6' per week was translated into 21, '1 per day' was translated into 31, '2 per day' was translated into 62, '3 per day' was translated into 93, and 'NA' was translated into 0. These recodings were chosen to represent the number of instances each month that a respondent ate each food.

Weight and height. Participants were asked to self-report their weight and height. When participants signed up for this study they were notified that they would need to report an accurate measurement of their current weight. In order to assess accuracy of this measure, participants were asked when they weighed themselves last and how accurate they thought this measure was. Participants were also asked how satisfied they felt with their current weight. We then calculated each participants Body Mass Index (BMI) by taking the ratio of weight, in kilogram, to height, in meters.

Demographics. Lastly, participants were asked basic demographic questions including birth date, gender, where they spent the majority of their childhood, ethnicity, current student status, and major.

Design

This survey had a between-subject quasi-experimental design. The outcome variable in this study body is mass index (BMI). The main explanatory variables used in this study are abnormal eating (i.e., restraint, emotional, and/or external), perceived social support, perceived stress, and depression. Other explanatory variables measured quality of life, self-efficacy, common food choices, age, and gender.

Procedures

Materials used for this study were in the format of one Qualtrics survey (See Appendix I for survey) that was emailed to participants who signed up for the study on the Psychology Participant Pool website. Once participants received the questionnaire they first read an informed consent form and provided consent prior to beginning the questionnaire. Debriefing information was included at the end of the study. Responses were collected solely using Qualtrics and all raw data was then exported to Microsoft Excel so that it could be recoded. Results were analyzed using JMP Version 5 (SAS) as well as Microsoft Excel.

Results

The first goal of this study was to ascertain the relationship between perceived stress, perceived social support, depression, and BMI. Sample means of all measures and BMI, stratified by gender can be found in Table 2. Table 3 shows the correlations between perceived stress, perceived social support, perceived depression and BMI. In females a significant and positive correlation was found between perceived stress and depression ($r(84) = .74$, $p < .001$). A significant and negative correlation was found between perceived social support and perceived stress ($r(84) = -.32$, $p = .003$) and perceived social support and depression ($r(84) = -.54$, $p <$

.001). In males there was a positive and significant correlation between perceived stress and depression ($r(73) = .64$, $p < .001$) and a negative correlation between perceived social support and depression ($r(73) = -.41$, $p < .001$), but there was not a significant correlation found between perceived social support and perceived stress ($r(73) = -.14$, *ns*). BMI did not significantly correlate with perceived stress, perceived social support, and perceived depression in males or females.

Relationship between normal and abnormal eaters and BMI

The second goal of this study was to determine the relationship between restraint eating, emotional eating, external eating, and BMI. Table 4 shows the correlations between the three types of abnormal eating measured and BMI by gender. Our analyses show that there is a significant relationship between restrained eating and external eating in both males ($r(73) = .28$, $p < .05$) and females ($r(84) = .38$, $p < .001$), but not emotional eating. There was also a significant correlation between restrained eating scores in males and BMI ($r(73) = .44$, $p < .001$). All other analyses performed using eating patterns and BMI yielded insignificant results.

Relationship between perceived stress, perceived social support, depression, abnormal eating, and BMI

Because the results of the separate analysis of perceived social support, perceived stress and BMI as well as the result of abnormal eating patterns and BMI we not significant, further analysis regarding Hypothesis Three was not performed.

Food frequency consumption calculations

In order to test the hypothesis that people who are more stressed out compared to those who are unstressed a regression, using perceived stress score as the dependent variable and a

variable computed for bread products as the main independent variable and gender and BMI as controls. No significance was found (b = -.001, *ns*).

