12-2006

Associations of Subjective Social Status and Perceived Stress to Dietary Behaviors in College Students

Eriko M. Grover
University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by Eriko M. Grover entitled "Associations of Subjective Social Status and Perceived Stress to Dietary Behaviors in College Students." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Lisa Jahns, Major Professor

We have read this thesis and recommend its acceptance:

Betsy Haughton, Gene Fitzhugh

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Accepted for the Council:

__Linda Painter_____
Interim Dean of Graduate Studies

(Original signatures are on file with official student records)

Associations of Subjective Social Status and Perceived Stress to Dietary Behaviors in College Students

A Thesis
Presented for the
Master of Science Degree
The University of Tennessee, Knoxville

Eriko M. Grover
December 2006

Acknowledgements

First and foremost, I would like to thank my major professor, Lisa Jahns, PhD, RD, for accepting me as her student, and providing me her endless support, encouragement, patience, and guidance throughout the completion of this thesis. Without her, this project would not have been possible. I would also like to thank my remaining committee members, Betsy Haughton, EdD, RD, and Gene Fitzhugh, PhD, for their input and recommendations during this process. Their expertise was invaluable to this research. I would also like to thank Cary Springer, UT Statistician, for all of the technical support and time she gave to this project. Lastly, I must thank my family and friends for their encouragement throughout this project. Despite the stress, long nights, and bad moods, they never stopped supporting me, and for that, I am eternally grateful.

Abstract

The purpose of this study was to examine the relationship that subjective social status indicators and perceived stress share with unhealthy diet behaviors. A total of 898 incoming freshmen students at the University of Tennessee, Knoxville (UTK) completed a web-based survey as part of a pilot study prior to their arrival at the UTK. Two versions of the Subjective Social Status (SSS) scale were used to assess incoming freshmen's perceptions of social standing in their high school environment and in a larger societal context. The Perceived Stress Scale (PSS) was used to assess stress. Diet was analyzed by assessing frequency of fruit intake, frequency of vegetable intake, snacking frequency, and frequency of fast food intake for the month prior to the survey. Bivariate analyses were conducted to determine differences in mean SSS and PSS scores by sociodemographic categories and dietary behaviors. Correlations between SSS and PSS were assessed using either Pearson's correlations or Spearman's rank. Lastly, diet variables were dichotomized and logistic regression analysis was used to determine the prospective risk of PSS and SSS on dietary behaviors. School SSS was found to have a strong bimodal distribution. PSS was not significantly correlated with either SSS indicator. However, societal and school SSS were highly correlated. In the final, fully adjusted logistic regression model, lower school SSS was associated with increased odds of meeting fruit and vegetable recommendations, lower society SSS was associated with a reduction in the odds of meeting fruit recommendations, and higher PSS was associated with an increase in the odds of increased snacking intake. Results from the present study suggest that incoming freshmen are in a transitional period in their lives and are assessing

their social status differently, depending on their maturity. In addition, stress does not appear to share a relationship with SSS, and only influences select unhealthy dietary behaviors. More research must be conducted in this area to determine where the shifts in perceptions of status occur for this population, and to determine the impact of SSS and PSS on other dietary behaviors known to influence health.

Preface

To aid the reader, an explanation of the format used for this thesis follows. This thesis consists of two parts. In Part I, an introduction, extensive review of the literature and the study's research questions can be found. Part II contains the actual study written in journal style format for publication.

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Part I

Overview

Introduction

In the United States, the prevalence of overweight and obesity has risen over the past 30 years (National Center for Health Statistics, 2004). This is important, due to the significant relationship that overweight and obesity share with type II diabetes, heart disease, stroke, and many of the other leading causes of morbidity and mortality in the U.S. (Must et al., 1999). Thus, understanding the risk factors for overweight and obesity may help in the prevention of the morbidity and mortality associated with these conditions.

Socioeconomic status (SES) is one such risk factor. Studies of the association between SES and health in developed nations have revealed a direct relationship with health for many years (higher SES is associated with better health) (Adler et al., 1994; Adler & Ostrove, 1999; Ball & Crawford, 2005; Ball, Mishra, & Crawford, 2002). More recently, a inverse relationship between SES and body weight (higher SES is associated with higher chronic disease risk) has been established in developed nations (Ball & Crawford, 2005; Ball, Mishra, & Crawford, 2002; Sobal, 1991). However, using traditional objective measures of SES (income, education, occupation) as a predictor of health outcomes reveals many inconsistencies (Adler & Ostrove, 1999; Ball & Crawford, 2005; Winkleby, Jatulis, Frank, & Fortmann, 1992). In addition, work with adolescents reveals that objective measures of SES are often difficult to measure and are unreliable in this population as they are in a transitional state from child to adulthood (Goodman et al., 2001). Tools other than traditional objective measures of SES may be better suited for understanding the relationship between social position and health.

The literature shows a strong inverse association between measures of *subjective* perceptions of social status and obesity in multiple populations, entirely independent of objective SES (Adler, Epel, Castellazzo, & Ickovics, 2000; Goodman et al., 2003; Goodman et al., 2001; Singh-Manoux, Adler, & Marmot, 2003). However, the mechanism through which this occurs has not been adequately explored. In addition, subjective social status (SSS) has been shown to be significantly inversely associated with obesity in adolescents, again independent of objective measures of parental SES (Goodman et al., 2003; Goodman et al., 2001).

