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DOES "COMFORT FOOD" WORK? HOW USING FOOD TO COPE IS ASSOCIATED WITH SELF-REPORTED PHYSICAL HEALTH AND WEIGHT-RELATED HEALTH

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ABSTRACT

Almost three quarters of adults in the United States over the age of 20 are overweight or obese (Centers for Disease Control and Prevention, 2009). The diseases and the risk of death associated with being overweight have a major influence on everyday functioning and quality of life. In addition, being overweight comes with major financial, personal and social costs. The way that people cope with stressors may be a cause of weight gain. This study uses data from Projects 1 and 4 of the MIDUS II to examine age and gender differences in using food to cope, how using food to cope is related to global health and weight-related health, and if age or gender moderate the associations. Principal components analyses and a series of hierarchical linear regressions are used to answer the research questions. The results of the analyses indicate that using food, as a distinct dimension of coping, is as prevalent as problem-focused and emotion-focused coping, and predicts poorer health. Younger individuals use more food to cope than older individuals and women use more food to cope than men. Age and gender interact, as well, and women decrease more steeply than men in their use of food to cope over the lifespan. Problem-focused coping predicts better self-reported physical health, lower BMI and fewer high-risk markers of metabolic load. Emotion-focused coping predicts poorer self-reported physical health. Using food to cope predicts poorer self-reported physical health, greater BMI, weight fluctuation and percentage of glycosylated hemoglobin, and more high-risk markers of metabolic load. The results of this study suggest using food to cope is associated with the epidemic of overweight and obesity in the United States. Implications and future research directions are discussed.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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Chapter 1

Introduction

Weight-related health is a major health concern in the United States today. A staggering 66.3 percent of adults over the age of 20 are overweight or obese (Centers for Disease Control and Prevention, 2009). The weight status of an individual has significant implications for his or her mortality and morbidity. Overweight and obesity increase the risk of many major illnesses such as hypertension, diabetes, stroke, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems and endometrial, breast, prostate and colon cancers (National Institutes of Health, 1998). These diseases and the risk of death have a major influence on everyday functioning and quality of life. The way that people cope with stressors may be a cause of weight gain. This thesis examines how various coping styles are associated with parameters of health

In addition to mortality and morbidity concerns regarding overweight and obesity, the financial impact of weight-related health problems is massive. In 1995, at least $99.2 billion dollars were spent on medical care and disability costs as a direct result of obesity, with more than half directed specifically to medical care. This is 5.7% of the United States national health care expenditure. Although the medical costs associated with cigarette smoking are the subject of much media fanfare, they only represent approximately half of the costs associated with obesity. In addition, the indirect costs of obesity totaled at least $47.6 billion dollars in 1995 (National Institutes of Health, 1998). Obesity and overweight are major economic burdens, but the personal and social cost of obesity to individuals who suffer from them are devastating (Fabricatore & Wadden, 2004). It is imperative to better understand the causes and predictors of overweight and obesity. This study examines how using food to cope is related to global and

weight-related health among participants from a nationally representative study of adulthood, Midlife in the United States (MIDUS).

Obesity and overweight are results of a long term energy imbalance in which an individual consumes more calories than they burn. Genetics, increased availability of fast food and packaged food, increased depression and anxiety, and decreased physical activity are some of the main causes of this energy imbalance (National Institutes of Health, 1998). A full understanding of weight gain, however, goes beyond calories to the psychological correlates of overweight and obesity. The energy imbalance does not explain why so many find it difficult to lose or maintain weight. The reasons for increased food consumption and decreased activity are not completely understood. It is becoming increasingly important to understand the biological and psychological causes of weight-related health problems and what can be done to avoid them. Research illustrates that losing weight by attempting to change a sedentary lifestyle and improve diet is often unsuccessful (Brownell & Rodin, 1994). Thus, interventions aimed at other mechanisms of weight gain, such as unhealthy ways of coping, may provide effective avenues for reducing obesity and overweight.

Stress has both psychological and physiological components and therefore is likely linked to weight-related health. Coping with stress has been conceptualized in many ways, but the most comprehensive and enduring model is Lazarus and Folkman's (1984) transactional model of coping. The model posits that an individual first appraises the stressor and then selects a coping strategy. Two primary types of coping, problem-focused and emotion-focused, are indentified and typically used in coping research. It is likely, however, that coping is multidimensional and that there are more than two general ways of coping (Thoits, 1991). An additional type of coping might be the use of health-related behaviors, such as eating comforting foods, consuming caffeine, or consuming alcohol, to alter the experience of the stressor. Using food to cope may be the key coping strategy that links coping with stressors to weight-related health outcomes.

The Construct of Coping

The transactional model of coping posits that coping is a transaction between the individual and the environmental context of the stressor (Lazarus & Folkman, 1984). This is in contrast to a trait/dispositional model that suggests an individual has a particular method of coping (trait coping) they always use, regardless of the environmental context (Folkman, 1992). The transactional model of coping, however, maintains that people tend to cope using particular strategies, but the coping strategy can vary depending on the situation (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Lazarus & Folkman, 1987). Prior research indicates that it is possible to measure a person's typical type of coping and establish stable patterns (Carver, Scheier, & Weintraub, 1989; Rohde, Lewinsohn, Tilson, & Seeley, 1990). This is not in opposition to the transactional model. Coping is situation specific, but it is likely that in day-to-day life, individuals experience the same types of stressors and therefore use the same types of coping strategies.

The transactional model of coping consists of two major components: appraisal of the situation and selection of the coping strategy. The coping process begins with primary and secondary cognitive appraisal of the stressor. Primary appraisal is an individual's assessment of the degree of personal threat the stressor poses. Secondary appraisal is an assessment of resources the individual has available in the environment or within themselves to successfully deal with the demands of the stressor. Following appraisal, the individual selects a coping strategy, which consists of the thoughts and behaviors used to deal with the stressor (Lazarus & Folkman, 1984; Lazarus & Folkman, 1987).

The two general types of coping identified by Lazarus and Folkman (1984) are problem-focused and emotion-focused coping. Problem-focused coping is defined as any behavior or cognition directed outward in an attempt to alter the environment related to the stressor. In contrast, emotion-focused coping is any behavior or cognition directed inward in an attempt to

alter the inner experience of a stressor (Lazarus and Folkman, 1984; Lazarus and Folkman, 1987). Each of these categories includes strategies that make progress towards resolution of the stressor as well as strategies that do not make progress towards resolution. There is no stratification of strategies such that problem-focused coping strategies resolve stressors whereas emotion-focused coping strategies do not resolve stressors. Some emotion-focused strategies resolve the stressor. For example, if an individual changes the way they feel about the stressor, they would reappraise the degree of threat posed by the stressor (and it would no longer be perceived at threatening). However, many emotion-focused coping techniques address one's reaction to the stressor, rather than resolution. Most of the problem-focused techniques, in contrast, are focused on resolving the stressor.

There are two key theoretical features about the transactional model of coping. First, coping is contextual. Appraisal of the demand and threat of a particular situation precedes coping efforts, and selection of coping strategy depends on the specific context. Second, coping is a managing process, not an outcome. Coping strategy itself consists of the thoughts and behaviors an individual uses to deal with a stressor, not how successfully they "coped with it." This is important because we look to other outcomes, such as mental or physical health to determine if the coping strategies were successful (Folkman, Chesney, McKusick, Ironson, Johnson, & Coates, 1991; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). As discussed above, various strategies have different impacts on resolving the stressor, but here we consider that the strategy, regardless of the degree to which it resolved the stressor, has an impact on mental and/or physical health. It is important to be clear on the distinction between resolution of a stressor and the impact on mental and physical health. A particular strategy may resolve the stressor and either improve or worsen health; the same is true for strategies that do not resolve the stressor.

Recent research suggests that a dual concept of coping as either problem-focused or emotion-focused is overly simplified. To understand the dimensions of coping better, Thoits (1991) developed a model that distinguishes coping into smaller categories than those suggested by the transactional model. The definitions of problem-focused and emotion-focused coping specifically state that coping efforts consist of thoughts and behaviors. In addition, theories regarding the components of emotion, physiology, expressive gestures and emotional labeling, can inform the dimensionality of emotion-focused coping. Therefore, cognition, behavior and emotion should be considered in coping. Figure 1-1 shows the components of problem- and emotion-focused coping: behavioral problem-focused, cognitive problem-focused, behavioral physiological, cognitive physiological, behavior expressive gestures, cognitive expressive gestures and cognitive emotional labeling.

The more complex model of coping developed by Thoits (1991) is supported by research that examines other dimensions of coping, such as alcohol use or other specific strategies (Carver, Scheier, & Weintraub, 1989; Veenstra, Lemmens, Friesema, Tan, Garretsen, Knottnerus, & Zwitering, 2007), and by common knowledge that there are multiple types of coping strategies. There are a number of common methods, for example, shopping ("retail therapy"), drinking alcohol ("drowning your sorrows"), eating ("comfort foods") and relaxation techniques, such as meditation or yoga. It is clear that, while it is useful to consider a broad conceptualization of the two main types of coping (i.e., problem-focused and emotion-focused), in practice, people use a broader variety of coping techniques. This may necessitate further elucidation of the transactional model of coping into multiple and distinct types of coping.

Using Food to Cope

The more complex conceptualization of coping allows researchers to identify and examine areas of coping relevant to obesity and overweight. One understudied type of coping with stress is the use of food. Food-focused coping means that when a stressful event occurs, the

individual uses food to manage the experience of stress. This is accomplished by eating more food than usual or by eating foods an individual enjoys, providing him or her with comfort from the negative feelings brought on by the stressor as well as distracting himself or herself from further negative thoughts.