Correlation analysis was run find the connection between people who ate a lot of certain foods and their levels of perceived stress, perceived social support, depression eating patterns, and BMI. In males, a significant correlation was found between BMI and alcohol consumption ($r(73) = .40$, $p < .001$), BMI and water ($r(73) = .38$, $p < .001$), potatoes corn and peas and perceived stress ($r(73) = .24$, $p < .05$), fish and perceived stress ($r(73) = .04$, $p < .05$), coffee and perceived stress ($r(73) = .03$, $p < .05$), depression and fruit intake ($r(73) = .27$, $p < .05$), depression and vegetable intake($r(73) = .25$, $p < .05$), perceived social support and fish ($r(73) = -.4p$, $p < .001$), perceived social support and heavy soups ($r(73) = -.28$, $p < .05$), restraint scores and cheese consumption ($r(73) = .32$, $p < .01$), restraint scores and soda consumption ($r(73) = -.25$, $p < .05$), restraint scores and proportioned food per month ($r(73) = .27$, $p < .05$), emotional eating scores and chips, pretzels and crackers ($r(73) = .42$, $p < .001$), emotional eating scores and pasta and pizza ($r(73) = .23$, $p < .05$), emotional eating scores and sweets ($r(73) = .25$, $p < .05$), emotional eating scores and diet soda ($r(73) = .23$, $p < .05$), emotional eating scores and fast food consumption ($r(73) = .35$, $p < .01$), and external eating scores and bread products ($r(73) = .23$, $p < .05$). In females, a significant correlation was found between BMI and campus eating ($r(84) = .03$, $p < .05$), perceived stress and regular soda ($r(84) = .24$, $p < .05$), sweets and perceived social support ($r(84) = -.24$, $p < .05$), restraint eating and health meats (i.e., chicken breast) ($r(84) = -.22$, $p < .05$), restraint eating and regular soda ($r(84) = -.23$, $p < .05$), external eating and tofu and bean consumption ($r(84) = .29$, $p < .01$). See Table 5 for a summary of means of foods eaten by gender.

Discussion

The main goal of the current study was to investigate the relationship between perceived stress, perceived social support, and depression as these feelings relate to abnormal eating habits, food choices and, ultimately, body mass index. Using a sample of male and female college undergraduates spanning all grade levels it was determined that there is not a significant relationship between BMI and any of the expected predictions.

The first goal of this study was to examine the relationship between normal and abnormal eaters and their BMI. We found that there is a significant relationship in both males and females between restrained eating and external eating, but not emotional eating. This can be explained by the fact that the different subtypes of abnormal eaters eat for different reasons and restrained and external eaters will eat because food is available and they have broken their diets whereas emotional eaters eat for internally based reasons. However, there was not a correlation between abnormal eating patterns and BMI. Perhaps this finding can be explained by the fact that people with abnormal eating habits will often try to overcompensate for eating binges by dieting. Even though dieting is very difficult to sustain and weight loss is hard to maintain people, especially those who are in the 18-22 year old age range, can diet enough to maintain a healthy weight range. Abnormal eating patterns are often a burden on the daily lives of those who have them. We looked at the correlation between abnormal eating patterns and three common psychosocial measures to find evidence of this connection.

On average males had lower scores across the three eating behavior subscales and the perceived stress, perceived social support, depression measures. Results from a correlational analysis with perceived stress, perceived social support, depression and the three subscales of the Dutch Eating Behavior Questionnaire stratified by gender showed significant negative correlations between perceived social support and both restrained and external eating in males.

Male, therefore, are more likely to be influenced by external food cues (i.e., free food at a club meeting) when they lack social support. This is especially interesting because external eating is often a trigger for restrained eating, which also negatively correlated with perceived social support scores. In females a positive correlation was found between emotional eaters and depression. This is an interesting finding because it is different from previous findings (e.g., Provencher, Polivy, Wintre, Pratt, et al., 2009) and it has implications for how resources should be allocated in colleges. For example, one implication of this finding is that collaborative eating environments and supportive rooming situations may be more important for males than previously thought because they may need more social support as a way to reconcile abnormal eating patterns.

In females a significant and positive correlation was found between perceived stress and depression. A significant and negative correlation was found between perceived social support and perceived stress and perceived social support and depression. In males there was a positive and significant correlation between perceived stress and depression and a negative correlation between perceived social support and depression, but there was not a significant correlation found between perceived social support and perceived stress. This finding is unique because normally social support and stress correlate. Moreover, this suggests that stress is not a mediator for social support so reducing stress will not reduce the correlation between perceived social support and both external and restrained eating in males.