The results of the research between SSS and weight are compelling; however, it has only been examined in young adolescents and adults. The impact of SSS on incoming college students has yet to be explored. The college years represent a period of transition from adolescence to young adulthood for traditionally-aged students. Due to their unique environment and life situations, studies have shown that transitional students (out of high school and into college) as well as college students may be at increased risk of weight gain and poor health behaviors, which may, in turn, affect future health (Laitinen, Ek, & Sovio, 2002; Levitsky, Halbmaier, & Mrdjenovic, 2004). Dietary habits in college have often been shown to be nutritionally inadequate (Butler, Black, Blue, & Gretebeck, 2004; Graham & Jones, 2002; Hendricks & Herbold, 1998; Levitsky, Halbmaier, & Mrdjenovic, 2004). In addition, a majority of college students have been shown to have high stress levels which have been linked to poor diet habits and overweight and obesity (Cartwright et al., 2003; Conner, Fitter, & Fletcher; Laitinen, Ek, & Sovio, 2002; Oaten & Cheng, 2005; Oliver & Wardle, 1999). Multiple studies have found that stress can increase unhealthy snacking habits and influence the overall amount

of food consumed at a meal (Oliver & Wardle, 1999). Subjective perceptions of social standing may interact and further influence these risks. For example, in adults, stress is significantly associated with subjective perceptions of social position (Adler, Epel, Castellazzo, & Ickovics, 2000). Therefore, simultaneous interactions between different levels of SSS, stress, and changes in dietary habits may be one pathway by which weight is affected, leading to future adverse health outcomes.

The purpose of this study was to examine the relationship that subjective social status indicators and perceived stress share with unhealthy dietary behaviors in incoming freshmen college students. In order to determine this, the following specific aims were investigated in a sample of the incoming freshman population at The University of Tennessee, Knoxville:

- Describe the distribution of SSS and perceived stress among incoming freshmen students by socio-demographic categories such as race, age, and gender.
- Determine the association between SSS, perceived stress, and dietary behaviors.

These aims were answered through the analysis of a web-based survey completed by incoming freshmen prior to their arrival at the University of Tennessee, Knoxville. Subsequent statistical analysis of the data was performed to determine the strength of associations.

Literature Review

Risk Factors for Overweight and Obesity in the United States

In the United States, the prevalence of overweight and obesity across populations has seen a dramatic increase in recent years (National Center for Health Statistics, 2004). Overweight and obesity are significant risk factors for adverse health outcomes and have been shown to be major contributors to chronic disease and preventable causes of death (U.S. Department of Health and Human Services, 2001). Due to its significant impact on health, public health efforts, such as Healthy People 2010, have made overweight and obesity a leading health indicator (U.S. Department of Health and Human Services, November 2000). It is a national objective to reduce the proportion of children, adolescents, and adults who are overweight or obese by 2010 (U.S. Department of Health and Human Services, November 2000).

Determining the pathways that affect obesity and obesity-related co-morbidities is a primary goal of public health nutrition in order to create effective interventions and prevention efforts. Nevertheless, although a large body of research has been directed at the risk factors that impact obesity, the pathways with which these factors influence obesity are not clear and have yet to be determined.

Socioeconomic Status and Obesity

SES has been traditionally defined as a compound measure that incorporates economic status, social status, and work status, usually measured by income, education, and occupation, respectively (Dutton & Levine, 1989). According to Lynch and Kaplan (2000), socioeconomic status can act as a powerful determinant of health by either

increasing the likelihood of experiencing poor health or by decreasing access to resources that may enhance health. As early as the 19th century, social scientists were investigating the observed relationship between the poor and their health in comparison to the rich – individuals at the high end of the social spectrum tended to have better health outcomes than those at the low end (Lynch & Kaplan, 2000). More recently, SES has been shown to have an inverse relationship with specific co-morbidities related to overweight and obesity. Although the SES-health gradient does not occur for all diseases, a strong and consistent inverse association does occur in many diseases specifically linked to overweight and obesity, such as cardiovascular disease, diabetes, and metabolic syndrome (Kaplan & Keil, 1993; Matthews, Kelsey, Meilahn, Kuller, & Wing, 1989). This is significant due to the overwhelming increase in obesity occurring globally in industrial nations (Rigby, Kumanyika, & James, 2004).

Although research has shown a strong relationship between SES and health, variations in the relationship have been seen in research studying the effects of SES on weight. In a study that reviewed a total of 34 papers investigating the inverse SES-weight gradient in developed countries, inverse associations were found between occupational status and weight gain and, to a lesser extent, education and weight gain in both men and women (Ball & Crawford, 2005). However, when income was used as the indicator of SES, findings were inconsistent for both men and women (Ball & Crawford, 2005). In addition, over 1/3 of the studies within the review found no significant relationship between any of the measures of SES and weight change (Ball & Crawford, 2005).