Thoits' model of coping (1991) includes using food to cope as a behavioral type of coping, whereby the individual attempts to alter their physiology. This categorization highlights that when using food to cope, an individual performs a behavior (eating) in response to a stressor and the behavior alters their physiology (the feeling of fullness, the taste of the food, etc.). However, as a distinct type of coping, even this classification of using food to cope is too simple because while it addresses the behavioral aspect of the technique, it ignores the cognitive aspect of using the strategy. In addition to the action of eating that changes the person's physiology, using food to cope has a cognitive component that invokes feelings of comfort. The food the person eats in order to cope is selected because there is a comforting memory, whether implicit or explicit, attached to it. For example, eating pizza may subconsciously remind an individual of a time when he or she was not experiencing intense feelings of stress. Using food to cope, therefore, has both behavioral and cognitive components.

Food-focused coping is important to consider in research on obesity and overweight because the strategy involves consuming unnecessary calories. Therefore, it might be a significant predictor of overweight and obesity as indicated by body mass index, as well as other weight-related health problems, including weight fluctuation, overall physical health, blood sugar levels and a clinical marker of weight-related health, metabolic load.

Using food to cope is an expansion of a construct in the nutrition literature, emotional eating. Emotional eating is the tendency to eat in response to emotional distress (Canetti, Berry, & Elizur, 2009). The construct, therefore, is similar to the definition of food-focused coping. The key distinction is that emotional eating focuses on the act of eating in order to provide

comfort, whereas using food to cope extends the construct to include what triggered the negative emotions. Food-focused coping specifies that individuals eat more than usual, or eat their favorite foods, in order to relieve themselves of the negative feelings brought about by a stressor. This allows us to better understand when people will consume unnecessary calories.

Coping, Emotional Eating and Health

Coping research has found effects of problem- and emotion-focused coping on mental and physical health. Emotion-focused coping has negative effects on psychological adjustment, whereas problem-focused coping has positive effects on psychological adjustment (for example, Aldwin & Revenson, 1987; Bombardier, D'Amico, & Jordan, 1990; Brenner, Melamed, & Panush, 1994; Felton & Revenson, 1984; Folkman, Lazarus, Gruen, & DeLongis,1986; Hamarat, Thompson, Zabrucky, Steele, Matheny, & Aysan, 2001, Rohde, Lewinsohn, Tilson, & Seeley, 1990, Thoits, 1991). Similar effects are found on various physical health outcomes, although the results are mixed and the examined health outcomes vary from general physical health to specific health outcomes such as rheumatoid arthritis (for example, Folkman, Lazarus, Gruen, & DeLongis, 1986; LeBlanc, Regehr, Jelley, & Barath, 2008; Thoits, 1991). Research on emotional eating has also found effects on physical health. Emotional eating is associated with a variety of weight-related health problems. Individuals who engage in emotional eating have higher body mass indexes than individuals who do not (Canetti, Berry & Elizur, 2009; Laitinen, Ek, & Sovio, 2001; Lowe & Fisher, Jr., 1983; Rasheed, 1998), and an increased preference for high fat, calorie-dense foods (Keskitalo, et al., 2008).

Health Outcomes

One issue in studying the effects of coping on health is the selection of outcome variables. It is important to select a reasonable outcome in regards to proximity and relevance so the effect of coping is not under or overestimated. The outcome selected should change on a time-scale relevant to the coping process, and should be both logically associated with the coping

process and independent from it (Folkman, 1992). Based on these criteria, there are several important outcomes when exploring the effect of using food to cope: general physical health as a long term and general outcome, body mass index and weight fluctuation as long term and weight specific outcomes, glycosylated hemoglobin as a short term, weight specific outcome and metabolic load as a long term clinical outcome. Each of these outcomes provides additional information about the association between using food to cope and health.

It is important to first understand if food-focused coping has an effect on a person's overall physical health. Global physical health does not usually change on a daily or weekly basis; instead, it is a measure of a person's general health over time. It is also important to explore the association of using food to cope with outcomes that are more specifically related to weight, such as body mass index. Rather than using absolute weight as an outcome, BMI takes height and weight into account to provide a number that indicates if an individual is underweight, a normal weight, overweight, or obese. Besides providing more information about an individual's weight category, it allows for comparison among individuals.

Weight and BMI do not tell the entire story, however. Another important specific and long term weight-related outcome is weight fluctuation, a measure of how often an individual gains and loses a significant amount of weight (more than ten pounds). Doing this frequently, or "yo-yo" dieting, is a health risk associated with cardiovascular disease and increased risk of mortality, and makes losing weight progressively more difficult for some individuals (Blair & Paffenbarger, 1993; Blair, Shaten, Brownell, Collins, & Lissner, 1993; Brownell & Rodin, 1994; Brownell, Greenwood, Stellar, & Shrager, 1986; Hamm, Shekelle, & Stamler, 1989; Lissner, Andres, Muller, & Shimokata, 1989).

Levels of glycosylated hemoglobin (HbA_{1c}) can be used to assess a shorter-term outcome. Glycosylated hemoglobin (HbA_{1c}) refers to the percentage of sugar attached to hemoglobin, or the part of red blood cells that carries oxygen. In contrast to instantaneous blood

sugar readings, which measure the current level of blood sugar, the percentage of glycosylated hemoglobin indicates an individual's average blood sugar levels during the few months prior to testing. Therefore, measuring HbA_{1c} provides a reliable estimate of one's average blood sugar levels based on his or her dietary intake (Nathan, Singer, Hurxthal, & Goodson, 1984; Tsenkova, Love, Singer, & Ryff, 2007). Frequently using food to cope, and therefore consuming unnecessary calories and likely excess sugar, would impact HbA_{1c}.

Glycosylated hemoglobin is also a high-risk marker included in a clinical diagnosis metabolic load or syndrome. Metabolic syndrome is comprised of a cluster of physiological symptoms closely linked to cardiovascular disease, coronary heart disease and diabetes. It is measured by obtaining markers of obesity, blood pressure, lipids and glucose (Yancura, Aldwin, Levenson, & Spiro III, 2006). Although glycosylated hemoglobin is one of the seven markers of metabolic load, it is an important outcome to consider because it provides another more general picture of health and, as a clinical marker, allows for comparison of the effects found with other metabolic functioning research.

Age and Gender as Moderators

The extent of using food to cope and the strength of the association between food-focused coping and health outcomes likely varies across the lifespan, with older individuals using the lowest levels. This claim is supported by research on aging suggesting emotion control increases and reactivity to stressors decreases with age (Mroczek & Almeida, 2004; Zarit, 2009). Older individuals experience less distress in response to stressors and therefore are less likely to turn to maladaptive coping strategies such as eating. Baltes' (1987, 1997) theory of selective optimization with compensation (SOC) also provides support for the prediction that older individuals use less food-focused coping. Through SOC, adults are able to alter their environment to be one in which they experience less stressors, especially less of the extremely devastating type, which ties into the decreased reactivity in response to stressors. Socioemotional

selectivity is an expansion of the SOC theory that specifically includes the management of emotions. Older adults develop the ability to control their emotions better, maximizing positive emotions and decreasing negative emotions, even in the face of stressors and negative events (Carstensen, 1992; Carstensen, Fung, & Charles, 2003; Carstensen, Isaacowitz, & Charles, 1999). Finally, Schulz and colleagues' theory suggests that younger adults use more primary control strategies that attempt to directly alter a situation than older adults who use more secondary control strategies that attempt to alter their experience (Schulz & Heckhausen, 1996; Schulz, Wrosch, & Heckhausen, 2003). Secondary control, like SOC and especially socioemotional selectivity, allows for older adults to better control their emotions. Older adults do not need to use food to cope with stress as much because they have decreased reactivity to stressors and better control over the emotions that do result. These four areas of research provide support for the age differences expected in the use of food-focused coping.

In addition to the age differences in level of use, the impact of using food to cope with stressors may be more devastating in terms of health outcomes at various stages of life. A number of changes in physical health occur as individuals age, in particular, the metabolism slows and an individual's muscle mass decreases. Older individuals are therefore more vulnerable to the effects of using food to cope. These changes make it very likely that using food-focused coping is especially detrimental to global health, weight-related health and metabolic functioning for older individuals, as compared to younger individuals who are better able to recover from the physical effects of using food to cope.

Similarly to the age moderation discussed previously, the strength of the association between using food to cope and health may be different depending on gender. Women probably use more food to cope than men, based on prior research on emotional eating (Bekker & Boselie, 2002). In addition, controlling for the amount of food-focused coping used, the effect of using food to cope is likely more devastating for woman than for men. Women tend to be

physically smaller than men, have a lower percentage of muscle mass and a higher percentage of body fat. Men may be able to burn off more of the unnecessary calories than women because they have more muscle-mass. Also, men and women may consume equal amounts of calories when they use food to cope, but men tend to have greater caloric need and they may not consume as many unnecessary calories. Therefore, the association between using food to cope and the health outcomes may be stronger for women than for men.

Goals of Study

This study uses data from Projects 1 and 4 of the second wave of MIDUS to examine the association between using food to cope and physical and weight-related health. The mortality and morbidity as a result of overweight and obesity are a major concern in the United States and the results of this study will provide a better understanding of how experiencing stressors may cause individuals to gain weight. Increased understanding of one of the causes will allow researchers to move from examining causes of weight gain to prevention and treatment.

Research Questions and Hypotheses

The first research question examines whether food-focused coping is a distinct dimension of coping. Specifically, it is hypothesized that a principal components analysis of the coping scales used in the MIDUS study will result in three distinct factors of problem-focused coping, emotion-focused coping and food-focused coping. In addition, the correlation between the food-focused coping items will be high and the using food to cope scale will be highly reliable.