In this study we also asked participants how they felt about their weight. We chose to ask this question because the relationship between how people actually feel about their weight and what they actually weight can vary across different people. It was interesting to find a significant and negative correlation between BMI and satisfaction with weight across both

genders. This suggests that the more somebody weighs, controlling for height, the less likely they are to be satisfied with their appearance. BMI was not correlated, in either gender, with scores on the Satisfaction with Life Scale. However, the SWLS was significantly and negatively correlated with how females feel about there weight. This correlation was not significant in males. How men felt about their weight was also significantly and negatively correlated with dietary restraint suggesting that men who feel unsatisfied with their weight are more likely to have the symptoms of a restraint eater. Lastly, how women felt about their weight was significantly and negatively correlated with both restraint eating and emotional eating suggesting that woman who are unhappy with their weight are more likely to show symptoms of restrained eaters and emotional eaters. Something that is also of note, especially to the college population is that there was a significant correlation between how woman felt about their weight and depression. This is a rather dour, yet not surprising, finding because it implies that those who are do not like their weight are more likely to be depressed that those who are satisfied with their weights. Special measures should be taken not only to promote healthy body weights, but also to promote healthy body images.

Much of the richness of this study comes from the nature of this study in that it was conducted solely for the purpose of measuring eating behaviors. Many studies like this one use data from nationwide samples that must compensate what can be asked with the amount of people who are taking the survey (e.g., see Liu et al., 2007). In this survey we asked about many different eating habits to find out if, by gender, certain foods are associated with abnormal eating patterns or coping mechanisms and, ultimately, BMI.

Perhaps the largest limitations of this study are the small sample size obtained and that it was based on self-reported data from one university. In order to combat using self-reports for

the dependent measure, we asked students to weigh themselves before the study and also how accurate they thought their weight was. Participants who either thought their reported weight was inaccurate or did not weigh themselves at least two weeks prior to the study were excluded from the final analysis.

A second limitation of this study is that lack of variance reported amongst abnormal eating habits and BMI. Even though the data collected from this study is similar to data collected in other eating behavior studies in the United States, the small sample size did not allow for huge differences in weight and the amount of analysis that we could have done on different weight groups and those with different eating patterns. The average male BMI was 23.73 (3.95) and the average female BMI was 21.46 (2.87). A ceiling effect is one explanation for our findings because, even thought the BMI's reported are similar to those found in colleges across the country, we did not have as much variation in our sample as other samples, due to much larger samples sizes, have found. If more data were collected, a cross sectional or stratified analysis could have been run.

Another shortcoming of this study is that students took this survey online in their own environment. Thus, the researchers had no way to control for distractions. Many students took this survey at the end of the semester and some took it during the middle of the night. In order to limit inaccurate data participants who displayed obvious patterns in answering (i.e., all three's for a scale) were removed from final analysis. Even so, by asking people about all of the food they have consumed within the last year, much was gained from this study. All of the research in this study was correlation. In order to gain a better picture of the causal factors that influence effects of psychosocial factors and eating behaviors on BMI more experiment in which one

experimental variable is manipulated should be undertaken. This is very difficult for ethical and practical reasons so a longitudinal design may be more realistic.

Future directions for this research include performing a longitudinal analysis. Tracking a group of students on changes in perceived stress, perceived social support, depression, other covariates and eating patterns would certainly add more depth to the currently literature. Also, asking students to keep a food diary would be a good way to get a more accurate measure of what students are actually eating. This would be especially interesting across high-stress periods (i.e., finals) and periods in which social support circles differ (i.e., breaks from college). It would also be beneficial to rerun a study similar to this in a different area of the country where eating patterns are different because people may eat different foods to cope with their feelings elsewhere.

There are many implications from this study that can be applied on the college level and to a broader audience. More resources need to be devoted to helping people transition into the college environment so that incoming students, especially males, have a higher level of perceived social support. Different communication tactics may be used to communicate the options students have for their meals as well as the consequences of some choices. A new variety of food, the way food is served, or the environment available for meals should also be offered to reflect the feelings people have about their food. Obesity is becoming a larger and costlier problem each day. Thus, social psychologists need to learn more about the complex web of factors that leads to obesity so that we can do whatever we must to reduce this epidemic. This study has helped us answer some of these questions and give support for many of the policy implications that are currently required in this are.