Other research has revealed a reduction in the strength of the SES-weight relationship over the past 30 years (Zhang & Wang, 2004). A recent study of U.S. adults found not only that the disparity in obesity between SES groups weakened over time (i.e. the differences in the prevalence of obesity for different levels of SES became smaller), but also that the prevalence of obesity across all SES levels increased over the same 30 year period (Zhang & Wang, 2004). It is clear from this research that changing trends in the SES-weight relationship may diminish the efficacy of using SES as a marker for overweight and obesity. In adolescents, research has found that family income and education have little effect on the disparities in overweight prevalence, while the effects of sociodemographic variables (like race/ethnicity) reveal large differences (Gordon-Larsen, Adair, & Popkin, 2003). These inconsistencies indicate that the traditional measures of SES might not fully explain the association between weight status and socioeconomic position. Variables other than SES may be able to more fully explain the factors that influence health, weight status, and obesity.

Inconsistencies in the SES-Health Relationship

As described above, although SES has been demonstrated to be strongly correlated with health and weight, using the measures of SES alone may not be fully descriptive of the association. Several inconsistencies exist in the SES-health relationship.

First, while research in the past often focused on the differences in health between poor versus rich poverty thresholds, evidence has shown a gradient in health that occurs throughout all levels of SES (Adler et al., 1994; Marmot, Shipley, & Rose, 1984; Marmot

et al., 1991). A groundbreaking study by Marmot et al. (1984) confirmed that as participants' occupational grade rose, health improved and mortality decreased, even though employees were all civil service employees, generally homogeneous, and at every grade had access to health insurance.

Second, although the positive SES-health gradient has been observed in almost every industrialized nation in which it has been studied, the strength of the association is not consistent, and the gradient is often reversed in non-industrialized countries (Adler et al., 1994; Adler & Ostrove, 1999; Ball & Crawford, 2005; Marmot, 1999). It is not clear exactly why non-industrialized countries are showing an opposite relationship between SES and health. Nevertheless, it is clear that the SES-health relationship as it is seen in western societies is not a universal truth.

Third, the three SES measures are often used interchangeably even though they are only moderately correlated with each other (Ostrove & Adler; Winkleby, Jatulis, Frank, & Fortmann, 1992). In some studies in which more than one SES indicator is used, health outcomes may be more highly correlated with one indicator than another. Some studies have found similar associations with health no matter which SES indicator is used (Adler & Ostrove, 1999). For example, Lynch and Kaplan (2000) argue that measurements of number of years of education tell nothing about the quality of education or how it is valued socially, and that measuring income at one point in adulthood fails to fully capture the dynamic relationship between health and income.

Lastly, the SES-health gradient often seen in adults is not consistently evident in children and adolescents (Goodman, 1999). This significantly limits the spectrum of use of SES to specific populations. There may be multiple reasons for this. A major issue is

simply that the task of measuring SES in children and adolescents is limited to obtaining information about parental or guardian SES. Therefore, the traditional variables of education, occupation, and income do not accurately reflect the social status of children and adolescents. In college students, measuring the traditional SES markers is equally as difficult. SES markers may change during this transitional period from adolescence to young adulthood. As children, social status is determined primarily by familial social status, and, as adolescents mature, their self-conceptualization moves from one that reflects their parent's social status, to one that reflects their own perceptions of social status, independent of their family. Nevertheless, many college students are still dependent on their families for financial and emotional support. Therefore, a college student's social standing may be based on both parental SES and the adolescent's own perception of his or her standing.

Mechanisms other than the traditional objective measures of SES may be responsible for determining the SES-health gradient. Measures of perceived social position in society may provide insight into these mechanisms.

Subjective Social Status and Health

When analyzing the SES-health gradient, the use of objective measures of SES implies that the events in and of themselves are the cause of poor health outcomes, and therefore, mediating factors in the relationship can often be overlooked. Furthermore, using objective measures of health may be misleading and inconclusive when determining associations (Adler & Ostrove, 1999).

Psychosocial influences on health may make the largest contribution to the socioeconomic gradient in health due to inequalities that result from social standing (Taylor & Seeman, 1999; Wilkinson, 1999). It is a plausible argument that inequality affects social environments and relationships that, in-turn, effect health. For example, one study found that people were more likely to be trustful of others in states where income differences were less significant (Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997). In another study, city mortality rates in the U.S. were shown to be positively correlated with hostility scores in cities with higher income inequality (Wilkinson, 1999). In addition, other variables, such as violence, friendships, emotional attachment, social support, and social anxiety, have all been cited as probable influences and buffers on the SES-health gradient (Taylor & Seeman, 1999; Wilkinson, 1999). Perhaps more than material possessions alone, social comparisons of socioeconomic inequalities (material and non-material) may determine perceptions of inferiority, failure, and rejection which subsequently influence the health and behaviors of individuals (Wilkinson, 1999). It has only been recently that research has aimed to investigate these theories.