The second research question examines the age and gender differences in the use of food-focused coping. It is hypothesized that both age and gender differences will be found. Based on prior research, it is predicted that older individuals will use food-focused coping less than younger individuals. It is also predicted that gender differences will be found. Women are predicted to use more food-focused coping than men. An age-by-gender interaction will also be

tested and it is expected that women will decrease more than men in their use of food-focused coping as they age.

The third research question pertains to the unique abilities of problem-focused coping, emotion-focused coping, and food-focused coping to predict global and weight-related health. It is predicted that each type of coping will uniquely predict health, specifically that problem-focused coping predicts positive physical health, lower BMI, low weight fluctuation and healthy levels of glycosylated hemoglobin and metabolic load, and that emotion-focused coping and especially food-focused coping will predict poor physical health, high BMI, increased weight fluctuation and high levels of glycosylated hemoglobin and metabolic load.

The final research question examines the moderating effects of age and gender on the associations found between food-focused coping and measures of weight-related health. The strength of the association between using food to cope and every health outcome is predicted to be greater for older individuals as compared to younger individuals, and greater for females than for males.

Figure 1-1. A More Complex Model of Coping (adapted from Thoits, 1999).

Type of Strategy:	*Type of Modification:* Behavioral	Cognitive
Problem Focused Coping	Act, Confront Seek info., advice, practical aid Withdraw, leave	Reinterpret situation Distraction Thought-stopping Accept the situation Fantasize solution, or escape
Emotion Focused Coping • Physiology	USE FOOD	Biofeedback, Meditation
• Expressive Gestures	Catharsis, Hide Feelings	Prayer
• Emotional Label	(not applicable)	Reinterpret feelings

Chapter 2

Methods

Sample and Procedure

Data for the analyses to answer research questions 1 and 2, and the self-reported health outcomes assessed in research questions 3 and 4 (self-reported physical health, body mass index, and weight fluctuation) are from the sample of respondents who participated in Project 1 of the second wave of the National Survey of Midlife in the United States (MIDUS II) carried out under the auspices of the MacArthur Foundation Research Network on Successful Midlife Development. Data for the analyses to answer the biomarker outcomes as part of research questions 3 and 4 (HbA_{1c} and metabolic load) are from a sub-sample of respondents who participated in Projects 1 and 4 of the MIDUS II. Previously published works have fully described the procedure for data collection, recruitment, sampling, and data entry (to read full descriptions of the MIDUS project procedure, see Brim, Ryff, & Kessler, 2004; Keyes & Ryff, 1998; Lachman & Weaver, 1998; Mroczek & Kolarz, 1998).

Project 1 is a nationally representative telephone-mail survey which includes psychosocial, sociodemographic and health variables asked in a self-administered questionnaire format as well as a telephone interview. There are 4,962 participants in Project 1. Participants were excluded from any analysis in which they did not respond to a question or did not know the answer, but were included in all analyses in which they had responses to all variables.

Respondents in Project 4 were randomly selected from the 4,962 respondents in the MIDUS II sample. Project 4 consists of comprehensive biomarker assessments collected at one of three General Clinical Research Centers around the country, one located on the West Coast, one in the Midwest, and the third on the East Coast. The sub-sample of participants who

participated in both Projects 1 and 4 is more selective and less representative because of the travel required as well as the greater time commitment of the data collection. In total, 1,038 people participated in both Project 1 and 4 of MIDUS II. Similarly to the full sample, participants were excluded from any analysis in which they did not respond to a question or did not know the answer, but were included in all analyses for which they had responses to all variables.

The full sample of participants is aged between 28 and 84, with an average of 55.4 years and a standard deviation of 12.4. The descriptive statistics for the full sample are presented in table 2-1. The sample is 53.3% female. Most of the participants are married (70.6%). 90.1% of the participants are white, 4.6% black, 0.5% Asian and 3% of Hispanic or Latino descent. Almost all, 99.3%, are United States citizens. 14.6% have a graduate degree, 22.4% graduated from a 4 or 5 year college (with a bachelor's degree), 25.5% completed high school but did not continue on to higher education and 6.2% did not graduate from high school. In addition to being highly educated, the sample has a relatively high average income at $42,119. More than half of the sample is employed or self-employed (64.4%). 23.7% are retired, and only 1.8% of the participants are unemployed and looking for work.

The descriptive statistics provided regarding the 4,962 participants from Project 1 indicate that it is reasonable to assume that the population can be generalized to a national sample of individuals who are educated, employed and are of slightly higher than average socioeconomic status. Future waves of this study intend to oversample non-white and lower socioeconomic status individuals, but until that data is available, the results found cannot be generalized to the population of the United States.

The descriptive statistics for the sub-sample of participants, who participated in both Projects 1 and 4, are presented in table 2-1. The participants are aged between 34 and 84, with an average of 56 years and a standard deviation of 11.7. The sample is 53% female. Most of the participants are married (61.3%). 92.3% of the participants are white, 2.4% black, 0.2% Asian

and 3.7% of Hispanic or Latino descent. Almost all, 99.5%, are United States citizens. 18.8% have a graduate degree, 21.6% graduated from a 4 or 5 year college (with a bachelor's degree), 20.4% completed high school but did not continue on to higher education and 3.8% did not graduate from high school. In addition to being highly educated, the sample has a relatively high average income at $45,296. More than half of the sample is employed or self-employed (66.5%). 23.3% are retired, and only 1.7% of the participants are unemployed and looking for work.

The descriptive statistics of the sub-sample are very similar to the full sample of participants. Again, based on the description of the 1,038 participants from Projects 1 and 4 who are used to test the predictions made regarding HbA_{1c} and metabolic load in research questions 3 and 4, it is reasonable to assume, as with the full sample, that the population can be generalized to a national sample of individuals who are educated, employed and are of slightly higher than average socioeconomic status.

Measures

Coping – Coping was assessed in the self-administered questionnaire in Project 1 using a shortened version of the COPE Inventory (Carver, Scheier, & Weintraub 1989). Seven of the original fifteen subscales were used in data collection. The eight subscales that were not used were excluded because they overlapped with other measures of MIDUS II (for example, religious coping and substance use) or because they had low internal consistency (for example, mental disengagement). Participants were asked to describe how they usually experience a stressful event by responding to a series of statements with "not at all," "only a little," "a medium amount,' or "a lot," which were coded from 1 – 4. The subscales used were positive reinterpretation and growth (α = .71), active coping (α =.61), planning (α = .77), focus on and venting of emotions (α = .72), denial (α = .67), behavioral disengagement (α = .6), and using food to cope (α = .90). Each subscale consisted of four items, such as "I try to see it in a different light, to make it seem more positive" (positive reinterpretation and growth) and "I pretend that it hasn't really

happened" (denial), except using food to cope, which consisted of two items ("I eat more than I usually do," and "I eat more of my favorite foods to make myself feel better"). Each of the seven scales are distinct coping strategies, although for parsimony in reporting results, analyses were run on the combined scales of problem-focused coping and emotion-focused coping, as is suggested by the transactional model of coping (Lazarus & Folkman, 1984). Problem-focused coping combined the twelve items from the positive reinterpretation and growth, active coping, and planning subscales. Emotion-focused coping combined the twelve items from focus on and venting of emotion, denial, and behavioral disengagement subscales.

Self-Reported Physical Health – The question regarding self-reported physical health was asked during the telephone interview of Project 1. Respondents were asked, "in general, how is your physical health?" The response options were poor, fair, good, very good, or excellent. These were coded on a scale of 1 (poor) to 5 (excellent).

Weight Fluctuation – Weight fluctuation was asked in the self-administered questionnaire in Project 1. Participants were asked to report the number of times over the past ten years they have lost ten pounds or more (excluding women after childbirth). The response form was a blank in which any number could be filled in, in contrast to set response options from which the respondent selects the answer that best applies to them.

Body Mass Index – Body mass index was calculated in two ways. In Project 1, participants reported their height and weight. In Project 4, height and weight are measured in the physical exam. To get BMI, an individual's weight, in kilograms, is divided by their height in meters, squared (BMI = kg / m^2). BMI is an indication of general status of weight and can provide an approximation of an individual's percentage of body fat. A BMI of less that 18.5 is considered underweight. A BMI between 18.5 and 24.9 indicates normal weight status. An individual classified as overweight has a BMI between 25.0 and 29.9. Obese individuals have a BMI over 30, and the morbidly obese have a BMI over 40.0. The self-reported BMI is used in

analyses because, as discussed previously, the full sample of MIDUS participants is used whenever possible. The correlation between self-reported BMI and the BMI measured in the physical exam is extremely high (r = .929, p<.001) and therefore they are essentially equivalent to use in analyses.

HbA_{1c} – HbA_{1c} was assayed from a sample of the participant's blood, which was collected during the physical exam as part of Project 4. The participants fasted for 12 hours prior to the blood collection. The blood was assayed at the MIDUS Biocore Lab. HbA_{1c} is measured as a percentage of sugar attached to hemoglobin, the part of red blood cells that carries oxygen.

