



Disturbed eating attitudes as predictors of coping processes and macronutrient preferences in undergraduate females under stress
by Maria Dawn Hinton

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Psychology
Montana State University
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Abstract:

Coping processes and food preferences are current topics of interest in eating disorder research. Coping processes refer to the way an individual regulates his or her reactions to stressful situations. Individuals with eating disorders and/or disturbed eating attitudes have been found to utilize more of certain coping processes and more overall coping processes when compared to individuals who have normal eating habits. Additionally, food preferences are highly related to eating disorders, in that individuals who diet heavily seem to avoid fat and sugar, but individuals who binge and purge tend to binge on foods high in fat and sugar. In this study, seventy undergraduate females were tested for coping processes after a common stressful event involving an unsolvable anagram procedure. Participants' eating attitudes, as measured by the EAT-26 and Binge Eating Scale (BES), were analyzed as predictors of perceived stress, coping processes, and food preferences. Food preoccupation was found to significantly predict overall coping, positive reappraisal coping, and problem solving coping. BES was found to significantly predict escape avoidance coping. Amount of perceived stress was not found to be a moderator between eating attitudes and coping processes used by participants. Dieting predicted lower scores on fat and sugar preferences, and restricting/purging predicted higher preference for sugar. Weekly intentional exercise was found to predict higher preference for sugar and lower preference for fat. These results and recommendations for future research are discussed.

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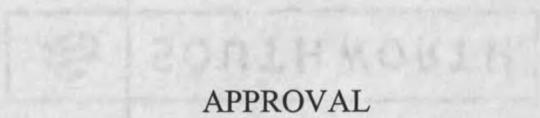
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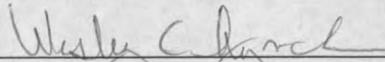
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This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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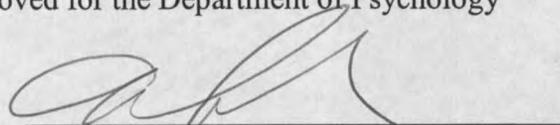


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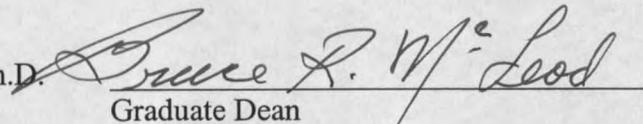


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TABLE OF CONTENTS

2. INTRODUCTION	1
Disturbed Eating Attitudes and Eating Disorders	1
The Transactional View of Stress	2
Eating Attitudes and Coping Processes	3
Hypothesis 1.....	7
Eating Attitudes, Coping Processes, and Stress	8
Hypothesis 2.....	9
Hypothesis 3.....	10
Macronutrient Self-Selection Paradigm, Fat Preference, and Sugar Preference.....	10
Hypothesis 4.....	11
Hypothesis 5.....	11
Hypothesis 6.....	12
3. METHOD	13
Participants.....	13
Instruments.....	13
Binge Eating Scale.....	13
Eating Attitudes Test-26	14
Food Preference Questionnaire.....	15
Subjective Stress Scale	15
Ways of Coping Questionnaire.....	16
Procedure.....	16
4. RESULTS	21
5. DISCUSSION.....	30
6. CONCLUSION.....	34
REFERENCES CITED.....	37
APPENDICIES	41
APPENDIX A: INSTRUMENTS.....	42
APPENDIX B: SAMPLE PAGES.....	51

LIST OF TABLES

Table	Page
1. Ways of Coping Questionnaire Coping Processes Descriptions.....	5
2. Macronutrient Self-Selection Paradigm (MSSP)	11
3. Unsolvable Anagrams Used for Problem Solving Task.....	18
4. Means and Standard Deviations	22
5. Correlations and Reliability Estimates	23
6. Partial Correlations between EAT-26 Subscales and BES and Coping Variables.....	25
7. Partial Correlations between EAT-26 Dieting, Restricting/Purging Subscales and BES and Fat Preference and Sugar Preference.....	27

LIST OF FIGURES

Figure	Page
1. Path Analysis of the Relationship between Eating Behavior and Concerns and Coping Processes	28
2. Path Analysis of the Relationship between Eating Behavior and Food Preferences	29

ABSTRACT

Coping processes and food preferences are current topics of interest in eating disorder research. Coping processes refer to the way an individual regulates his or her reactions to stressful situations. Individuals with eating disorders and/or disturbed eating attitudes have been found to utilize more of certain coping processes and more overall coping processes when compared to individuals who have normal eating habits. Additionally, food preferences are highly related to eating disorders, in that individuals who diet heavily seem to avoid fat and sugar, but individuals who binge and purge tend to binge on foods high in fat and sugar. In this study, seventy undergraduate females were tested for coping processes after a common stressful event involving an unsolvable anagram procedure. Participants' eating attitudes, as measured by the EAT-26 and Binge Eating Scale (BES), were analyzed as predictors of perceived stress, coping processes, and food preferences. Food preoccupation was found to significantly predict overall coping, positive reappraisal coping, and problem solving coping. BES was found to significantly predict escape avoidance coping. Amount of perceived stress was not found to be a moderator between eating attitudes and coping processes used by participants. Dieting predicted lower scores on fat and sugar preferences, and restricting/purging predicted higher preference for sugar. Weekly intentional exercise was found to predict higher preference for sugar and lower preference for fat. These results and recommendations for future research are discussed.

INTRODUCTION

Coping processes, which are involved in how we regulate our reactions to stressful situations, have recently been the focus of extensive research in relation to eating disorders (Troop, Holbrey, & Treasure, 1998; Fryer, Waller, & Stenfert-Kroese, 1997; Troop, Holbrey, Trowler, & Treasure, 1994). Troop et al. (1998) state that people with Anorexia Nervosa and Bulimia Nervosa generally have a stressful life event preceding their disease and report feeling a higher level of stress at present. Numerous empirical studies appear to support the view that there is an association between disordered eating attitudes and reactions to stressors, which includes the ability to cope with stress (Fryer et al., 1997; Hansel & Wittrock, 1997; Wolff, Crosby, Roberts, & Wittrock, 2000).

Disturbed Eating Attitudes and Eating Disorders

The three main types of eating disorders are generally recognized as Anorexia Nervosa, involving excessive dieting and restrictive eating; Bulimia Nervosa, involving restrictive eating but also bingeing and purging; and Binge Eating, involving uncontrolled overeating without purging. There is a definite difference between eating disorders and disturbed eating attitudes, or subclinical eating disorders, but similar basic categories apply. The present experiment focuses on multiple types of eating attitudes in a non-clinical population of women. The participants in this study have not been diagnosed with eating disorders; instead, they have been surveyed to obtain self-report information about eating attitudes related to the above disorders.