How people *feel* about and *perceive* their placement in society may shed more light on the moderators of the SES-health gradient. Subjective social status (SSS) can be defined as an individual's perception of his or her place in society (Davis, 1956). Measures of perceptions of social status have been shown to have a significant relationship with health effects in multiple population groups, independent of the traditional measures of SES (Adler, Epel, Castellazzo, & Ickovics, 2000; Goodman et al., 2003; Goodman et al., 2001; Singh-Manoux, Adler, & Marmot, 2003; Wright & Steptoe, 2005). In middle-aged white women, SSS was more strongly correlated with physical

health, waist-hip ratios, sleep latency, and resting heart rate, than with a composite measure of SES (Adler, Epel, Castellazzo, & Ickovics, 2000). Furthermore, associations between subjective status and sleep latency, heart rate, chronic stress, pessimism, control over life, active coping, and passive coping all remained significant after controlling for objective SES (composite measure of education, occupation, and income) and negative affect (Adler, Epel, Castellazzo, & Ickovics, 2000). SES alone was significantly associated with only 3 of the 14 physiological and psychological variables (Adler, Epel, Castellazzo, & Ickovics, 2000). Overall, correlations between SSS and physiological health were stronger and more significant than with objective SES (Adler, Epel, Castellazzo, & Ickovics, 2000). In another study of London, white-collar adults, lower SSS in both men and women was associated with higher rates of age-adjusted morbidity (Singh-Manoux, Adler, & Marmot, 2003). In addition, low SSS was a strong predictor of overall ill-health, and education, occupation, and income could not fully explain this relationship (Singh-Manoux, Adler, & Marmot, 2003).

If research has shown that SSS has a strong relationship with health, then what is the mechanism influencing SSS? Only one study has examined the possible predictors of SSS, and although SSS has been associated with health independent of SES, a relationship between the two measures has been found (Singh-Manoux, Adler, & Marmot, 2003). Using a statistical model, Singh-Manoux et al. (2003) revealed that the participants in their study did use socioeconomic criteria to assign themselves a subjective status position. The three traditional measures of SES were found to be significant predictors of SSS (employment grade being the strongest in this sample) (Singh-Manoux, Adler, & Marmot, 2003). In addition, the correlation between

psychological variables (i.e. hopelessness, optimism, hostility, etc) and SSS was very weak, thus indicating that psychological factors were not introducing bias when deciding SSS placement (Singh-Manoux, Adler, & Marmot, 2003). It is clear from these results that an understanding of both SES and SSS and their relationship will be useful in determining the predictors of health.

The results found in adolescent SSS studies are consistent with findings in adults. Researchers have recently validated a youth specific version of the SSS scale for adolescents that utilizes the more proximal school environment as a referent for assessing social status (Goodman et al., 2001). Using this scale in two studies with adolescents, higher SSS was associated with fewer depressive symptoms and a decreased likelihood of overweight and obesity (Goodman et al., 2003; Goodman et al., 2001). However, SSS was not associated with the odds of being overweight in black girls, and the strength of the SSS-weight association was different between genders, a finding that may allude to differences in SSS among different socio-cultural groups (Goodman et al., 2003). These results are important due to the unique placement of adolescents in society and the inconsistencies of using objective measures of SES in this population.

Although research on SSS is compelling, the limited amount of research using SSS, especially in the adolescent population, reduces the strength of the findings. The lack of available information prompts the need for increased focus towards the study of SSS in different types of populations and as a determinant of overweight and obesity.

College Students and Health

Weight and dietary behaviors. Entering college is a significant change of life event that bridges the passage between childhood and adulthood. It is often associated with multiple changes, both emotionally and physically. It is a crucial time in the development of health beliefs and health behaviors that has the potential to influence behaviors throughout an individual's life course. These changes could have significant consequences on future health outcomes, especially with regard to overweight and obesity (Anderson, Shapiro, & Lundgren, 2003; Butler, Black, Blue, & Gretebeck, 2004; Graham & Jones, 2002; Levitsky, Halbmaier, & Mrdjenovic, 2004; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005).

Although significant weight gain has been reported in studies within the college population, the literature is inconsistent and sparse. A study of college freshmen revealed a mean weight gain of 1.9 kg (or 158.3 g/week) over their first 12 weeks of college, a highly significant change (Levitsky, Halbmaier, & Mrdjenovic, 2004). This rate of increase is considerably greater than that observed in the general adult population (mean weekly weight gain is 7.8 g/week) (Levitsky, Halbmaier, & Mrdjenovic, 2004). In addition, mean body mass index (BMI) increased significantly over the 12 week period (Levitsky, Halbmaier, & Mrdjenovic, 2004). An even larger increase in weight gain was found in a study that demonstrated a 4.1kg (or 9 lb) weight gain in 70% of the students studied between the beginning of the freshman year and the end of the sophomore year of college (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). In the freshman year alone, researchers saw increases in both body weight and BMI; in fact, 75% of the freshman showed an increase in BMI (Racette, Deusinger, Strube, Highstein, &

Deusinger, 2005). In a comparison study of freshman college women and non-college women of the same age, college women were found to gain weight at a rate 36 times the non-college women (Hovell, Mewborn, Randle, & Fowlerjohnson, 1985). Other studies have found similar increases in weight, BMI, and fat mass during the first year of college (Anderson, Shapiro, & Lundgren, 2003; Butler, Black, Blue, & Gretebeck, 2004; Graham & Jones, 2002). Nevertheless, some research has shown decreases in weight while attending college, and still others have found no changes in weight while in college (Anderson, Shapiro, & Lundgren, 2003; Annunziato et al., 2003; Butler, Black, Blue, & Gretebeck, 2004; Graham & Jones, 2002; Hodge, Jackson, & Sullivan, 1993; Hovell, Mewborn, Randle, & Fowlerjohnson, 1985). One study found that a high rate of weight gain occurred in university women within their freshman year of college, but that the weight declined after the first year and almost returned to baseline by the junior year (Hovell, Mewborn, Randle, & Fowlerjohnson, 1985). It appears from these data that the highest risk for weight gain may be during the first year of college, the freshman year, and that metabolic profiles may have the opportunity to improve once the student moves through college. Further research is warranted to investigate the pattern of weight change experienced by adolescents as they transition into college.