Metabolic Load – Metabolic load is a composite variable, created by identifying how many high-risk metabolic biomarkers an individual has. For each marker used, a cut-off was established to dichotomize the variable into 1 (has high-risk marker) or 0 (does not have high-risk marker). Metabolic load is the total number of high-risk metabolic markers that an individual has, out of seven. The seven high-risk markers follow, and the cut-off used to determine high-risk is included in parenthesis: body mass index (>= 33.37), waist-to-hip ratio (>= 0.97), HbA_{1c} (>=6.24%), triglycerides (>= 160), high-density lipoprotein (HDL) -bound cholesterol ("good cholesterol") (<= 41), low-density lipoprotein (LDL) -bound cholesterol ("bad cholesterol") (>=129), and ratio of total cholesterol to HDL (>=4.49). Valid scores of metabolic load are in the range from 0 (no high-risk markers and no metabolic load) to 7 (all the high-risk markers, and therefore the highest possible metabolic load). The seven markers used to calculate metabolic load were measured during the physical exam as part of Project 4. The biomarkers used were assayed from the blood sample collected during the physical exam.

Controls – Age, gender and highest level of education completed are used as controls because these variables predict the health outcomes. In addition, current diabetic status is used in analyses for HbA_{1c} and metabolic load because an individual who has diabetes has organically disregulated blood sugar levels (therefore not necessarily due solely to their food and beverage

intake), which strongly predicts HbA_{1c} and metabolic load. Including current diabetic status demonstrates the association of using food to cope with HbA_{1c} and metabolic load above and beyond the disregulation of blood sugar due to diabetes, and is consistent with prior research using HbA_{1c} (for example, Tsenkova, Love, Singer, & Ryff, 2007).

Data Analysis

Principal components analysis was run on the nine subscales of the COPE scale to determine if using food to cope is a distinct dimension of coping. In addition, a correlation was run on the two items on the using food to cope subscale and the reliability of the subscale was examined.

Hierarchical linear regression was used to test the second set of hypotheses, that there are age and gender differences in food-focused coping. The regression equation used is

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_4X_{1i}X_{3i} + e_i \quad (1)$$

where Y_i is food-focused coping, X_{1i} is age, X_{2i} is age^2 (to test for a non-linear relationship between age and food-focused coping) X_{3i} is gender and $X_{1i}X_{3i}$ is an age by gender interaction. Age and age^2 were entered in the first step, gender in the second step and the age by gender interaction term in the third step.

Hierarchical linear regression analyses were also used to test the third set of hypotheses regarding the associations between using food to cope and weight-related health outcomes.

To test the predicted associations between food-focused coping and self-reported physical health, body mass index and weight fluctuation, age, gender and education were entered first as controls. The equation for these associations is

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_3X_{4i} + b_3X_{5i} + b_3X_{6i} + e_i \quad (2)$$

where Y_i is the dependent variable (self-reported physical health, body mass index or weight fluctuation), X_{1i} is age, X_{2i} is gender, X_{3i} is education, X_4 is problem-focused coping, X_5 is emotion-focused coping and X_6 is food-focused coping. Age, gender and education were entered

in the first step. Problem-focused coping and emotion-focused coping were entered in the second step. These scales were used rather than each specific dimension of coping for parsimony. Using food to cope was entered in the third step.

To test for the effect of food-focused coping on HbA_{1c} (glycosylated hemoglobin) and metabolic load, age, gender and education were controlled for, and current diabetic status was entered into the analysis. The regression equation used is

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_3X_{4i} + b_3X_{5i} + b_3X_{6i} + b_3X_{7i} + e_i \quad (3)$$

where Y_i is the dependent variable (HbA_{1c} or metabolic load), X_{1i} is age, X_{2i} is gender, X_{3i} is education, X_4 is diabetic status, X_5 is problem-focused coping, X_6 is emotion-focused coping and X_{7i} is food-focused coping. Age, gender, education and diabetic status were entered in step one. Problem-focused coping and emotion-focused coping were entered in the second step. Using food to cope was entered in the third step.

Finally, the hypothesis that age or gender moderate the associations between food-focused coping and health was tested using a series of hierarchical linear regressions that include the interaction of age or gender and food-focused coping. The same controls used in the regressions testing the association without the effect of moderation will be used for these regressions. The regression equation used is

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_4X_{4i} + b_5X_{5i} + b_6X_{6i} + b_7X_{1i}X_{6i} + b_8X_{2i}X_{6i} + e_i \quad (4)$$

where Y_i is the health outcome being examined (self-reported physical health, body mass index or weight fluctuation), X_1 is age, X_2 is gender, X_3 is education, X_4 is problem-focused coping, X_5 is emotion-focused coping, X_6 is food-focused coping, X_1X_6 is the interaction of age and food-focused coping and X_2X_6 is the interaction of gender and food-focused coping. Age, gender and education were entered in the first step. Problem-focused coping and emotion-focused coping

were entered in step two. Food-focused coping was entered in step three and the interaction terms were entered in step four.

To examine the moderating effects of age and gender on the association between using food to coping and HbA_{1c} (glycosylated hemoglobin) and metabolic load, current diabetic status was entered into the analyses. The regression equation used is

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + b_4X_{4i} + b_5X_{5i} + b_6X_{6i} + b_7X_{7i} + b_8X_{1i}X_{7i} + b_9X_{2i}X_{7i} + e_i \quad (5)$$

where Y_i is HbA_{1c} or metabolic load, X_1 is age, X_2 is gender, X_3 is education, X_4 is current diabetic status, X_5 is problem-focused coping, X_6 is emotion-focused coping, X_7 is food-focused coping, X_1X_7 is the interaction of age and food-focused coping and X_2X_7 is the interaction of gender and food-focused coping. Age, gender, education and diabetic status were entered in the first step. Problem-focused coping and emotion-focused coping were entered in step two. Food-focused coping were entered in step three and the interaction terms were entered in step four.

SPSS 16.0 was used to manage the data set of Project 1 and Project 4 participants from the MIDUS II study and was also used to run all analyses.

Table 2-1. Descriptive Statistics of Full- and Sub-Samples.

	Project 1 (*N*=4,962)	Projects 1 and 4 (*N*=1,038)
Age	*M*=55.4, *SD*=12.4	*M*=56, *SD*=11.7
Gender	53.3% Female	53% Female
Marital Status		
Married	70.6%	61.3%
Race		
White	90.1%	92.3%
Black	4.6%	2.4%
Asian	0.5%	0.2%
Hispanic/Latino	3.0%	3.7%
U.S. Citizen	99.3%	99.5%
Level of Education		
Graduate Degree	16.6%	18.8%
Graduated from 4/5 Year College	22.4%	21.6%
Graduated High School	25.5%	20.4%
Did not Graduate High School	6.2%	3.8%
Income	*M*=$42,119	*M*=$45,296
Employment		
Employed/Self-Employed	64.4%	66.5%
Retired	23.7%	23.3%
Unemployed	1.8%	1.7%

Chapter 3

Results

Descriptive Statistics

The full sample from Project 1 of MIDUS has a total of 4,962 participants and the sub-sample of participants who completed Projects 1 and 4 consists of 1,038 participants. The full and sub-samples are very similar, with average ages of 55.4 (*SD*=12.4, age range: 28-84) and 56 (*SD*=11.7, age range: 34-84), respectively. The descriptive statistics of both samples are presented in table 3-1. Both samples are highly educated and slightly more than half of each sample is female. A small minority of the participants in Projects 1 and 4 currently have diabetes (Type I or II).

Table 3-1 also presents the mean and standard deviation of the sample for the independent and dependent variables. Problem-focused and emotion-focused coping are on the same scale, ranging from 12-48, but were transformed for this table to be on the same scale as food-focused coping in order to be able to easily compare level of use. Participants use higher levels of problem-focused coping, as compared to emotion-focused and food-focused coping. Participants rate their health, on average, between "fair" and "good." The sample reports an average BMI of 27.9 (*SD*=5.8), which is highly correlated with the mean BMI of 29.2 (*SD*=6.1) measured in the physical exam as part of Project 4 ($r = .929$, $p<.001$). Participants report losing ten or more pounds 2.3 times (*SD*=5.8), on average, in the last ten years. The mean level of glycosylated hemoglobin is 6.0% (*SD*=.9). The mean number of high-risk markers for metabolic load is 1.7 out of 7 (*SD*=1.6).

Correlations. The correlations among independent variables are presented in table 3-2. Older participants report lower levels of education, slightly greater use of problem-focused and

emotion-focused coping and less food-focused coping than younger participants. Women are slightly less educated, use more emotion-focused and food-focused coping and less problem-focused coping as compared to men. Participants with higher levels of education report using lower levels of emotion-focused coping, slightly less food-focused coping and more problem-focused coping. Those who use problem-focused coping more are less likely to use emotion-focused coping and food to cope. In contrast, those who use higher levels of emotion-focused coping are also more likely to use higher levels of food-focused coping.

Table 3-3 presents the baseline correlations of independent variables with the dependent variables. In general, older individuals report poorer self-reported physical health than younger adults, although their weight fluctuates less. Older adults, however, have a higher percentage of glycosylated hemoglobin. Women report slightly lower BMI and fewer high-risk markers of metabolic load than men. More highly educated individuals report better self-reported physical health, lower BMI and have fewer high-risk markers of metabolic load. Individuals who currently have diabetes have a higher percentage of glycosylated hemoglobin and more risk markers for metabolic load than individuals who do not have diabetes. Participants who use high levels of problem-focused coping reported better self-reported physical health, lower BMI and fewer high-risk markers of metabolic load than participants using low levels. In contrast, participants who use high levels of emotion-focused coping report poorer self-reported physical health and higher BMI than participants who use low levels of emotion-focused coping. Finally, high levels of using food to cope is associated with poorer self-reported physical health, greater BMI, increased weight fluctuation, a higher percentage of glycosylated hemoglobin and more high-risk markers of metabolic load, as compared to low levels of using food to cope.

Is Using Food to Cope a Distinct Dimension?