The Eating Attitudes Test, utilized in this study, was originally developed to screen for undiagnosed cases of Eating Disorders (Garner, Olmsted, Bohr, and Garfinkel, 1982). This test obtains a self-report on eating attitudes to help determine if an eating disorder may exist in the person taking the test. The instrument, however, does not diagnose eating disorders; instead, it assesses disturbed eating attitudes and behaviors related to these disorders.

Although this study focuses on eating attitudes in a non-clinical population, research in the past has used both clinical participants who have been diagnosed with eating disorders and non-clinical participants who have not been diagnosed with eating disorders but express disturbed eating attitudes. Therefore, both the term disturbed eating attitude and the term eating disorder will be used throughout this report.

The Transactional View of Stress

To properly view the relationship between eating disorders and stress, we must understand how people manage stress. Folkman and Lazarus (1988) have proposed the transactional view of stress to explain the relationship between stress and coping processes. This theory proposes two processes: *cognitive appraisal* and *coping*, which are viewed as mediators of "stressful person-environment relations and their immediate long range outcomes." (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986, p. 992).

Cognitive appraisal is the evaluation a person makes as to whether an event is relevant to his or her well being (Folkman & Lazarus, 1988). There are two steps in

cognitive appraisal: *primary appraisal*, when the person makes the evaluation as to whether he or she has anything to lose in the encounter, and *secondary appraisal*, when the person decides whether or not anything can be done about the situation. The theory states that stress is experienced when a situation is viewed as relevant to a person's well being. From this perspective, coping includes both the behavioral and cognitive efforts a person uses to manage events that are appraised as stressful. Within this transactional view of stress, each encounter viewed as relevant to his or her well-being takes place as a transaction between the person and the environment. Coping processes therefore change with each encounter depending on the secondary appraisal. According to Folkman et al. (1986), coping has two main functions: to regulate emotions that are stressful to the person (emotion-focused), and to alter the situation (problem-focused) or the "person-environment relation causing the distress (p. 993)."

Eating Attitudes and Coping Processes

Several studies have shown that people with clinical and subclinical eating disorders and more disturbed eating attitudes seem to lack effective coping processes and typically use maladaptive coping processes (Etringer, Altmaier, & Bowers. 1989; Fryer et al., 1997; Troop et al., 1994; Troop et al., 1998).

The coping assessment instrument developed by Folkman and Lazarus (1988) is the Ways of Coping Questionnaire, which is based on the transactional view of stress. This questionnaire measures the following eight different coping processes: confronting, distancing, self-controlling, seeking social support, accepting responsibility, escape-

avoidance, planful problem solving, and positive reappraisal. For complete descriptions of these coping processes, see Table 1 on page 5. Three of these coping processes, escape-avoidance, planful problem solving, and positive reappraisal have been most strongly associated with eating disorders (Etringer et al., 1989; Fryer et al., 1997; Nakahara et al., 2000; Troop et al., 1998; Troop et al., 1994).

Escape-avoidance coping involves wishful thinking and behavioral efforts to escape or avoid the stressor (Folkman & Lazarus, 1988). This can include eating, drinking, and even sleeping more than usual, and other activities that distract the individual from the stressor. People with eating disorders or disturbed eating attitudes seem to use this coping style more commonly than controls (Fryer et al., 1997; Troop et al., 1998; Troop et al., 1994).

Planful problem solving coping involves deliberate efforts to change the situation or solve the problem (Folkman & Lazarus, 1988). Previous research has indicated that people with eating disorders seem to lack this coping style. In fact, Etringer et al. (1989) reported that bulimic women even viewed themselves to have less problem solving capabilities as compared to non-bulimic women and seemed to have a lesser feeling of personal control over problem situations. Nakahara, Yoshiuchi, Yamanaka, and Sasaki (2000) found that among Japanese women, those participants in the Anorexia Nervosa group and those in the Bulimia Nervosa group all used significantly less planful problem solving than controls.

Table 1. Ways of Coping Questionnaire Coping Processes Descriptions (Folkman & Lazarus, 1988, p. 11)

Coping Process	Description
Escape-Avoidance	describes wishful thinking and behavioral efforts to escape or avoid the problem. Items on this scale contrast with those on the Distancing scale, which suggest detachment.
Planful Problem Solving	describes deliberate problem-focused efforts to alter the situation, coupled with an analytic approach to solving the problem.
Positive Reappraisal	describes efforts to create positive meaning by focusing on personal growth. This also has a religious dimension.
Confrontive Coping	describes aggressive efforts to alter the situation and suggests some degree of hostility and risk taking.
Distancing	describes cognitive efforts to detach oneself and to minimize the significance of the situation.
Self-Controlling	describes efforts to regulate one's feelings and actions.
Seeking Social Support	describes efforts to seek informational support, tangible support and emotional support.
Accepting Responsibility	acknowledges one's own role in the problem with a concomitant theme of trying to put things right.

Positive reappraisal coping is the final coping process most linked with eating disorders and attitudes. In the study mentioned above, Nakahara et al. (2000) found that participants in the Anorexia Nervosa group and participants in the Bulimia Nervosa group both used less positive reappraisal than controls.

Other research studies on eating disorders or disturbed eating attitudes and coping processes have been based on different coping theories and have therefore used different terminology but have yielded similar results. Troop et al., (1997), for instance, found that women with eating disorders were more likely to display helplessness and less likely to be masterful. Masterfulness was defined as having high levels of purposefulness and adequacy of coping strategies used. Although not a coping style, masterfulness determined the usefulness and adequacy of the coping styles each woman used and revealed that women with eating disorders used less purposeful and adequate coping styles than women without eating disorders. In a more recent study, Nagata et al. (2000) found that bulimic patients, as compared to controls, reported using significantly more emotion-oriented coping. Additionally, patients diagnosed with Anorexia Nervosa of the binge/purge type had lower scores on task-oriented coping as compared to controls. These investigators also found that the more impulsive the bulimic patients were, the more they used emotional coping strategies.

Hansel and Wittrock manipulated stress in their 1997 study, exposing female undergraduates to two tasks: a five minute high or low stress video and an anagram solving task that was either high or low stress. Participants were first categorized into two groups, the binge group and the non-binge group depending on their scores on the

Binge Eating Scale. Participants also completed a daily stress inventory for one week following the initial experiment. This study found that the binge group utilized more coping strategies than the non-binge group, but this included both more negative and more positive coping strategies. Negative coping strategies were categorized by being maladaptive, while positive coping strategies were adaptive for the individual based on the stressful situation. For example, coping with the stressor by doing something to escape the situation and not deal with it would be considered maladaptive and therefore negative; however, solving the problem and therefore dealing with the situation would be considered positive. Hansel and Wittrock also found that their binge group reported experiencing more perceived stress than control participants. Their higher level of perceived stress may explain why the binge group utilized more coping strategies overall, since they viewed the situation as more stressful overall. These findings from previous research on coping processes and eating attitudes lead to the following hypothesis of the present study.