Results from the 1995 National College Health Risk Behavior Survey showed that 20% of college women were overweight, as indicated by a BMI of greater than 27.3 (Douglas et al., 1997). Of the entire undergraduate sample in the 1995 survey, 35% of the undergraduate students were classified as overweight (Douglas et al., 1997). A BMI greater than 22 at age 18 has been associated with increased mortality from cardiovascular disease (Manson et al., 1995; Willett et al., 1995). In addition, studies

have shown that weight gain of 22 pounds or more after age 18 increases morbidity and mortality risk for all causes (Manson et al., 1995; Willett et al., 1995). It is clear that the impact of weight gain during college significantly increases risk for poor health outcomes in the future. The mechanisms that influence these weight changes have yet to be determined.

Dietary trends in the transition from high school to college. The transition from high school to college can influence dietary behaviors, which in turn, may affect weight (Baranowski et al., 1997; Baranowski et al., 1999; Cullen et al., 1999). It has been widely published in the literature that adolescents are not meeting dietary recommendations and instead, are practicing unhealthy dietary behaviors that have been shown to impact health (Must et al., 1999). The majority of adolescents do not meet dietary recommendations for fruits and vegetables (Nielsen, Siega-Riz, & Popkin, 2002). In college age students (18-24 year olds), the literature reports that most students eat less than five servings of fruits and vegetables per day (Lowry et al., 2000). Adolescents have also been shown to have increased levels of energy intake from snacking (Jahns, Siega-Riz, & Popkin, 2001; Nielsen, Siega-Riz, & Popkin, 2002). Data from the Continuing Survey of Food Intakes by Individuals (CFSII) shows that 2-18 year olds derived the highest proportion of calories from snacks (Jahns, Siega-Riz, & Popkin, 2001), more than any other age group (Nielsen, Siega-Riz, & Popkin, 2002). Fast food is also of concern, due to its positive association with higher energy and fat intake, and its negative impact on fruits and vegetables (French, Story, Neumark-Sztainer, Fulkerson, & Hannan, 2001). Fast food intake is a diet behavior of concern that has increased steadily in the past 20 years in adolescents and young adults (Nielsen, Siega-Riz, & Popkin, 2002). In one

study of adolescents, researchers found that fast food consumption was associated with weight gain, increased total energy intakes, and poorer diet quality (Taveras et al., 2005). The literature has shown that 19-39 year olds, the age group where adolescents often move out of the home and transition into different life roles, were shown to consume the greatest percentage of fast food meals, as compared to other age groups across the lifespan (Nielsen, Siega-Riz, & Popkin, 2002).

It is likely that poor dietary behaviors will not only continue as young adults mature, but also worsen. Fruit intake has been shown to decrease steadily in both males and females as they transition out of high school (Baranowski et al., 1997; Cullen et al., 1999). High fat intakes have also been shown to be higher in college age young adults (ages 18-21) when compared to their high school counterparts (ages 14-17) (Baranowski et al., 1997). This trend is worrisome, due to the fact that the literature reports a continuing trend of poor dietary behaviors in college, as well as significant weight gain (Anderson, Shapiro, & Lundgren, 2003; Butler, Black, Blue, & Gretebeck, 2004; Graham & Jones, 2002; Levitsky, Halbmaier, & Mrdjenovic, 2004; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). In fact, being overweight or obese or having significant weight gain after age 18 has been linked with increased morbidity and mortality for all causes (Manson et al., 1995; Willett et al., 1995). Therefore, it is necessary that research focuses on this significant turning point in a young person's life, in order to protect health and promote better dietary behaviors.

The transition into college has been shown to be associated with other negative dietary behaviors. In one study, freshman weight gain was attributed to common dietary behaviors among students, including high consumption of "junk" foods, increased meal

frequency, eating at "all-you-can-eat" facilities (popular on many college campuses), and increased consumption of snacks (Levitsky, Halbmaier, & Mrdjenovic, 2004). NHANES data revealed that in college age females' (20-29 years old) intakes of total fat and saturated fat were above the recommended amounts (Hendricks & Herbold, 1998). Other research conducted in college student populations reports similar findings of high total fat and saturated fat intakes, as well as inadequate vitamin and mineral intakes (Hendricks & Herbold, 1998).