To determine if using food to cope is a distinct dimension, principal components analysis was run on the nine subscales of the COPE scale. The reliability and correlation of the two items

in the using food to cope subscale were also tested. The results of the principal components analysis are shown in table 3-4. The rotation used was varimax with Kaiser Normalization. Three components were extracted based on the assumption that problem-focused and emotion-focused coping subscales would load onto two components, leaving a third for using food to cope. The loadings presented in table 3-4 show that three subscales load with a component that is problem-focused coping (positive reinterpretation, active coping and planning) and three subscales load with a second component that is emotion-focused coping (venting of emotion, denial and behavioral disengagement). The using food to cope subscale has the highest loading on a third component. There are cross-loadings, however. Denial loads onto the second and third components (emotion-focused and food-focused coping). Table 3-4 presents the alphas of each subscale. Using food to cope is very reliable ($\alpha = .90$). A correlation was run on the using food to cope subscale. The two items in the subscale are highly correlated ($r = .814$, $p<.001$).

Age and Gender Differences in Using Food to Cope

Age and gender differences were tested by running a hierarchical linear regression using age, age^2 (to test for a non-linear component), gender and an age-by-gender interaction to predict food-focused coping. The results of this regression are presented in table 3-5. Age and age^2 were entered in the first model. The overall model is significant (R^2 *Change* = .009, $p<.001$). There is a main effect of age. Younger individuals are more likely to use food to cope than older individuals ($\beta = -.084$, $p<.001$). The non-linear component of age is not significant. In the second model, gender was entered. The model is improved (R^2 *Change* = .061, $p<.001$). Women use food to cope more than men ($\beta = .247$, $p<.001$). Finally, an age by gender interaction was entered into the model. The interaction is significant ($\beta = -.043$, $p<.01$) and the model is significantly improved (R^2 *Change* = .002, $p<.01$). As shown in figure 3-1, women use more food to cope at all ages, and decrease more than men in their level of use over the lifespan.

The Predictive Ability of Using Food to Cope, and Age and Gender Moderation

A series of hierarchical linear regressions were used to test the association of using food to cope with self-reported physical health, BMI, weight fluctuation, HbA_{1c} and metabolic load. For each linear regression, a table presents the variables entered in each successive model, the R^2 and the R^2 change.

Self-Reported Physical Health. Age, gender, education, problem-focused coping, emotion-focused coping and using food to cope were used to predict self-reported physical health. Table 3-6 presents the results of the hierarchical linear regression. The model including age, gender and education is significant (R^2 *Change* = .09, p<.001). Older individuals report poorer self-reported physical health (β = -.128, p<.001). Participants with higher levels of education report better self-reported physical health (β = .253, p<.001). Gender does not significantly predict self-reported physical health. Problem- and emotion-focused coping were entered in model two. The model is significantly improved (R^2 *Change* = .038, p<.001). Individuals who use higher levels of problem-focused coping have better self-reported physical health (β = .129, p<.001) and individuals who use higher levels of emotion-focused coping have poorer self-reported physical health (β = -.125, p<.001). In model three, using food to cope was entered. The model is significantly improved (R^2 *Change* = .009, p<.001). Food-focused coping significantly predicts poorer self-reported physical health (β = -.104, p<.001). Finally, in model four, age and gender moderation were added. No significant age moderation or gender moderation is found, nor is the model significantly improved.

Body Mass Index. Table 3-7 presents the results of the hierarchical linear regression for BMI. Age, gender and education were entered in model one. The model is significant (R^2 *Change* = .022, p<.001). Older individuals, women and more highly educated individual have lower BMIs (β = -.045, p<.01; β = -.084, p<.001; β = -.136, p<.001, respectively). In model two, problem- and emotion-focused coping were entered. Problem-focused coping predicts lower

BMI (β = -.049, p<.01). Emotion-focused coping is not significant. Using food to cope was entered in model three. Higher levels of food-focused coping significantly predicts greater BMI (β = .424, p<.001). The model is significantly improved (R^2 *Change* = .149, p<.001). Age and gender moderation were examined in model four. Neither is significant, nor is the model significantly improved.

Weight Fluctuation. Hierarchical linear regression was used to predict weight fluctuation. The results are presented in table 3-8. Age, gender and education were entered in model one. The overall model is significant (R^2 *Change* = .007, p<.001). Older individuals experience less weight fluctuation (β = -.082, p<.001). Neither gender nor level of education is significant. In model two, problem- and emotion-focused coping were entered. Neither predicts weight fluctuation, nor is the R^2 change to the model significant. Using food to cope was entered in model three and the model is significantly improved (R^2 *Change* = .025, p<.001). Food-focused coping predicts greater weight fluctuation (β = .174, p<.001). Age and gender moderation were entered in model four. The model is significantly improved (R^2 *Change* = .002, p<.05). Age moderates the association between using food to cope and weight fluctuation (β = -.203, p<.01). As shown in figure 3-2, the association between age and weight fluctuation is stronger for younger individuals, especially for younger individuals who use high levels of food to cope. Gender does not significantly moderate the association.

Glycosylated Hemoglobin. The results of a hierarchical linear regression for HbA_{1c} are presented in table 3-9. Age, gender, education and current diabetic status were entered in model one. The model is highly significant (R^2 *Change* = .280, p<.001). Older individuals and individuals who currently have Type I or Type II diabetes are more likely to have a higher percentage of glycosylated hemoglobin (β = .132, p<.001; β = .500, p<.001, respectively). Neither gender nor level of education predicts HbA_{1c}. Problem- and emotion-focused coping were entered in model two. The model is not significantly improved and neither predict HbA_{1c}.

In model three, using food to cope was entered. The model is significantly improved (R^2 *Change* = .010, p<.01). Individuals who use higher levels of food-focused coping have a greater percentage of glycosylated hemoglobin (β = .108, p<.01). In model four, age and gender moderation were entered. The overall model is not significantly improved, but gender does significantly moderate the association between using food to cope and HbA_{1c}. The association between using food to cope and HbA_{1c} is stronger for men than for women (β = -.287, p<.05), especially at high levels of using food to cope, as displayed in figure 3-3.

Metabolic Load. Table 3-10 presents the results of the hierarchical linear regression for metabolic load. In model one, age, gender, education and current diabetic status were entered. The model is significant (R^2 *Change* = .155, p<.001). Men and highly educated individuals are less likely to have a high number of high-risk markers of metabolic load (β = -.326, p<.001; β = -.121, p<.001, respectively). Individuals who currently have Type I or Type II diabetes are more likely to have a high number of high-risk markers of metabolic load (β = .184, p<.001). Problem- and emotion-focused coping were entered in model two. The model is significantly improved (R^2 *Change* = .008, p<.05). Individuals who use higher levels of problem-focused coping are less likely to have a high number of high-risk markers of metabolic load (β = -.092, p<.01). Emotion-focused coping does not significantly predict metabolic load. Using food to cope was entered in model three. Individuals who use higher levels of food-focused coping are more likely to have a high number of high-risk markers of metabolic load (β = .172, p<.001). The model is significantly improved (R^2 *Change* = .024, p<.001). Finally, in model four age and gender moderation were entered. The model is not significantly improved and neither age nor gender moderates the association between using food to cope and metabolic load.

Table 3-1. Descriptive Statistics.

	Means (*SD*)	
	Project 1 (*N*=4,962)	Projects 1 and 4 (*N*=1,038)
Age	55.4 (12.4)	56.0 (11.7)
Gender (1=Male, 2=Female)	1.53	1.53
Level of Education	7.2 (2.5)	7.7 (2.5)
Have Diabetes (0=No, 1=Yes)		.09 (.3)
Problem-focused Coping	6.3 (1.0)	
Emotion-focused Coping	3.7 (0.9)	
Food-focused Coping	3.7 (1.9)	
Self-Reported Physical Health	2.5 (1.0)	
Body Mass Index (Self-Reported)	27.9 (5.8)	
Weight Fluctuation	2.3 (5.8)	
Body Mass Index (Exam)		29.2 (6.1)
HbA_{1c}		6.0 (.9)
Metabolic Load		1.7 (1.6)

Table 3-2. Correlations between Independent Variables.

	Age	Gender	Education	PFC	EFC
Age					
Gender (1=male, 2=female)	.004				
Level of Education	-.14***	-.10***			
Problem-focused Coping (PFC)	.04*	.04*	.13***		
Emotion-focused Coping (EFC)	.04*	.21***	-.22**	-.24***	
Food-focused Coping	-.09***	.25***	-.004	-.10***	.35***

*p<.05, **p<.01, ***p<.001.

Table 3-3. Correlations between Independent Variables and Dependent Variables.

	Self-Reported Physical Health	BMI	Weight Fluctuation	HbA_{1c}	Metabolic Load
Age	-.18***	-.03	-.08***	.17***	-.00
Gender (1=Male, 2=Female)	-.02	-.07***	.02	-.05	-.32***
Level of Education	.26***	-.12***	-.02	-.05	-.10**
Have Diabetes (0=No, 1=Yes)				.52***	.18***
Problem-focused Coping	.18***	-.08***	-.03	.03	-.13***
Emotion-focused Coping	-.20***	.05**	-.03	.01	-.04
Food-focused Coping	-.12***	.35***	.17***	.10**	.08*

*p<.05, **p<.01, ***p<.001.

Table 3-4. Loadings from the Principal Components Analysis and Alphas.