Hypothesis 1

Individuals who express more disturbed eating attitudes, as determined by the EAT-26 and the BES, will utilize more overall coping processes, more escape avoidance coping, and less planful problem solving coping and positive reappraisal coping, than individuals who express less disturbed eating attitudes.

Eating Attitudes, Coping Processes, and Stress

As noted above, Hansel and Wittrock (1997), in one of the few experimental studies of stress effects on binge eating, found that their binge group reported experiencing more perceived stress than control participants. Additionally, Wolff, Crosby, Roberts, and Wittrock (2000) found in a three-week study that their binge group as compared to the non-binge group reported experiencing more stress. Their binge group furthermore seemed to use more avoidance coping than the control group. The binge group reported significantly more overall use of coping strategies, although when the avoidance coping strategy was removed from the analysis, the groups no longer differed in number of coping strategies used.

Although the link between coping processes and disturbed eating attitudes has been extensively studied, very few experimental studies have directly linked coping and disturbed eating attitudes following a specific stressful event. The survey research typically instructs participants to think about a stressful event they experienced in the past and to reflect on what they did in that situation. Since these events are not typically fresh in participants' memories, their actions may no longer be fully clear to them. In addition, each participant may be recalling different types of stressful situations. Thus, surveys may not accurately predict what coping processes participants would use under actual stressful conditions. Although Hansel and Wittrock (1997) did induce stress in participants, they used a coping assessment instrument that has not been commonly used, making it difficult to compare their results to previous findings; moreover, they focused exclusively on binge eating.

In previous studies, unsolvable or extremely difficult anagrams have been used to induce stress in participants to invoke feelings of helplessness and lower self-esteem (Murphy & Galbraith, 1990; Hansel & Whittrock, 1997). Murphey and Galbraith (1990) accomplished this by leading each participant to believe that he or she failed to solve the anagrams while other participants succeeded. This anagram-failure procedure involves stress directly influencing self-esteem and ego, so it would be considered stressful according to the transactional view of coping by Folkman & Lazarus (1988).

Hansel and Wittrock (1997) used anagrams to induce stress in their study on binge eating and coping processes, but did not use false feedback of failure. In their study, participants were set up to fail, but were expected to deduce that they had failed without experimenter feedback. By providing false feedback, which leads each participant to believe that she is one of the only people in the group to have failed the task, the stress experienced should be slightly greater and more personally relevant than the stress induced by the Hansel and Wittrock procedure. This previous research on stress and the relationship between coping and eating attitudes leads to the next two hypotheses of the present study.

Hypothesis 2

Individuals who express more disturbed eating attitudes, as determined by the EAT-26 and the BES, will report experiencing higher levels of subjective stress as compared to individuals who express less disturbed eating attitudes.

Hypothesis 3

Stress moderates the relationship between eating attitudes and coping processes.

Macronutrient Self-Selection Paradigm, Fat Preference and Sugar Preference

Numerous studies have provided evidence that eating attitudes affect food preference and selection (Sunday, Einhorn, & Halmi, 1992; Drewnowski, Pierce, & Halmi, 1988; Yanovski et al., 1992; Heatherington et al., 1994).

The Macronutrient Self-Selection Paradigm (MSSP), developed by Geiselman et al. (1998), is a procedure designed to assess individuals' macronutrient preferences. The actual paradigm classifies foods into six cell categories. The two main categories are High Fat and Low Fat. These two categories are each then subdivided into an additional three subcategories: High Simple Sugar, High Complex Carbohydrates, and Low Carbohydrates/High Protein. Table 2 provides a visual representation of this classification system.

Previous research has indicated that anorectic women have an increased preference for foods low in fat and calories (Sunday et al., 1992) and aversions to sweet and fatty foods (Drewnowski et al., 1988). This implies that women who diet excessively avoid foods high in fat and sugar.

On the other hand, Yanovski et al. (1992) found that during a binge meal, obese binge participants consumed a higher percentage of calories from fat and less from protein as compared to the obese control group. During both binge and normal meals, the obese binge group consumed significantly more calories and consumed more snack food

and dessert items than the control obese group did. Heatherington et al. (1994) found that as compared to non-obese controls, non-obese bulimic participants consumed more calories from fat and less from protein. Additionally, non-obese bulimic participants tended to choose sweet, high fat foods during binge episodes, for example cookies, chocolate, and ice cream. This previous research leads to the following hypotheses of this study.

Table 2. Macronutrient Self-Selection Paradigm (MSSP) (Geiselman et al. 1998)

	High Simple Sugar	High Complex CHO	Low CHO/ High Protein
High Fat	HF/HS	HF/HCCHO	HF/LCHO/HP
Low Fat	LF/HS	LF/HCCHO	LF/LCHO/HP
	HF/HS	High Fat/High Sugar	
	HF/HCCHO	High Fat/High Complex Carbohydrates	
	HF/LC/HP	High Fat/Low Carbohydrates/High Protein	
	LF/HS	Low Fat/High Sugar	
	LF/HCCHO	Low Fat/High Complex Carbohydrates	
	LF/LC/HP	Low Fat/Low Carbohydrates/High Protein	

Hypothesis 4

Higher scores on the dieting subscale of the EAT-26 will predict lower preference for sugar and fat.

Hypothesis 5

Higher scores on the restricting and purging subscale of the EAT-26 and higher scores on the Binge Eating Scale will predict higher preferences for fat and sugar.

Crystal, Frye, and Kanarek (1995) found that athletes and women who reported exercising three or more hours per week also exhibited lesser preference for high sugar and high fat foods as compared to women who exercised less. This, of course, did not explore whether exercising led to less preference for fat and sugar or whether less preference for fat and sugar led to exercising more. This previous research leads to the following hypothesis on exercise and food preferences for the current study.

Hypothesis 6. Individuals who report more weekly intentional exercise will have lower preference for fat and sugar.

METHOD

Participants

Two hundred six undergraduate females from a Montana State University Introductory Psychology class were pre-surveyed using the Eating Attitudes Test-26 (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982). The EAT-26 questionnaire provided to participants additionally requested self-report information on hours per week of intentional exercise, age, marital status, height, and weight. All pre-surveyed female undergraduates were called to request participation; seventy actually participated in the study (mean age = 19.74, sd = 2.66). Participants were informed that they would receive credit toward their Introductory Psychology class as an incentive to participate. The Montana State University Human Subjects Committee approved the procedures of this experiment and the consent form that was provided to participants.