The change in living situations in the transition from high school to college may also produce significant changes in eating environments and options. The availability and adequacy of kitchens in college dorms varies from campus to campus. For many students, it may be the first time that they have needed to acquire the skills necessary to cook and prepare food. One study found that women living on college campuses tended to have higher protein and fat intakes, as well as higher levels of serum triglycerides, total cholesterol levels, and lower HDL cholesterol levels than college women living off campus, a trend indicating that dietary habits during college may differ, some of which may have a negative impact on health (Brevard & Ricketts, 1996). College campuses also support different types of eating environments than students may have previously experienced. These may include all-you-can eat dining facilities, snack food convenience shops, a close proximity of fast food restaurants and off-campus restaurants that cater to the "on-the-go" college student, as well as a lack of access to traditional grocery stores. When college students were asked where food was most often consumed or obtained, college students reported frequenting fast food restaurants the most, followed by vending machines, convenience stores, full-service restaurants, grocery stores, and ice cream

stores (Sneed & Holdt, 1991). Racette et al. (2005) found that 50% of freshman students ate fried or high-fat fast foods at least 3 times a week. Subsequently, 70% of the students surveyed had gained a significant amount of weight by the end of their sophomore year, although this weight gain was not associated with the dietary behaviors measured in this study (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005).

College and Stress

Stress is a common element in the college environment. In one study of 145 college students, 52.1% reported "being stressed during a typical semester" (Hudd et al., 2000). Of these students, 55.6% reported being "highly stressed" (Hudd et al., 2000). Major sources of stress for college students include changes in social activities, roommate conflict, changes in sleeping habits, changes in eating habits, increased school workloads, pressure for grades, and many others (Ross, Niebling, & Heckert, 1999). Misra et al. (2000) found that students in their first year of college were particularly vulnerable to stress, because of the conflict and stress of managing new responsibilities in unfamiliar environments. In a study of perceived stress in undergraduates, perceived stress levels were found to be in the middle range (range 0-40) (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). In another study of 300,000 freshman from 600 universities in the U.S., the percentage of students who felt "frequently" overwhelmed increased steadily from 16.0% in 1985 to a high of 25.3% in 1995 (Sax, 1997).

Stress has been tied to overweight and obesity in multiple populations. In youth, personal stress is significantly associated with variations in BMI levels and general and central adiposity (Yin, Davis, Moore, & Treiber, 2005). Also, psychological responses to

stress may occur that, in turn, create behavioral reactions to stress. One potential behavioral modification may be changes in eating behaviors that occur in times of stress.

Interaction between stress and dietary behaviors. The association between stress and poor dietary behaviors has been consistently shown in the literature. Oliver and Wardle (1999) found that the vast majority of students reported stress affecting their eating habits. During times of stress, studies have reported on the significant increase in consumption of "junk food," a positive correlation with snacking, more fatty food intake, less fruit and vegetable intake, and a reduced likelihood of breakfast consumption (Cartwright et al., 2003; Conner, Fitter, & Fletcher; Laitinen, Ek, & Sovio, 2002; Oaten & Cheng, 2005; Oliver & Wardle, 1999). One study of undergraduate college students found that when the students perceived higher amounts of stress, the overall amount of food that they consumed was influenced (both increased and decreased). The majority of students reported eating more snacks than usual, and the intake of specific foods, such as sweets, chocolate, cakes, and other snacks, increased (Oliver & Wardle, 1999). Another study reported that a majority of undergraduate students significantly increased their between-meal snacking in times of stress versus non-stressful periods (O'Connor & O'Connor, 2004). In times of stress, students who were currently trying to lose weight perceived that they were eating more between-meal snacks compared to non-stressful periods (O'Connor & O'Connor, 2004). Reasons for these variations have yet to be determined. Some research speculates that palatability and certain food components (i.e. carbohydrates and other "high density" nutrients) may influence mood and therefore be chosen in times of stress (Oliver & Wardle, 1999). Nevertheless, all of these dietary

behaviors have the potential to negatively influence health and weight status by promoting over-consumption of energy.

With regards to weight, it is interesting to note that an extensive review of the literature on the differences in stress-induced eating in obese versus normal weight individuals revealed that normal-weight individuals in general are unaffected by stress (Greeno & Wing, 1994). However, this study also reported that obese people are not at increased vulnerability to stress-induced eating as compared to normal-weight people (Greeno & Wing, 1994). This raises an interesting question about the mechanism by which people become or do not become stress-induced eaters. Dieting may prove to be an important mediator in this relationship. Dieting has been shown to increase the likelihood of hyperphagia when stressed compared to non-dieters (Oliver & Wardle, 1999). Other studies have presented similar results, with current dieting being significantly associated with stress eating, and current stress being strongly correlated with obesity (Willenbring, Levine, & Morley, 1986). Therefore, it is important to include current dieting in any investigation of stress and eating.

Influence of SSS on Diet and Stress

The influence of SSS on diet and stress has yet to be determined, due to the lack of research on SSS. However, the relationship between SES, diet, and stress has been well established, and it may reveal insight into the possible interactions with this new measure of subjective status.

Lower SES has been shown to be associated with multiple social and environmental events and factors which influence chronic stress and subsequently,

overall health (Baum, Garofalo, & Yali, 1999). Studies have identified stress as a possible mediating factor to explain how the effects of income, occupation, and education affect health (Baum, Garofalo, & Yali, 1999). Women in a low social position were found to have significantly lower levels of self esteem, poorer social support, higher job strain, poorer coping, and poorer quality of life (all which are stress related markers) than women in high social position (Wamala, Wolk, & Orth-Gomer, 1997). In addition, the women of low social position were almost 2.74 times more likely to be obese when compared to women in a high social position (Wamala, Wolk, & Orth-Gomer, 1997). This is significant, due to the fact that lower SES has been found to be strongly associated with visceral obesity and higher cortisol values in relation to perceived stress (Marin et al., 1992; Rosmond & Bjorntorp, 2000; Rosmond, Dallman, & Bjorntorp, 1998). In youth, stress is significantly associated with social disadvantage, regardless of whether the disadvantage is defined in terms of race/ethnicity or SES (Goodman, McEwen, Dolan, Schafer-Kalkhoff, & Adler, 2005).