	Problem-Focused Coping	Emotion-Focused Coping	Use Food to Cope
Positive Reinterpretation (4 items, α=.71)	.81	-.03	-.06
Active Coping (4 items, α=.61)	.91	-.13	-.01
Planning (4 items, α=.77)	.90	-.18	-.01
Venting of Emotion (4 items, α=.72)	.04	.41	.63
Denial (4 items, α=.67)	-.05	.88	.09
Behavioral Disengagement (4 items, α=.60)	-.26	.77	.22
Use Food to Cope (2 items, α=.90)	-.08	.05	.90

Table 3-5. Hierarchical Linear Regression Analysis for Age and Gender Differences in FFC.

	Model 1*** β	Model 2*** β	Model 3*** β
Age	-.084***	-.007***	-.074***
Age^2	-.083	-.029	.030
Gender		.247***	.250***
Age x Gender			-.043**
R^2	.009	.070	.072
R^2 *Change*	.09***	.061***	.002**
Valid N = 3.988			

*p<.05, **p<.01, ***p<.001

Figure 3-1. Age and Gender Interaction on Using Food to Cope.

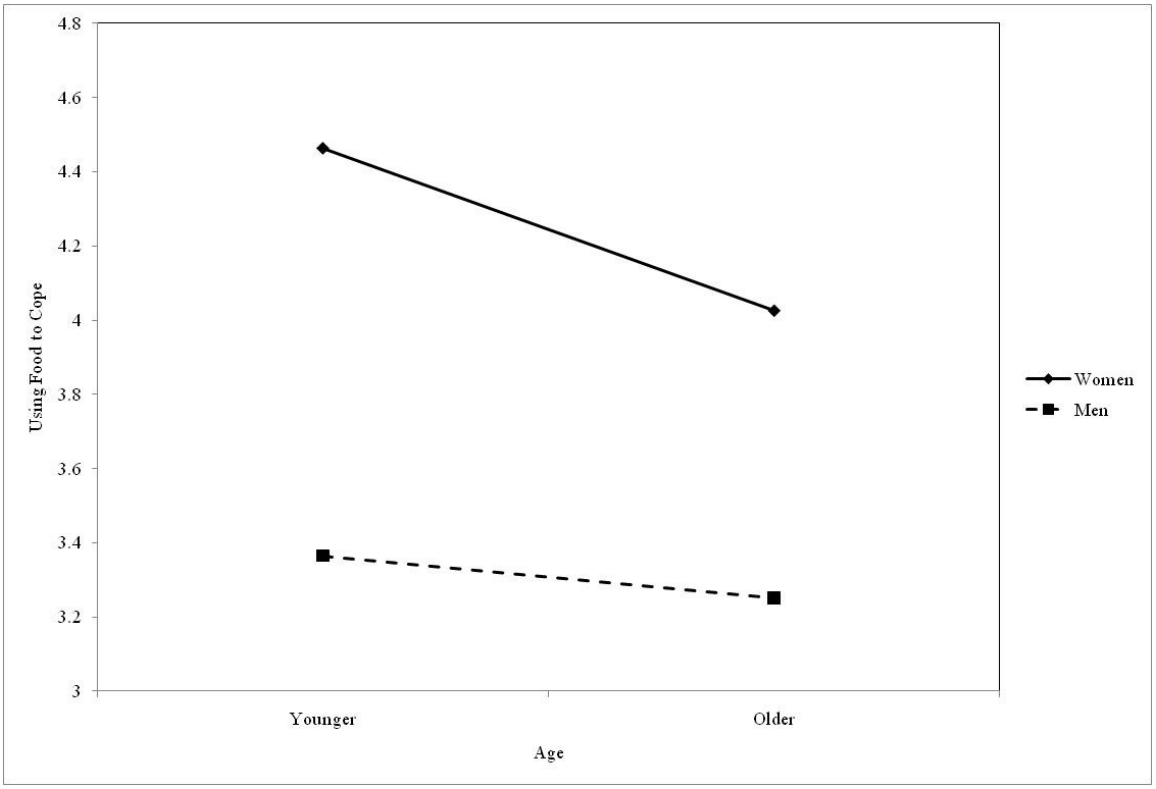

Table 3-6. Hierarchical Linear Regression Analysis for Self-Reported Physical Health.

	Model 1***	Model 2***	Model 3***	Model 4***
	β	*β*	*β*	*β*
Age	-.128***	-.134***	-.143***	-.142***
Gender	.014	.030*	.050**	.052**
Education	.253***	.210***	.219***	.219***
Problem-focused Coping		.129***	.126***	.126***
Emotion-focused Coping		-.125***	-.091***	-.090***
Use Food to Cope			-.104***	-.108**
Use Food to Cope x Age				.024
Use Food to Cope x Gender				.014
R^2	.089	.127	.136	.137
R^2 *Change*	.09***	.038***	.009***	.001
Valid *N* =	3,974			

*p<.05, **p<.01, ***p<.001

Table 3-7. Hierarchical Linear Regression Analysis for Body Mass Index.

	Model 1***	Model 2***	Model 3***	Model 4***
	β	*β*	*β*	*β*
Age	-.045**	-.043**	-.007	-.006
Gender	-.084***	-.086***	-.167***	-.164***
Education	-.136***	-.124***	-.159***	-.159***
Problem-focused Coping		-.049**	-.034*	-.034*
Emotion-focused Coping		.027	-.110***	-.109***
Use Food to Cope			.424***	.417***
Use Food to Cope x Age				.002
Use Food to Cope x Gender				.025
R^2	.023	.027	.176	.176
R^2 *Change*	.022***	.004**	.149***	.000
Valid *N* =	3,758			

*p<.05, **p<.01, *** p<.001

Table 3-8. Hierarchical Linear Regression Analysis for Weight Fluctuation.

	Model 1***	Model 2***	Model 3***	Model 4***
	β	*β*	*β*	*β*
Age	-.082***	-.081***	-.066***	-.068***
Gender	.017	.014	-.020	-.020
Education	-.030	-.023	-.037*	-.037*
Problem-focused Coping		-.020	-.013	-.013
Emotion-focused Coping		.021	-.034	-.034
Use Food to Cope			.174***	.170***
Use Food to Cope x Age				-.042**
Use Food to Cope x Gender				.009
R^2	.007	.008	.034	.035
R^2 *Change*	.007***	.001	.025***	.002*
Valid *N* =	3,832			

*p<.05, **p<.01, ***p<.001

Figure 3-2. Age Moderates the Association between Using Food to Cope and Weight Fluctuation.

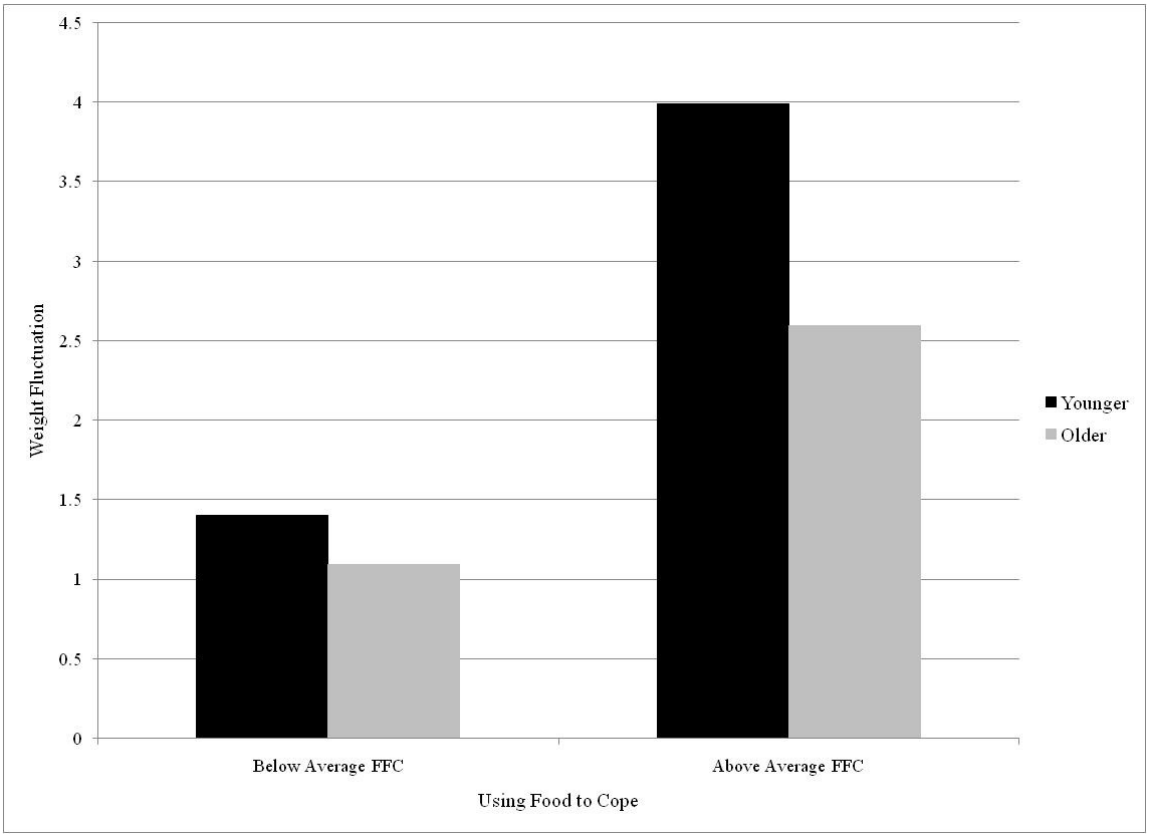

Table 3-9. Hierarchical Linear Regression for Glycosylated Hemoglobin.