References

Arnow, B., Kenardy, J., & Agras, W.S. (1992). Binge eating among the obese: a descriptive study. *Journal of Behavioral Medicine, 15(2),* 155-170.

Bellisle, F., Louis-Sylvestre, J., Linet, N., Rocaboy, B., Dalle, B., Cheneau, F., et al. (1990). Anxiety and food intake in men. *Journal of Psychosomatic Research, 52*, 451-457.

Benton, D. (2002). Carbohydrate ingesting, blood glucose and mood. *Neuroscience & Biobehavioral Reviews, 26,* 293-308.

Benton D., & Donohoe R.T. (1999): The effects of nutrients on mood. *Public Health Nutrition, 2,* 403-409.

Brooks, J.H., & DuBois, D.L. (1995). Individual and environmental predictors of adjustment during the first year of college. *Journal of College Student Development, 36*, 347–60.

Brooks, T.L.., Harris, S.K., Thrall, J.S., & Woods, E.R. (2002). *Journal of Adolescent Health, 31*, 240-246.

Cartwright, M., Wardle, J., Steggles, N., Simon, A.E., Croker, H., & Jarvis, M.J. (2003). Stress and dietary practices in adolescents. *Health Psychology, 22(4)*, 462-469.

Castro J. M., & Brewer E. (1992). The amount eaten in meals by humans is a power function of the number of people present. *Physiology & Behavior, 51*, 121–25.

Center for Disease Control. (2009). Obesity halting the epidemic by making health easier.

Chaiken S. & Pliner P. (1990). Eating, social motives, and self-presentation in women and men. *Journal of Experimental Social Psychology, 26*, 240– 54.

Cohen, S., Kamarck, T., Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*, 385-396.

Diener, E., Emmons, R.A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, *49*, 71-75.

Delinsky, S.S., & Wilson, G.T. (2008). Weight gain, dietary restraint, and disordered eating in the freshman year of college. *Eating Behaviors, 9*, 82-90.

Fulkerson, J.A., Sherwood, N.E., Perry, C.L., Neumark-Sztainer, D., & Story, M. (2004). Depressive symptoms and adolescent eating and health behaviors: a multifaceted view in a population-based sample. *Preventative Medicine, 38*, 865-875.

Galef, B.G. (1981). The development of olfactory control of feeding site selection in rat pups. *Journal of Computational Psychology, 95*, 615-662.

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

Gluck, M.E. (2006). Stress response and binge eating disorder. *Appetite, 46(1),* 26-30.

Greeno, C.G., & Wing, R.R (1994). Stress-induced eating. *Psychological Bulletin, 115*, 444-464.

Herman, C.P., & Polivy, J. (1975). Anxiety, restraint and eating behavior. *Journal of Abnormal Psychology, 84(6),* 666-672.

Herman, C.P., & Polivy, J. (1984). A boundary model for the regulation of eating. In A.J. Stunkard & E. Stellar (Eds.), Eating and its disorders (pp. 141–156). New York: Raven Press.

Prasad, C. (1998). Food, mood and health: a neurobiologic outlook. *Brazilian Journal of Medical and Biological Research, 31,* 1517-1527.

Levitsky, D.A., Halbmaier, C.A., & Mrdjenovic, G. (2004). The freshman weight gain: a model for the study of the epidemic of obesity. *International Journal of Obesity and Related*

Metabolic Disorder, 28, 1435–1442.

Liberman, H.R., Wurtman, J.J., & Chew, B. (1986). Changes in mood after carbohydrate consumption among obese individuals. American Journal of Clinical Nutrition, 44, 772-778.

Liu et al. (2007). Perceived stress, depression and food consumption frequency in the college students of China seven cities. *Physiology and Behavior, 92,* 748-754.

Macht, M. (2008). How emotions affect eating: a five-way model. Appetite, 50(1), 1-11.

Michaud, C.I., Kahn, J.P., Musse, N., Burlet, C., Nicolas, J.P., & McJean, L. (1990). Relationships between a critical life event and eating behavior in high school students. *Stress Medicine, 6,* 57-64.