Instruments

Copies of all instruments used in this experiment are presented in Appendix A.

Binge Eating Scale

This scale is designed to determine levels of severity of binge-eating tendencies in individuals (BES; Gormally, Black, Daston, & Rardin, 1982). This measure has been shown to have high internal consistency and reliability. The Binge Eating Scale yields a quantitative score of binge eating tendency. Higher scores on this scale indicate greater tendency to binge eat. The questions are presented in groups of statements. Participants

are instructed to read all statements in each group and then to choose which statement best fits their own behavior. For example, question 3 includes: “a) I feel capable to control my eating urges when I want to; b) I feel like I have failed to control my eating more than the average person; c) I feel utterly helpless when it comes to feeling in control of my eating urges; d) Because I feel so helpless about controlling my eating, I have become very desperate about trying to get in control.” Different statements have scores ranging from 0 to 3. The scores on all questions are added to obtain the overall Binge Eating Scale score.

Eating Attitudes Test – 26

The EAT-26 is an abbreviated version of the original 40-item self-report inventory (EAT-26; Garner et al., 1982). It has been validated in both normal and clinical populations. Items are rated by participants on a scale ranging from 1=always to 6=never. Scores are determined by converting the 6-point scale to an inverted 3-point scale (3=never to 1=sometimes). Garner et al. (1982) identified three factors in the EAT-26 scale. These were designated “dieting,” “bulimia and food preoccupation,” and “oral control.” However, in subclinical populations, another set of factors has been determined to be more successful in terms of subscale interitem reliability (Smolak & Levine, 1994). Smolak & Levine (1994) identified the following four factors from the EAT-26: dieting, restricting and purging, food preoccupation, and oral control. These factors use the same questions as the original EAT-26. The dieting subscale by Smolak & Levine includes items related specifically to dieting. The restricting and purging subscale includes items that reflect both restrictive eating, or dieting, and items indicating bulimia. The food

preoccupation subscale indicates constant thoughts about food. The oral control subscale includes items related to social pressure and oral control.

Food Preference Questionnaire

This questionnaire is based on the Macronutrient Self-Selection Paradigm (MSSP) discussed earlier and visually presented in Table 2 (FPQ; Geiselman et al., 1998). It randomly lists 12 foods derived from each of the six cells of the MSSP (i.e. High or low fat, high simple sugar, high protein, or high complex carbohydrate), therefore totaling 72 foods. The questionnaire uses a 9-point scale ranging from “dislike extremely” (1) to “like extremely” (9), with 5 being “neutral, neither like nor dislike.” In addition to the nine point scale, individuals also have the option of checking another box labeled “don’t know/never tasted before,” so that if an individual taking the questionnaire has never heard of a food or has never tried that food before, it will not be calculated into the scoring of the scale.

Subjective Stress Scale

A modified version of this scale was used to measure each participant’s perceived stress level before and after exposure to stressors (SSS; Neufeld & Davidson, 1972). By using the adjectives developed for the Subjective Stress Scale, participants recorded a reference report of the range of stress they had experienced in the past five years and their stress levels during the experiment. The reference points obtained from participants provide a range of 0 to 100% stress the person had experienced in the last 5 years. By determining these points, subjective stress levels experienced and assessed during the

study were compared to the 100% scale, providing measurement of the percentage of maximum stress the participant was experiencing.

Ways of Coping Questionnaire

This instrument is based on the previously discussed transactional view of stress proposed by Folkman and Lazarus (1985). The questionnaire measures the following eight coping processes: confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal (Folkman & Lazarus, 1988). Descriptions of these coping processes by Folkman and Lazarus (1988) are listed in Table 1. This questionnaire was used to assess thoughts and actions the participants use to cope with the anagram – failure procedure to be used to induce stress in this study.

Procedure

Participants were asked via telephone to attend sessions and were scheduled in groups of ten. Participants were separated into cubicles to eliminate participant interaction during problem solving and questionnaire completion. After reviewing and signing consent forms, participants were each provided with two numbers, one was their participant number to be used on all questionnaires, and the other was their problem solving session number. We explained to participants that the participant numbers were necessary for tracking data, but that it was easier to have a separate problem solving number since the participant numbers ranged up to 206 and the problem solving session numbers would only range from 1-10. Participants were then instructed to report their

reference level of stress, or highest and lowest levels of stress experienced in the past five years, using the modified SSS (Neufeld & Davidson, 1972).

Participants were then provided with and asked to complete the Binge Eating Scale, which was entitled "Eating Habits Checklist," and then the Food Preference Questionnaire. After questionnaire completion, participants were informed that there would be two tasks. The first task was listening to soft music in dim lighting. After five minutes of task 1, participants were then instructed to report their perceived level of stress. This provided a baseline report of perceived stress.

After baseline reports of perceived stress were completed, participants were instructed regarding task 2. First, participants were told that task 2 involved anagram solving. They were also told what was involved in solving an anagram and were informed that the task would be timed. Participants were then presented with a set of six, five-letter, unsolvable anagrams and were told they had one-minute to solve them. This method of inducing stress is consistent with Murphey and Galbraith (1990). The anagrams used in this experiment are presented in Table 3. Appendix B includes a sample anagram task sheet.

After the one-minute period, participants were instructed that they had one more minute to write their solutions in the solution boxes. This was expected to encourage participants to at least try to devise solutions. After the second minute, the anagram answer sheets were collected for "grading." Using feedback sheets, each participant was then led to believe that she had failed while almost everyone else had succeeded, following the procedure outlined in Murphey and Galbraith (1990) to induce stress.

Table 3. Unsolvable Anagrams Used for Problem Solving Task

Anagram	Set
BDMUY	1
DLIMU	1
EGOUS	1
BLOTO	1
LIGRT	1
POPTI	1
ELIDL	2
TEOGL	2
BRFAS	2
TKAMC	2
ONJHU	2
RNAMP	2
BLMOA	3
LEEMA	3
DFIAR	3
YTUQI	3
NUFRE	3
DIFOB	3

The anagram procedure involved providing a problem solving session number to each participant for feedback purposes. Unknown to the participants, all participants received the same number – number 8. On feedback sheets, participant number 8 always received a score of 0 and one other bogus participant number was also given a very low score as well. However, all other participant numbers showed scores relatively higher than participant number 8. For a sample feedback sheet, refer to Appendix B. By using this method, each participant was led to believe that she was the only participant who consistently failed the anagram task. The indication that at least one other person was also not doing well was expected to make the problem solving seem more realistic. However, the “other” number’s feedback changed with each anagram set, scoring a “0”

on the first set, a “2” on the second, and a “1” on the third, indicating that even this “other” person was still doing better than number 8. This way, each person believed that she had failed all sets, and that at least one other person had failed each set, but that no one else had failed all the sets, as she had. Participants were provided feedback approximately three minutes after collection of their anagram answers. When finished with each set, participants were instructed not to interact with each other and were told that it would be a good time to think about their anagram solving technique. This was intended to keep participants on task and to prevent them from distancing themselves from the task at hand. A total of three sets of anagrams were provided, yielding a total stress exposure time of 15 to 18 minutes.