SES has a strong effect on dietary habits (N. E. Adler et al., 1994; Baum, Garofalo, & Yali, 1999; Lien, Jacobs, & Klepp, 2002; Smith & Owen, 1992). Higher SES of individuals has been found to be associated with lower dietary fat, higher dietary fiber densities, higher fruit and vegetable intake, and lower overall sugar intake versus low SES of individuals (Lien, Jacobs, & Klepp, 2002; Smith & Owen, 1992). In one study of adult women, dietary habits accounted for 40% of the association between low social position and obesity (Wamala, Wolk, & Orth-Gomer, 1997). It is also interesting to note that the most significant dietary factors were total fiber, carbohydrate, and sucrose, not total fat or energy intakes (Wamala, Wolk, & Orth-Gomer, 1997). Men in

higher occupational grades and educational levels have been shown to have significantly better overall dietary profiles compared to men in the lower end of the gradient (Lynch, Kaplan, & Salonen, 1997).

Barriers to a healthy diet also exist at the lower end of the SES gradient. Lower SES women reported that they depend on convenience foods when they do not have time to prepare a meal, and other studies have supported this, showing that low and mid-SES individuals spend the least amount of time preparing and cooking meals, and are more likely to depend on ready-made foods (Greder & Brotherson, 2002; Inglis, Ball, & Crawford, 2005). Overall, lower SES women cited cost as the major purchasing consideration for healthy food (Inglis, Ball, & Crawford, 2005).

As previously stated, to date, there has been no research examining the interaction between SES, diet, and perceived stress. In addition, the impact of subjective perceptions of social rank on diet and stress has yet to be determined. Furthermore, there have been minimal studies in this area in the college-aged population. The data presented in this research proposal visibly show the need for increased research in this area.

Research Questions

No known studies have been conducted to examine the distribution of SSS within the college population. In addition, studies exploring the relationship between SSS, dietary behaviors, and stress have yet to be performed. By determining the prevalence of low and high social status in college students, and examining the relationship of SSS with two variables known to be associated with poor health outcomes (stress and unhealthy eating behaviors), possible explanations into the mediating factors of the SES-health

gradient may be determined. As a part of this goal, this study specifically described SSS in the incoming freshmen population, and addressed the relationship of social status and perceived stress on dietary behaviors. Specifically, this research:

1. Described the distribution of societal and school SSS among incoming freshmen students, in terms of socio-demographic categories such as race (White vs. non-white), age (traditional ages vs. non-traditional ages), and gender (male vs. female).
2. Determined the relationship between perceived stress levels and SSS indicators (societal and school status).
3. Determined the association between SSS (mean scores for society SSS and median scores for school SSS) and specific dietary behaviors, in terms of daily fruit intake frequency, vegetable intake frequency, snacking frequency, and fast food intake frequency.
4. Determined the relationship between perceived stress scores (mean scores) and specific dietary behaviors, in terms of daily fruit intake frequency, vegetable intake frequency, snacking frequency, and fast food intake frequency.
5. Analyzed if higher stress (perceived stress scores) and lower SSS (society and school status scores) increased the likelihood of poor dietary behaviors (frequency of daily fruit intake, frequency of daily vegetable intake, snacking frequency, and fast food frequency) in incoming freshmen at the University of Tennessee.

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Part II

Associations of Subjective Social Status, Perceived Stress and Dietary Behaviors in Incoming Freshmen

Abstract

The current study examined the relationship between subjective social status indicators, perceived stress, and unhealthy diet behaviors among 898 incoming freshmen students at the University of Tennessee, Knoxville. Diet was analyzed by assessing frequency of fruit intake, vegetable intake, snacking, and fast food intake for the month prior to the survey. Logistic regression analysis was used to determine the prospective risk of PSS and SSS on dietary behaviors. In the final, fully adjusted model, lower school SSS was associated with increased odds of meeting fruit and vegetable recommendations, lower society SSS was associated with a reduction in the odds of meeting fruit recommendations, and higher PSS was associated with increased odds of increased snacking frequency and frequency of fast food intake. This study suggests that incoming freshmen are in a transitional period in their lives and are assessing their social status differently, depending on their maturity. Results from the present study suggest that stress and social status appear to be associated with select dietary behaviors, and that these relationships may be affected by the unique transitional period in their lives.

Introduction

Entering college is a significant change of life event that bridges the passage between childhood and adulthood. It is considered a transitional period and is associated with multiple changes, both emotionally and physically (Wethington, 2005). It is often seen as the period of change from adolescence to young adulthood for traditionally-aged students. This is also a time for the development of health beliefs and health behaviors that have the potential to influence behaviors throughout an individual's life course (Baranowski et al., 1997; Wethington, 2005).