	Model 1***	Model 2***	Model 3***	Model 4***
	β	*β*	*β*	*β*
Age	.132***	.129***	.136***	.138***
Gender	-.018	-.027	-.051	-.058
Education	-.019	-.017	-.027	-.027
Have Diabetes	.500***	.501***	.493***	.494***
Problem-focused Coping		.043	.054	.054
Emotion-focused Coping		.031	.000	.004
Use Food to Cope			.108**	.126***
Use Food to Cope x Age				.023
Use Food to Cope x Gender				-.063*
R^2	.280	.282	.292	.296
R^2 *Change*	.280***	.002	.010**	.004
Valid *N* =	865			

*p<.05, ** p<.01, *** p<.001

Figure 3-3. Gender Moderates the Association between Using Food to Cope and Glycosylated Hemoglobin.

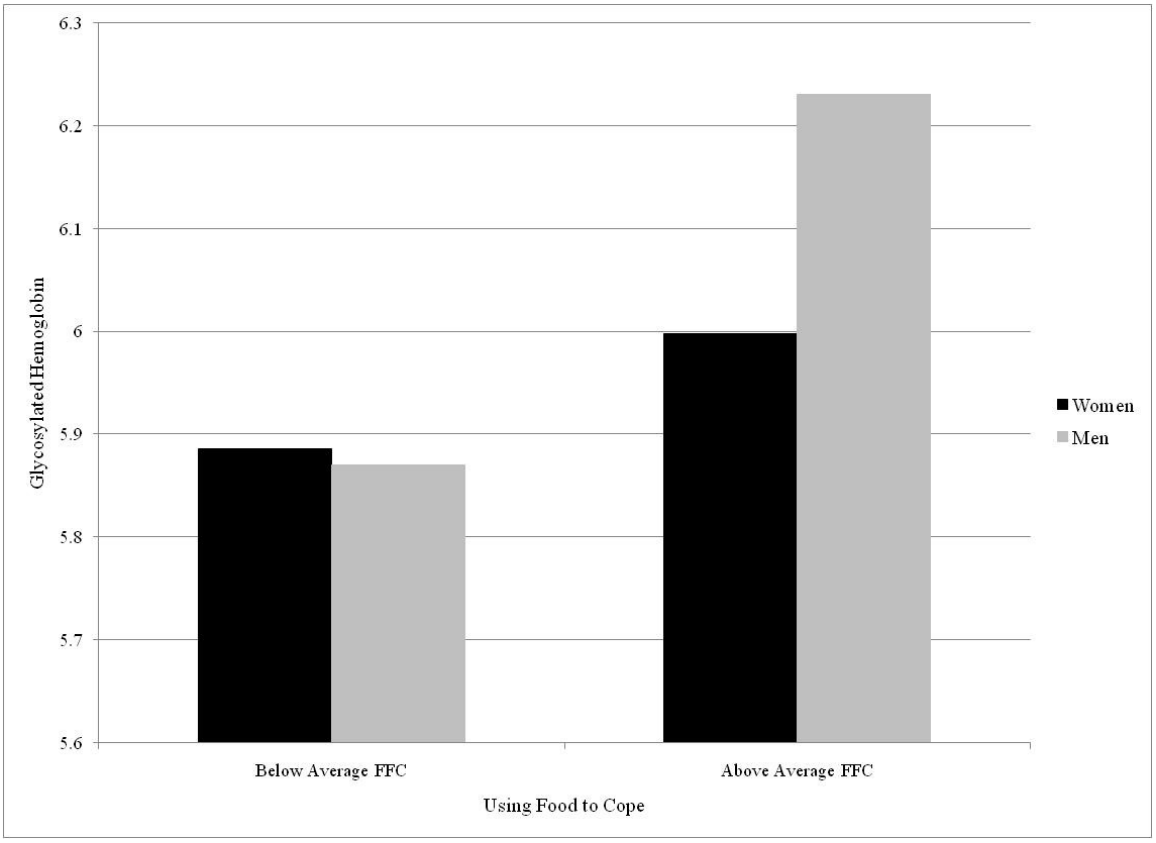

Table 3-10. Hierarchical Linear Regression for Metabolic Load.

	Model 1***	Model 2***	Model 3***	Model 4***
	β	*β*	*β*	*β*
Age	-.038	-.032	-.021	-.019
Gender	-.326***	-.313***	-.351***	-.356***
Education	-.121***	-.118***	-.133***	-.133***
Have Diabetes	.184***	.183***	.170***	.171***
Problem-focused Coping		-.092**	-.074*	-.074*
Emotion-focused Coping		-.023	-.070*	-.066
Use Food to Cope			.172***	.185***
Use Food to Cope x Age				.027
Use Food to Cope x Gender				-.039
R^2	.155	.163	.187	.189
R^2 *Change*	.155***	.008*	.024***	.002
Valid *N* =	867			

*p<.05, **p<.01, ***p<.001

Chapter 4

Discussion

Study Findings and Contributions

This study uses data from Projects 1 and 4 of MIDUS to explore the impact of using food to cope on health. There are four major aims. The first goal is to establish that using food to cope is a distinct dimension of coping. Second, this study examines age and gender differences in using food to cope. The third aim is to test the ability of using food to cope to uniquely predict self-reported physical health, body mass index, weight fluctuation, HbA_{1c} and metabolic load. The last aim is to explore possible moderating effects of age and gender on the associations between using food to cope and health. These goals build on prior coping research by examining the effects of an understudied type of coping, using food, on health and extending the construct of emotional eating to include the cause of negative emotions. In addition, this study increases understanding of one cause of weight gain.

Participants most often use problem-focused coping strategies, and use emotion-focused coping and food to cope less often. On average, participants report that they have "fair" or "good" health. The average participant is overweight, with a BMI of 27.9, as would be expected based on current figures which estimate 66.3% of adults in the United States are overweight or obese (Centers for Disease Control and Prevention, 2009). Further examination of the weight categories of the respondents also supports the estimation and this is presented in table 4-1. Just over one percent (1.1%) of the participants are underweight, 31.2% fall into the normal weight range, and 67.7% are overweight or obese, specifically, 39.4% of the individuals are overweight, and 28.3% are obese. The respondents report that their weight fluctuates 2.3 times, on average, over a ten year period. Younger individuals, women and individuals with lower levels of education use more food-focused coping than older individuals, men and the highly educated.

This is consistent with prior research on aging suggesting older individuals are better able to manage their emotions and therefore use adaptive coping methods more often (Baltes, 1987; Baltes, 1997; Mroczek & Almeida, 2004; Schulz & Heckhausen, 1996; Schulz, Wrosch, & Heckhausen, 2003; Zarit, 2009).

Baseline correlations indicate that age, gender and education are associated with the outcome variables. Older individuals report poorer self-reported physical health and a higher percentage of glycosylated hemoglobin. However, they also report less weight fluctuation than younger adults. Men have lower BMIs and fewer high-risk markers of metabolic load than women. Highly educated individuals report better self-reported physical health, lower BMI and fewer high-risk markers of metabolic load than less educated individuals. Problem-focused coping is correlated with better self-reported physical health, lower BMI and fewer high-risk markers of metabolic load. Emotion-focused and food-focused coping are correlated with poorer self-reported physical health and greater BMI. Using food to cope, but not emotion-focused coping, is also correlated with increased weight fluctuation, a greater percentage of glycosylated hemoglobin and more high-risk markers of HbA_{1c}. The correlations demonstrate that, as predicted, using food to cope is associated with a more negative score on every health outcome measured. Problem and emotion focused coping, however, have no correlation with weight-related health beyond BMI, with the exception of problem focused coping being associated with metabolic load. This correlation most likely exists because metabolic load includes a broad range of physical health measures, beyond weight-related health, and problem focused coping is associated with general self-reported physical health.

Is Using Food to Cope a Distinct Dimension? The first research question was addressed by running principal components analysis on the COPE scale subscales, obtaining the alpha of the using food to cope subscale and examining the correlation between the two using food to cope items. As predicted, the results of the principal components analysis indicate that using food to

cope is distinct from the two dimensions of coping identified in the transaction model of coping, problem-focused and emotion-focused (Lazarus & Folkman, 1984). Three dimensions of coping result from the principal components analyses on the COPE scale, problem-focused, emotion-focused and food-focused coping. Despite a small number of items, the alpha for the using food to cope subscale is high, indicating that the scale is very reliable. The items are also highly correlated, as would be expected by the high reliability. Together, these results suggest using food to cope is a distinct dimension of coping, as hypothesized, and provide a solid foundation for the further pursuit of the associations between using food to cope and health.

Age and Gender Differences in Using Food to Cope. The second research question was examined by running a hierarchical linear regression using age, age^2 (to test for a non-linear component), gender and an age-by-gender interaction to predict using food to cope. The results indicate that, as predicted, older individuals use slightly less food-focused coping than younger individuals. Older individuals may use less food to cope because they experience fewer stressors, they are less reactive and they are better able to manage their negative emotions, as would be expected based on theories of aging such as SOC, socioemotional selectivity theory, primary and secondary control theories, and prior research on stressor exposure over the lifespan (Baltes, 1987; Baltes, 1997; Carstensen, 1992; Carstensen, Fung, & Charles, 2003; Carstensen, Isaacowitz, & Charles, 1999; Mroczek & Almeida, 2004; Schulz & Heckhausen, 1996; Schulz, Wrosch, & Heckhausen, 2003; Zarit, 2009). Women use food to cope far more often than men, as predicted. Women may use more food to cope because it is a more acceptable strategy to engage in for women than for men, or because men are more often using other coping methods that are not as acceptable for women, such as drinking alcohol. An age by gender interaction in using food to cope is also found. Women of all ages use food to cope more than men, and they decrease more steeply in their use over the lifespan than men. Young women use the highest levels of using food to cope and older men use the lowest levels. The sharper decrease for

women over the lifespan may exist because as women age and are better able to manage their emotions, the "pay-off" is larger for them and they are able to more dramatically decrease their amount of food-focused coping, whereas men use a more stable amount of food-focused coping over the lifespan. The hypotheses put forth in the introduction predicting the age and gender differences in using food to cope are fully supported.