After the third set of anagrams, participants again reported their level of perceived stress using the modified SSS (Neufeld & Davidson, 1972). Participants were then instructed to complete the Ways of Coping Questionnaire (Folkman & Lazarus, 1988) with specific instructions to assess the coping processes they had utilized during the anagram problem solving task (Appendix A).

Not all items in the Ways of Coping Questionnaire, were relevant to this specific situation. The Ways of Coping Questionnaire has a response available that indicates the item is not applicable as identified by “0 = Does not apply or not used.” Although participants completed the entire Ways of Coping Questionnaire, only items relevant to this task were included in data analysis. Appendix A lists items of the Ways of Coping Questionnaire included in analysis.

Participants were then weighed and measured for height in a separate, adjacent room, one at a time for privacy. These measures were taken to calculate BMI for use in the data analysis. Finally, participants were debriefed regarding the purpose of the experiment. For a copy of the debriefing statement, see Appendix B. At this point, any lingering feelings of stress or helplessness as a result of not being able to solve the anagrams were resolved. The Montana State University Human Subjects Committee approved the debriefing statement as appropriate and satisfactory prior to the study.

RESULTS

Means and standard deviations for variables are provided in Table 4, and Pearson correlations among all variables and inter-item reliability analyses results for all variables included in analysis are listed in Table 5. No significant differences were found by age, marital status, or session number.

Scores for coping processes were determined using the raw scores for each subscale of the Ways of Coping Questionnaire, as described by Folkman and Lazarus (1988). Inter-item reliability analyses were determined for each subscale, and these results are reported in Table 5 for subscales included in analysis. An overall coping score was calculated by averaging the raw scores of the eight subscales. Overall coping inter-item reliability was $\alpha = .8602$.

Each participant's Subjective Stress Scale reference score was compared to the baseline and post-stress reports of perceived stress to determine subjective stress. The baseline and post-stress perceived stress reports were therefore made relative to the reference report for each participant. To accomplish this, the distance along a linear scale between the reference levels of highest and lowest stress were measured in millimeters. The subsequent two reports of stress were also measured in millimeters. By subtracting the low reference level of stress from the baseline measure and dividing by the total distance between the high and low reference reports, the proportion of stress being experienced at baseline was determined. The post-stress perceived stress level was obtained in the same manner. The baseline and post-stress perceived stress percentages were then used to calculate the percent change in stress from baseline report to final

report of perceived stress. Change in stress was used as the measure of perceived stress induced by anagram testing. A paired samples t-test revealed that there was a significant difference between participants' baseline perceived stress and their post-stress perceived stress ($t = -10.04, p = .000$).

The EAT-26 provided four subscales related to eating attitudes (Smolak & Levine 1994): dieting, restricting and purging, food preoccupation, and oral control. Inter-item reliability estimates for each EAT-26 subscale are reported in Table 5.

Table 4. Means and Standard Deviations.

	Mean	Standard Deviation	Minimum	Maximum
Overall Coping	0.97	0.53	0.12	2.42
Escape Avoidance	0.89	0.68	0	2.60
Planful Problem Solving	1.09	0.65	0	3
Positive Reappraisal	0.59	0.72	0	2.71
EAT-Total	8.31	8.21	0	45
Dieting	4.79	4.67	0	20
Restricting/Purging	3.39	2.82	0	13
Food Preoccupation	1.54	1.76	0	8
Oral Control	1.14	1.66	0	9
Binge Eating Scale	11.2	7.07	0	28
Weekly Exercise	4.51	4.24	0	23
Fat Preference	0.93	0.20	0.37	1.49
Sugar Preference	1.07	0.16	0.70	1.56
Stress	29.77	24.82	0	105.7
Age	19.75	2.66	18	34
BMI	21.88	2.53	15.66	30.54

Table 5. Correlations and Reliability Estimates

Variable	1	2	3	4	5	6	7
1. Overall Coping	(.93)						
2. Escape Avoidance	.82***	(.78)					
3. Problem Solving	.83***	.59***	(.81)				
4. Positive Reappraisal	.86***	.69***	.83***	(.89)			
5. EAT-26 Total Score	.26*	.20	.15	.23	(.86)		
6. Dieting	.20	.16	.09	.19	.93***	(.83)	
7. Restricting/Purging	.26*	.18	.16	.26*	.87***	.89***	(.81)
8. Food Preoccupation	.37**	.29*	.25*	.30*	.83***	.71***	.69***
9. Oral Control	.26*	.24*	.15	.22	.79***	.67***	.63***
10. Binge Eating Scale	.20a	.26*	.07	.10	.42***	.49***	.38***
11. Weekly exercise	.01	.10	-.05	.09	.00	-.08	-.05
12. Fat Preference	-.14	.02	-.06	-.02	-.35**	-.35**	-.32**
13. Sugar Preference	-.15	-.15	.03	-.12	.27*	-.10	.06
14. Stress	.13	.24*	-.05	.02	.04	.01	.02

Range of n: 68 to 70. Cronbach's alphas are in parentheses on the main diagonal.

* = significant at $p < .05$ level; ** = significant at $p < .01$ level; *** = significant at $p < .001$ level.

Table 5. Correlations and Reliability Estimates (cont.)

Variable	8	9	10	11	12	13
8. Food Preoccupation	(.79)					
9. Oral Control	.83***	(.58)				
10. Binge Eating Scale	.21	.13	(.86)			
11. Weekly exercise	.00	.02	-.08			
12. Fat Preference	-.29*	-.32**	.00	-.19		
13. Sugar Preference	.02	.06	-.22	.27*	-.10	
14. Stress	-.04	.06	.17	.02	.08	-.26

Range of n: 68 to 70. Cronbach's alphas are in parentheses on the main diagonal.

* = significant at $p < .05$ level; ** = significant at $p < .01$ level; *** = significant at $p < .001$ level.