Mikolajczyk, R.T., Ansari, W.E., & Maxwell, A.E. (In Press). Food consumption frequency and perceived stress and depressive symptoms among college students in three European countries. *Nutrition Journal, 8(31).* Retrieved November 12, 2009, from http://www.ncbi.nlm.nih.gov/pubmed.

National Eating Disorder Association (2005). Statistics: Eating disorders and their precursors. Retrieved March 30,2010 from http://www.nationaleatingdisorders.org/.

Oliver, G., & Wardle, J. (1999). Perceived effects of stress on food choice. *Physiology and Behavior, 66(3)*, 511-515.

Paul, E.L., & Brier, S. (2001). Friendsickness in the transition to college: precollege predictors and college adjustment correlates. *Journal of Counseling Development*, 7, 77–89.

Polivy, J., Herman, C.P., & McFarlane, T. (1994). Effects of anxiety on eating: Does palatability moderate distress-induced overeating in dieters. *Journal of Abnormal Psychology, 103(3),* 505-510.

Provencher, P., Polivy, J., Wintre, M.G., Pratt, M.W., Pancer, S.M., Birnie-Lefcovitch, S., & Adams, G.R. (2009). Who gains or who loses weight? Psychosocial factors among first-year university students. *Physiology & Behavior, 96(1),* 135-141.

Radloff, L. (1977). The CES-D scale. *Applied Psychological Measurement, 1,* 385-401.

Rodin, J. (1975). Causes and consequences of time perception differences in overweight and normal weigh people. *Journal of Personality and Social Psychology, 31*, 898-904.

Rodin, J., & Slochower, J. (1976). Externality in the non-obese: The effects of environmental responsiveness on weight. *Journal of Personality and Social Psychology, 33,* 338-334.

Schachter, S. (1971). Some extraordinary facts about obese humans and rats. *American Psychologist,* 26, 129-144.

Jerusalem, M., & Schwarzer, R. (1992). Self-efficacy as a resource factor in stress appraisal processes. In R. Schwarzer (Ed.), Self-efficacy: Thought control of action (pp. 195-213). Washington, DC: Hemisphere.

Stone, A.A. & Brownell, K. (1994). The stress-eating paradox: multiple daily measurement in adult males and females. *Psychological Health, 9,* 425-436.

Torres, S.J. & Nowson, C.A. (2007). Relationship between stress, eating behavior, and obesity. *Nutrition, 23,* 887-894.

Van Strein, T., Frijters, J.E.R., Bergers, G.P.A., & Defares, P.B. (1986). The Dutch eating behavior questionnaire (DEBQ) for asesment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders, 5,* 295-315.

Wansink B. (1994). Antecedents and mediators of eating bouts. *Family Consumer Science Research Journal,* 23(2), 166-182.

Wansink, B. (2004), Environmental factors that increase the food intake and consumption volume of unknowing customers, *Annual Review of Nutrition,* 24, 455-479.

Wansink, B., Cheney, M.M., & Chan, N. (2003). Exploring comfort food preference across age and gender. *Physiology and Behavior, 79*, 739-747.

Wardlea, J., Steptoeb, A., Olivera, G., & Lipseyb, Z. (2000). Stress, dietary restraint and food intake. *Journal of Psychosomatic Research, 48,* 195-202

Weidner, G., Kohlmann, C.W., Dotzauer, E., & Burns, L.R. (1996). The effects of academic stress on health behaviors in young adults. *Anxiety, Stress, & Coping, 9,* 123-133.

Wurtman, R.J., & Wurtman, J.J. (1989). Carbohydrates and depression. *Scientific American, 260,* 68-75.

Zimet, G.D., Dahlem, N.W., Zimet, S.G. & Farley, G.K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment, 52,* 30-41.