The Predicative Ability of Using Food to Cope. A series of hierarchical linear regressions were used to examine the third research question, testing the extent to which problem-focused, emotion-focused and food-focused coping predict health. Problem-focused coping predicts better self-reported physical health, a lower BMI and fewer high-risk markers of metabolic load. No association is found between problem-focused coping and weight fluctuation or glycosylated hemoglobin. These results partially support the hypothesis that problem-focused coping would predict better self-reported physical health, lower BMI, weight fluctuation, levels of glycosylated hemoglobin and fewer high-risk markers of metabolic load. While not every predicted association is found, the results are all in the predicted direction. The results support prior research that problem-focused coping is associated with improved self-reported physical health (for example, Folkman, Lazarus, Gruen, & DeLongis, 1986; LeBlanc, Regehr, Jelley, & Barath, 2008; Thoits, 1991).

The study also extends these prior results by indicating that beyond predicting better self-reported physical health, problem-focused coping also impacts weight-related health. The use of more problem-focused coping predicts lower BMI and fewer high-risk markers of metabolic load. Therefore, problem-focused coping may be a more adaptive method to apply in a prevention or treatment program for overweight that attempts to alter coping style. Replacing food-focused coping with problem-focused techniques may improve self-reported physical health and weight-related health.

Emotion-focused coping predicts poorer self-reported physical health. No association is found between emotion-focused coping and the weight-related health outcomes, including BMI, weight fluctuation, glycosylated hemoglobin or metabolic load. The hypothesis was partially confirmed. It was predicted that emotion-focused coping would be associated with poorer self-reported physical health, increased BMI, weight fluctuation, percentage of glycosylated hemoglobin and a greater number of high-risk markers of metabolic load. The association of emotion-focused coping with poorer self-reported physical health is consistent with prior research (for example, Folkman, Lazarus, Gruen, & DeLongis, 1986; LeBlanc, Regehr, Jelley, & Barath, 2008; Thoits, 1991).

This study expands upon prior research by including how emotion-focused coping impacts weight-related health. No associations were found for weight-related health outcomes, indicating that when weight is the outcome of interest, neither problem-focused nor emotion-focused are predictive and are not the variable to examine. Coping with stressors using problem-focused and/or emotion-focused techniques appears to be unrelated to the epidemic of overweight and obesity. Overweight and obesity prevention or treatment programs can consider emotion-focused coping strategies as a replacement for food-focused coping because of the lack of association with weight-related health. However, caution should be used because of the association of emotion-focused coping with poorer self-reported physical health.

Using food to cope predicts poorer self-reported physical health, greater BMI, increased weight fluctuation, a higher percentage of glycosylated hemoglobin and more high-risk markers of metabolic load, as predicted. Using food to cope predicts a more negative result on every health outcome measured. The results of the hierarchical linear regressions fully support the hypothesis. The results are consistent with the research on emotional eating which suggests that consuming unnecessary calories increases the risk of poor weight-related health (Canetti, Berry & Elizur, 2009; Laitinen, Ek, & Sovio, 2001; Lowe & Fisher, Jr., 1983; Rasheed, 1998).

As previously discussed, this study extends prior research on coping and emotional eating by exploring an understudied dimension of coping, the use of food, by connecting a stressor as a cause of emotional eating. This increases our understanding of when people will eat to comfort themselves, and the impact of using food to cope with negative emotions due to a stressor. As predicted, using food to cope significantly predicts (statistically and practically) poorer overall health and weight-related health. Using high levels of food-focused coping predicts poorer overall health and, most importantly for our understanding of overweight and obesity, predicts greater BMI, weight fluctuation, glycosylated hemoglobin and more high-risk markers of the clinical outcome metabolic load. Furthermore, using food to cope was the only coping strategy examined that predicted all weight-related health outcomes. Problem- and emotion-focused coping, although associated with self-reported physical health, are not associated with weight-related health (with one exception, as discussed previously). The results suggest there is a direct impact of using food to cope on these measures of health and that replacing food-focused coping techniques with other, more adaptive strategies may have a positive impact on an individual's weight status as well as other indictors of their health that are related to their weight.

Age and Gender Moderation. The final research question examined if age or gender moderated the associations between using food to cope and each health outcome. It was predicted that age and gender would both moderate the association, and that the association would be stronger for older individuals and women, as compared to younger individuals and men, respectively. This hypothesis is very weakly supported. Two significant moderations are found (age moderation of weight fluctuation and gender moderation of HbA_{1c}), but most health outcomes do not show evidence of age or gender moderation. In addition, the two moderations found are contrary to the hypothesized direction.

A food-focused coping by age interaction is significant for weight fluctuation, but the food-focused coping by gender interaction is not significant, indicating that age but not gender

moderates the association between using food to cope and weight fluctuation. Contrary to the prediction, the association is strongest for younger adults, particularly young adults who use high levels of food-focused coping. Younger adults who use high levels of food to cope report greater weight fluctuation than older adults, although younger and older adults who use low levels of food-focused coping report similarly low weight fluctuation. This age moderation is contrary to the hypothesis, but upon further reflection is entirely plausible and is consistent with the information used to make the prediction. Older adults have less muscle mass and a slower metabolism; this means that even if weight is easier to gain with food-focused coping, it is harder to lose again, thereby decreasing weight fluctuation for older individuals. Younger adults, on the other hand, may find losing weight easier and therefore if they gain weight using food to cope, they are also able to lose it more frequently.

A significant food-focused coping by gender interaction is found for glycosylated hemoglobin, although the food-focused coping by age interaction is not significant. The interaction term is significant, but the model in which the interaction terms were added is not significantly improved. However, when probed, the gender moderation does have practical significance. When the model was re-run entering just the food-focused coping by gender interaction in the fourth model (rather than both interaction terms), the model is significantly improved. The association between using food to cope and glycosylated hemoglobin is stronger for men, especially at high levels of food-focused coping. Similarly to the age moderation, the gender moderation is opposite of what was predicted. It was predicted that the association would be stronger for women. There are a number of alternative explanations that should be considered for this moderation. Rather than focusing on the ability to metabolize and process the food once consumed (and predicting that men would be more efficient at this), perhaps men consume more calories, in general, or more calories from sugar specifically, than women when they use food to cope. The difference in food type or amount may explain the stronger association for men.

This study has made important progress in understanding how coping with stressors impacts health, especially weight-related health and, in particular, how coping connects with the epidemic of overweight and obesity. The results of the analyses are supported by prior research on problem- and emotion-focused coping and emotional eating, as well as expand upon prior work by including another type of coping (the use of food) and weight-related health as an outcome.

Limitations and Future Directions

The sample of participants from Projects 1 and 4 of the MIDUS II are relatively ethnically homogeneous, wealthy, and highly educated. The results of this study, therefore, cannot be generalized to the United States or any other more diverse sample. Future research should replicate the analyses in a more representative sample. Finding consistent results in diverse populations will strengthen the conclusions.

Using food to cope is the independent variable of most interest in this study, and unfortunately only two items are included in the MIDUS II that make up the using food to cope subscale. While the results from the two item scale are not void or unreliable, future studies should include a more extensive measure of using food to cope that would be able to provide more information regarding how much food is consumed, the type of food consumed and how often the technique is used. In addition, as discussed in the methods section, many subscales of the COPE scale were dropped because of overlap with other measures in the MIDUS II. However, including the other coping subscales would provide for interesting and informative comparisons between the associations of various types of coping with health.

The data from the MIDUS II used for this study is cross-sectional. Although results are interpreted with the assumption that using food to cope affects health, it cannot be determined if food-focused coping does affect health or if health partially or fully drives selection of coping strategy. Future research should examine coping and health in a longitudinal data set.

Determining the directionality of the association would provide a great deal more information to move the field forward. If it can be confidently concluded that using food to cope causes poorer self-reported physical health, increased BMI and weight fluctuation, a higher percentage of HbA_{1c} and a higher risk of metabolic load, researchers can begin asking questions that are necessary to form a treatment and/or prevention program regarding coping style and weight. If style of coping, particularly using food to cope, causes weight-related health problems, does replacing food-focused coping with a more adaptive strategy, such as problem-focused coping, decrease BMI, weight fluctuation, the percentage of glycosylated hemoglobin and risk of metabolic load?

Conclusion

The results of this study indicate that an understudied type of coping, using food, is associated with poor global health and weight-related health. This study confirms prior research that problem-focused coping is associated with better health and emotion-focused coping is associated with poorer health and expanded upon it by demonstrating that problem-focused and emotion-focused coping are associated with better weight-related health. Using food to cope, however, is associated with poorer physical and weight-related health, indicating that of all coping strategies examined, using food is the most devastating to health. In addition, the focus of this study on weight-related health connects coping research to the epidemic of overweight and obesity in the United States and suggests that using food to cope may be one cause of overweight and obesity.

The associations found between problem-focused, emotion-focused and food-focused coping indicate that overweight and obesity treatment and/or prevention programs should consider improving health by altering how an individual copes with the experience of stress. Further research on how coping techniques can be altered is necessary, but this study provides evidence that coping impacts weight-related health and should be considered as a possible avenue of change.

Table 4-1. Weight Categories of Respondents from Project 1 of the MIDUS II.

	N	%
Underweight	43	1.1
Normal	1187	31.2
Overweight	1500	39.4
Obese	1075	28.3

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