The overall high-fat score was divided by the overall low-fat score from the MSSP to create a fat preference score, as suggested by Geiselman, et al. (1998). The overall high simple sugar column score was divided by the average of the high-protein column score and the high-complex carbohydrate column score to create the sugar preference score.

Hypothesis 1 stated that individuals expressing more disturbed eating attitudes will utilize more coping processes as compared to individuals who express less disturbed eating attitudes. A multiple regression analysis was conducted to determine how well disturbed eating attitudes predict coping processes. The predictors were the four subscales of the EAT-26 determined by Smolak & Levine (1994) and the scores from the BES. The dependent variables were overall coping, escape avoidance coping, planful problem solving coping, and positive reappraisal coping. The linear combination of EAT-26 subscales and the BES accounted for a significant amount of variance in overall coping, $F(5, 61) = 3.57, p = .007, R^2 = .23$. This linear combination of independent variables also accounted for a significant amount of the variance in escape avoidance coping, $F(5, 61) = 2.762, p = .026, R^2 = .18$, and positive reappraisal coping, $F(5, 61) = 2.534, p = .038, R^2 = .172$. This combination of the EAT-26 subscales and the BES as predictors of planful problem solving coping almost reached significance, $F(5, 61) = 2.143, p = .07, R^2 = .147$. Hypothesis 1 stated that individuals who expressed more disturbed eating attitudes would report using less planful problem solving and positive reappraisal coping, but these relationships turned out to be positive, so more disturbed eating attitudes predicted more use of planful problem solving and positive reappraisal

coping. Table 6 provides the partial correlations between each predictor and the coping variables, controlling for all other variables. Food preoccupation was the best predictor of overall coping ($p = .011$), planful problem solving coping ($p = .018$), and positive reappraisal coping ($p = .044$), accounting for 10% of the variance in overall coping, 9% of the variance in planful problem solving coping, and 7% of the variance in positive reappraisal coping. BES was the best predictor of escape avoidance coping ($p = .022$), accounting for 8% of the variance in escape avoidance coping. BES was not a significant predictor of any of the other coping variables. Dieting was also a significant predictor of overall coping ($p = .04$), but not of any of the other coping variables. Restricting/purging and oral control were not significant predictors of any of the coping variables.

Table 6. Partial Correlations between EAT-26 Subscales and BES and Coping Variables.

	Overall Coping	Escape Avoidance	Planful Problem Solving	Positive Reappraisal
Dieting	.26*	.23	.23	.22
Restricting Purging	.19	.10	.16	.22
Food Preoccupation	.32*	.22	.30*	.26*
Oral Control	.04	.06	.10	.06
Binge Eating Scale	.20	.28*	.11	.07

* significant at $p < .05$

Hypothesis 2 stated that individuals who express more disturbed eating attitudes, will report experiencing higher levels of subjective stress as compared to individuals who express less disturbed eating attitudes. This hypothesis, tested with a multiple regression analysis with the EAT-26 subscales and the BES as independent variables and change in stress as the dependent variable, was not supported.

Hypothesis 3 predicted that stress would moderate the relationship between eating attitudes and coping processes. To complete this analysis, an interaction variable was created with EAT-26 total score and change in stress. The product of these variables was used as the interaction variable. All three variables (EAT-26 total, change in stress, and the product of the two) were then entered into a multiple regression analysis of overall coping. Stress did not significantly moderate the relationship between EAT-26 total and overall coping. In light of Hansel and Wittrock's (1997) study, this analysis was also completed with the BES, change in stress, and the product of the two. It was also not significant, so stress did not moderate the relationship between BES scores and overall coping, either.

Hypotheses 4, 5, and 6 were tested with another multiple regression analysis with the dieting and restricting/purging subscales of the EAT-26, BES, and weekly intentional exercise as the predictors, and fat preference and sugar preference as the dependent variables. The linear combination of predictors accounted for a significant amount of variability in fat preference, $F(4, 62) = 4.27, p = .004, R^2 = .21$ and in sugar preference, $F(4, 62) = 3.73, p = .009, R^2 = .19$. Table 7 provides the partial correlations between these predictors and fat and sugar preference, controlling for all other predictors. Both parts of Hypothesis 4, that higher scores on dieting would predict lower preference for fat and sugar, were supported. Individuals with higher scores on dieting reported significantly lower preference for fat and significantly lower preference for sugar, with dieting accounting for approximately 6% of the variability in these two dependent variables ($p = .04$). Hypothesis 5, that higher scores on the restricting/purging scale and the BES would

predict higher preferences for sugar and fat, was partially supported, with the restricting/purging subscale of the EAT-26 accounting for approximately 9% of the variability in sugar preference ($p = .02$). Scores on the restricting/purging subscale of the EAT-26 did not significantly predict fat preference, and scores on the BES did not significantly predict either sugar or fat preference.

Table 7. Partial Correlations between EAT-26 Dieting, Restricting/Purging Subscales and BES and Fat Preference and Sugar Preference.

	Fat Preference	Sugar Preference
Dieting	-.25*	-.24*
Restricting Purging	.03	.30*
Binge Eating Scale	.21	-.16
Weekly Intentional Exercise	-.25*	.26*

* significant at $p < .05$

Hypothesis 6, that individuals who exercise more will have lesser preference for sugar and fat, was partially supported by the above regression analysis. Weekly intentional exercise predicted significantly less preference for fat, which is in support of hypothesis 6, but weekly intentional exercise actually predicted higher preference for sugar, in opposition of hypothesis 6. Weekly intentional exercise accounted for approximately 6% and 7% of the variability in fat preference and sugar preference, respectively ($p = .05$; $p = .04$).

Based on these regression analyses, AMOS was used to create Figures 1 and 2, two path analyses to visually present these results. Figure 1 illustrates that overall coping, positive reappraisal, and planful problem solving coping are predicted by food preoccupation subscale of the EAT-26, and that scores on the BES predict escape

avoidance coping. Figure 2 shows that fat preference is predicted by dieting subscale of the EAT-26 and weekly intentional exercise, and that sugar preference is predicted by dieting and restricting/purging subscales of the EAT-26 and weekly intentional exercise. All paths in these figures are statistically significant.

Figure 1. Path Analysis of the Relationship between Eating Behavior and Concerns and Coping Processes.