Tables

Table 1

Participant Information

	Female	Male
	n=84	n=73
BMI	21.46 (2.86)	23.73 (3.95)
Age	19.96 (1.12)	20.32 (1.15)
	Year In College	
Freshman	5%	7%
Sophomore	12.78%	18%
Junior	13.33%	11%
Senior	17.78%	16%

Table 2

Means and Standard Deviations of Psychosocial Factors and Eating Scores by Gender

	Female	Male	Significance
	n=84	n=73	
Perceived Stress	1.97 (0.49)	1.87 (0.53)	*
Depression	0.96 (0.55)	0.75 (0.51)	*
Perceived Social Support	5.75 (1.08)	5.22 (1.09)	*
Satisfaction with Life	3.26 (1.32)	3.12 (1.29)	*ns*
Self Efficacy	3.16 (0.45)	3.21 (0.44)	*ns*
Restrained Eating	2.71 (0.90)	2.07 (0.82)	***
Emotional Eating	2.85 (1.01)	2.03 (0.78)	***
External Eating	3.43 (0.59)	3.13 (0.63)	**
DEBQ_Total	2.98 (0.65)	2.37 (0.51)	***

Note * < .05 **<.01 *** P < .001

Table 3

Pairwise Correlations for Perceived Stress, Perceived Social Support, Depression, and BMI by Gender

Male

Correlations	Perceived Stress	Depression	Perceived Social Support	BMI
Perceived Stress	1	.64***	-0.15	0.04
Depression	.64***	1	(-0.41**)	0.034
Perceived Social Support	-0.15	(-0.41**)	1	-0.005
BMI	0.04	0.034	-0.005	1

Female

Correlations	Perceived Stress	Depression	Perceived Social Support	BMI
Perceived Stress	1	0.74***	(-0.32**)	-0.02
Depression	0.74***	1	(-0.54***)	0.08
Perceived Social Support	(-0.32**)	(-0.54***)	1	-0.06
BMI	-0.02	0.08	-0.06	1

Note * < .05 **<.01 *** P < .001

Table 4

Pairwise Correlations Eating Patterns and BMI by Gender

Male

	Restrained Eating	Emotional Eating	External Eating	BMI
Restrained Eating	1	0.28***	-0.13	0.44
Emotional Eating	0.28***	1	0.31***	0.11
External Eating	-0.13	0.31***	1	-0.07
BMI	0.44	0.11	-0.07	1

Female

	Restrained Eating	Emotional Eating	External Eating	BMI
Restrained Eating	1	0.38**	0.19***	0.18***
Emotional Eating	0.38**	1	0.45	0.12
External Eating	0.19***	0.45	1	0.06
BMI	0.18***	0.12	0.06	1

Note * < .05 **<.01 *** P < .001

Table 5

Average Monthly Reported Foods Consumed by Gender

	Female n=84		Male n=73	
Food Type	Mean	sd	Mean	sd
BreadBreadProductsCereals	6.80	7.42	5.35	3.75
ChipsPretzelsGranolaBarsCrackers	4.39	5.59	3.87	4.35
HealthierMeatEggs	5.45	4.04	6.98	4.78
Fish	2.14	3.37	2.09	4.49
UnhealthyMeatsFriedChickenFriedFish	2.21	3.07	4.13	4.03
StewCreamSoupChili	2.10	3.06	1.98	3.37
LightSoup	2.43	4.18	1.47	3.08
PastaPizza	3.91	3.17	4.41	2.39
TofuBeans	2.02	3.07	2.17	4.22
Burritos	1.65	1.92	2.09	2.66
MilkYogurt	12.61	11.31	13.22	11.18
Cheese	6.08	7.44	6.05	5.57
FruitIncJuice	5.37	4.47	4.39	4.90
VegetablesIncJuice	5.39	4.71	3.70	3.67
PotatoesCornPeas	4.20	4.76	2.99	2.59
SaladDressingMayonnaiseButter	4.84	3.78	4.37	5.18
MealBarMealDrink	2.86	6.84	2.88	6.14
FriesColeSlawPotatoSalad	2.80	2.80	3.44	3.14
Sweets	4.11	4.36	3.78	4.38
Alcohol	4.05	6.46	3.85	5.75
LatteCappuccinoMochaHotChocolate	6.77	10.62	5.16	9.49
Coffee	9.90	18.50	6.64	12.11
DietSoda	7.21	14.60	4.84	11.50
Water	42.92	22.45	41.02	23.54
RegularSodaSugarFruitDrinks	4.98	11.00	7.21	8.05