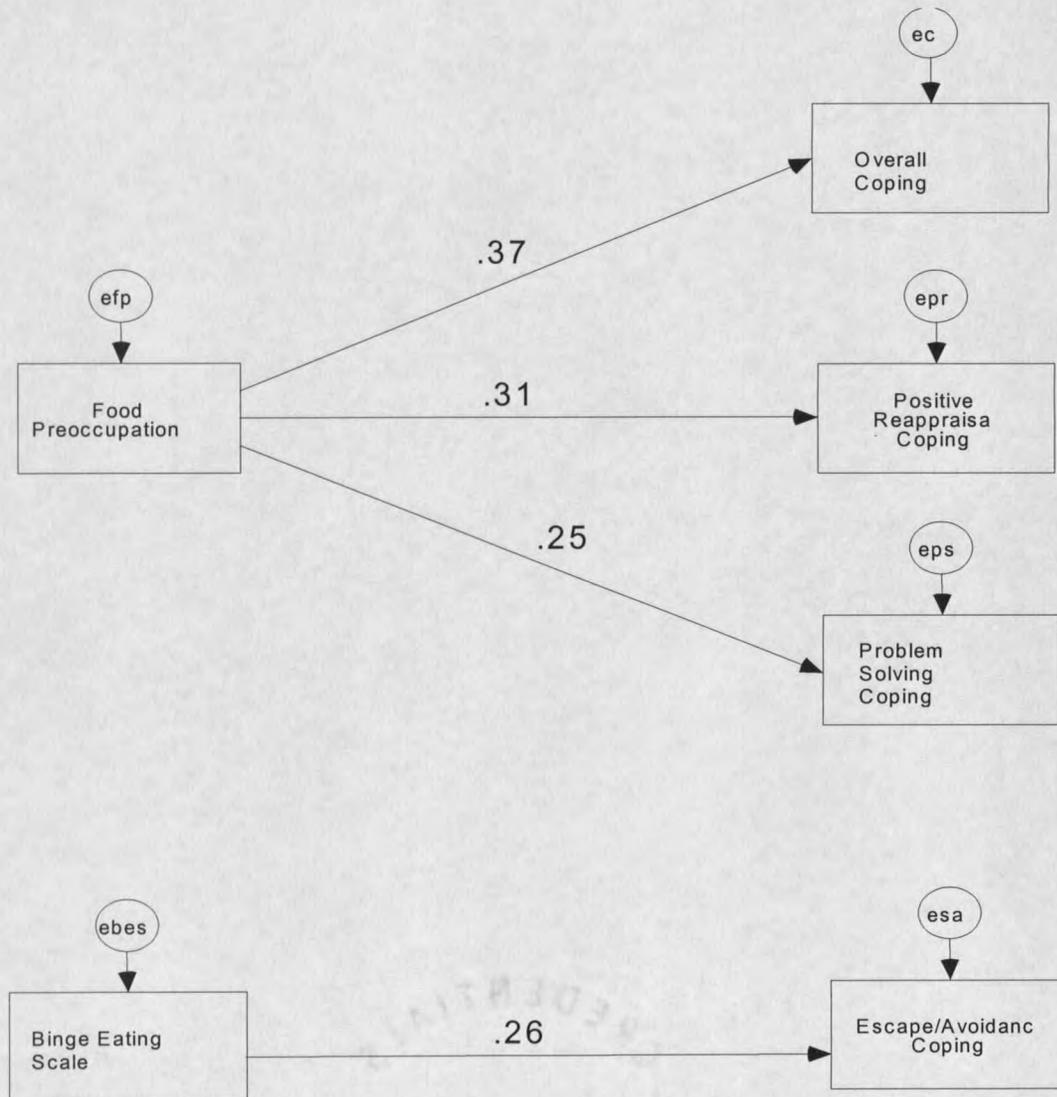
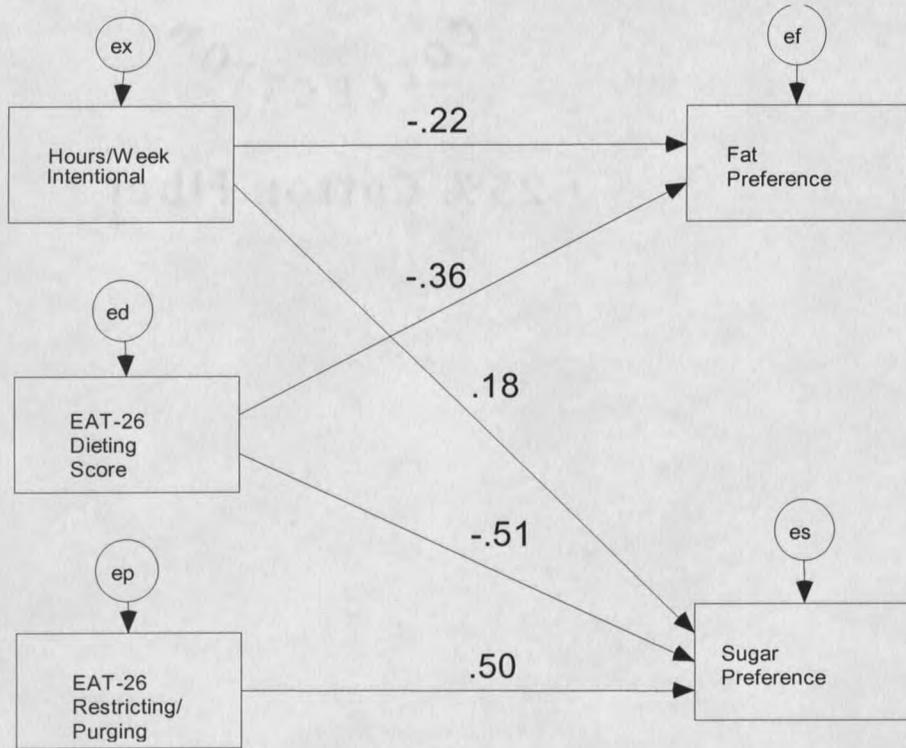


Figure 2. Path Analysis of the Relationship between Eating Behavior and Food Preferences.



DISCUSSION

Hypothesis 1 stated that individuals with more disturbed eating attitudes use more overall coping processes, more escape avoidance coping, more positive reappraisal coping, and less planful problem solving coping. This hypothesis was partially supported with scores on the food preoccupation subscale of the EAT-26 predicting the use of more overall coping and positive reappraisal coping. Scores on the BES also significantly predicted more use of escape avoidance coping. These results are consistent with several previous studies (Fryer et al., 1997; Troop et al., 1998; Troop et al., 1994), in particular, Hansel and Wittrock (1997), who found that binge eating predicted increased use of coping processes in general. The food preoccupation factor score also significantly predicted more use of planful problem solving coping, which was not consistent with hypothesis 1. Although previous studies have found that disturbed eating behavior leads to increased use of escape avoidance and lesser use of planful problem solving and positive reappraisal coping (Nagata et al., 2000), Hansel and Wittrock (1997) found that disturbed eating behavior predicted more use of coping styles in general, which is consistent with the results of the current study.

Hypothesis 2, that individuals with more disturbed eating attitudes would report higher levels of perceived stress during the anagram task, was not supported. No relationship was found between eating attitudes and perceived level of stress. However, perceived amount of stress was significantly positively correlated with escape avoidance coping. Hansel and Wittrock (1997) and Wolff et al. (2000) both found that participants in their Binge Eating groups utilized more escape avoidance coping when under stress,

and that these participants have also reported higher levels of perceived stress. It is possible that with more participants, the current study would have revealed similar results.

Hypothesis 3, that stress is a moderator between disturbed eating attitudes and coping processes was also not supported. There are several reasons why these results were not found but this may still be the correct hypothesis. First of all, we had a relatively small sample size, and with only 70 participants, there may not have been enough participants with severely disordered eating attitudes. Second, although the stress manipulation was effective, the anagram-failure procedure may not have induced enough stress to produce the level of stress necessary to find support for this hypothesis. Additionally, the Subjective Stress Scale may not be the best measure for stress in this type of experiment, since it allows for a high level of self-report error. A test of participant stress that does not depend on self-report from participants may be required for this type of experiment. For example, the salivary cortisol test that measures cortisol levels in participants' saliva has been used to measure stress in eating disorder research (Van Eck, Berkhof, Nicolson, & Sulon, 1996). Higher levels of cortisol would indicate higher levels of stress in participants, a test of which is uncontrollable by participants.

Hypothesis 4 was supported with higher scores on dieting predicting lower scores on fat preference and sugar preference. This supports research by Sunday et al., (1992) and Drewnowski et al., (1988). This makes sense in that fat accounts for more calories per gram than carbohydrates and protein, so individuals who diet would avoid these foods. In regard to sugar preference, there were two categories of sugar preference: high

fat/high simple sugar and low fat/high simple sugar. Since people who diet generally avoid high fat foods, the high fat category of simple sugar, which consisted of food like chocolate cake, cheesecake, ice cream, etc., may have outweighed the low fat category, which mainly consisted of fruit selections.

Hypothesis 5 was partially supported with higher scores on the restricting/purging subscales of the EAT-26 predicting higher preference for sugar but not fat. This is interesting considering that previous research has indicated that individuals who binge and purge tend to choose foods high in both sugar and fat (Yanovski et al., 1992 and Heatherington et al., 1994). However, since a binge was not induced during this experiment and participants only self-reported their preferred foods, they may have been reporting what they thought they should prefer, instead of what they actually prefer. It is also possible that the small sample size provided a range of binge scores that were too narrow to provide the expected results. Higher levels of perceived stress also had a significant positive relationship with sugar preference. These findings, as well as the finding that restricting/purging predicted greater preference for sugar, add support to the research by Yanovski et al. (1992) and Heatherington et al. (1994).

Finally, with regard to hypothesis 6, weekly intentional exercise was found to predict lesser preference for fat, but a higher preference for sugar. This particular relationship will require more research to determine the basis of this relationship between sugar preference and exercise. This is actually supported by previous research by Horio and Kawamura (1998), who found that after moderate cycling for 30 minutes their undergraduate student participants had a significantly increased preference for sucrose (as

cited in Tremblay & Drapeau, 1999). Extended physical activity does induce glycogen depletion, which may increase one's preference for glycogen replenishing foods (Position of the American Dietetic Association, 2000). In addition, if participants of the present study are aware of recommendations regarding glycogen replenishment following extended physical activity, their preferences for foods higher in sugar and carbohydrates in general may have been affected by their knowledge in the field. The mean for weekly intentional exercise in the present study was 4.5 hours/wk with a standard deviation of 4.2. Future research on exercise and sugar preferences should address sugar preferences after extended moderate exercise, focusing on the history of physical activity of the participants, whether no history, short term, acute, or chronic.

CONCLUSION

The current experiment provides support for previous research examining eating disorders, food preferences, and coping processes. Considering that only seventy female undergraduates actually participated in this study and that the sample was not random; however, the results do have significant limitations.

These results show an interesting pattern in regard to thoughts and concerns about eating predicting coping processes. Food preoccupation is comprised of more subclinical items related to thoughts about food, not actual eating behaviors that make up the dieting and restricting/purging subscales. These results may indicate that just constant thoughts about food and dieting may have more of an effect on coping processes than do actual disturbed eating behaviors such as restrictive eating or bingeing and purging. Further research is necessary on this proposal that eating behavior better predicts food preferences. However, results of the current study suggest that we may predict use of coping processes by studying food preoccupations.

These results provide a direction for use of coping processes in therapy for eating disordered individuals to instruct them regarding, and encourage use of, adaptive versus maladaptive coping processes. Garvin, Striegel-Moore, and Wells (1998), for example, developed a self-help program for women who binge eat, specifying four goals, which are based on coping processes. These four goals included decreasing social isolation, increasing knowledge of problem at hand, improving self-esteem, and extending overall coping skills. Hansel and Wittrock (1997) also recommended teaching patients adaptive coping processes in therapy for eating disorders. The results of this study support this

type of intervention, and provide evidence that focusing on eating concerns and thoughts may be more effective than focusing on specific eating behaviors.

Although the hypothesis that stress is a moderator between disturbed eating attitudes and coping processes was not significantly supported, we nevertheless expect that a study with a larger sample size and a stronger stressor might reveal the predicted results. According to the Transactional View of Stress (Folkman & Lazarus 1988), the presence of stress is required to induce the use of coping processes. Previous research has indicated that individuals with eating disorders have a tendency to perceive stress at higher levels, thus utilizing more coping processes (Hansel & Wittrock 1997; Wolff, Crosby, Roberts, & Wittrock 2000). The limitations of the current study may have caused the stress manipulation to be less effective than necessary to provide the results proposed in Hypotheses 2 and 3.

This study has introduced the Macronutrient Self-Selection Paradigm (Geiselman et al., 1998) into eating disorder research. The Food Preference Questionnaire was definitely user-friendly. Use of this paradigm and questionnaire in this study still provided results consistent with previous research that dieting and restricting/purging are linked to a reduced preference for fat (Sunday, Einhorn, & Halmi, 1992) by using a questionnaire instead of presenting participants with actual samples of food. The results of this study also provide a more specific direction for research on disturbed eating attitudes and food preferences; specifically that eating behaviors are significant predictors of food preferences. Much of the previous research on food preferences and eating attitudes has been on clinical populations and has not focused on subclinical, disturbed

eating attitudes. The current study provides support that disturbed eating attitudes are also significant predict food preferences.

REFERENCES CITED