It has been widely published in the literature that adolescents are not meeting dietary recommendations and instead, are practicing unhealthy dietary behaviors that have been shown to impact health. This is of concern due to the impact that diet has on weight, an increasingly worrisome problem in the United States and for this population (Quatromoni, Copenhafer, D'Agostino, & Millen, 2002). The majority of adolescents do not meet dietary recommendations for fruits and vegetables (Nielsen, Siega-Riz, & Popkin, 2002). In college age students (18-24 year olds), most studies report that students eat fewer than the recommended five servings of fruit and vegetables per day (Lowry et al., 2000).

Other dietary behaviors of concern include snacking frequency and frequency of fast food intake among youth and young adults. Adolescents have been shown to have increased levels of energy intake from snacking (Jahns, Siega-Riz, & Popkin, 2001; Nielsen, Siega-Riz, & Popkin, 2002). Data from the Continuing Survey of Food Intakes by Individuals (CFSII) show that 2-18 year olds derived the highest proportion of calories from snacks (Jahns, Siega-Riz, & Popkin, 2001), more than any other age group (Nielsen,

Siega-Riz, & Popkin, 2002). Fast food is of concern, due to its positive association with higher energy and fat intake, and its negative impact on fruits and vegetables (French, Story, Neumark-Sztainer, Fulkerson, & Hannan, 2001). Fast food intake is a diet behavior of concern that has increased steadily in the past 20 years in adolescents and young adults (Nielsen, Siega-Riz, & Popkin, 2002). In one study of adolescents, researchers found that fast food consumption was associated with weight gain, increased total energy intakes, and poorer diet quality (Taveras et al., 2005). The literature has shown that young adults (greater than 19 years old), the age group where adolescents often move out of the home and transition into different life roles, were shown to consume the greatest percentage of fast food meals as compared to other age groups across the lifespan (Nielsen, Siega-Riz, & Popkin, 2002).

It is likely that poor dietary behaviors will not only continue as young adults mature, but also worsen. Fruit intake has been shown to decrease steadily in both males and females as they transition out of high school (Baranowski et al., 1997; Cullen et al., 1999). High fat intakes have also been shown to be higher in college age young adults (ages 18-21) when compared to their high school counterparts (ages 14-17) (Baranowski et al., 1997). This trend is worrisome, due to the fact that the literature reports a continuing trend of poor dietary behaviors in college, as well as significant weight gain (Anderson, Shapiro, & Lundgren, 2003; Butler, Black, Blue, & Gretebeck, 2004; Graham & Jones, 2002; Levitsky, Halbmaier, & Mrdjenovic, 2004; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). In fact, being overweight or obese or having significant weight gain after age 18 has been linked with increased morbidity and mortality for all causes (Manson et al., 1995; Willett et al., 1995). Therefore, it is necessary that research

focus on this significant turning point in a young person's life, in order to protect health and promote better dietary behaviors.

If unhealthy diets are a major factor in the diminished health of college students, then what is causing young adults to make unhealthy diet choices? The impact of socioeconomic status (SES) across the life course has been recognized by researchers as a primary influence on health and health differentials for many years. Studies of the association between socioeconomic status (SES) and health in developed nations have revealed a strong relationship with health (higher SES is associated with better health) (Adler et al., 1994). However, using traditional objective measures of SES (income, education, occupation) as a predictor of health outcomes has been shown to have many inconsistencies (Adler & Ostrove, 1999; Ball & Crawford, 2005; Ostrove & Adler; Winkleby, Jatulis, Frank, & Fortmann, 1992). In younger, more dependent populations (children and adolescents), the SES-health gradient is not consistently evident (Goodman, 1999). In adolescents transitioning to college, measuring the traditional SES markers is equally as difficult. SES markers may change during this transitional period from adolescence to young adulthood. As children, social status is determined primarily by familial social status, and, as adolescents mature, their self-conceptualization moves from one that reflects parental social status, to one that reflects their own perceptions of social status, independent of their family (Goodman et al., 2001). Nevertheless, many college students are still dependent on their families for financial and emotional support. Therefore, a college student's social standing may be based on both parental SES and the adolescent's own perception of his or her standing.

How people *feel* about their placement in society may shed more light on the moderators of the SES-health gradient. Research has begun to explore the relationship between *subjective* measures of SES and health, so that unique populations and their health may be better understood. Researchers have theorized that psychosocial influences on health may make the largest contribution to the socioeconomic gradient in health due to inequalities that result from social standing (Taylor & Seeman, 1999; Wilkinson, 1999). Perhaps more than material possessions alone, social comparisons of socioeconomic inequalities (material and non-material) may determine perceptions of inferiority, failure, and rejection which subsequently influence the health and behaviors of individuals (Wilkinson, 1999). It has only been recently that research has aimed to investigate these theories.

Subjective Social Status (SSS) has been defined as an individual's perception of his or her place in society (Davis, 1956). Two separate scales have been developed to measure SSS in the adult and adolescent population, respectively. The societal SSS subscale assesses perceptions similar to the traditional objective socioeconomic measures. The school community subscale allows the adolescent to make an individual decision about his/her subjective placement in the more proximal environment where students, both at the high school and college levels, spend most of their time. The level of autonomy in determining placement allows the individual to view SSS as she or he sees fit. A study by Goodman et al. (2001) validated the use of the MacArthur Scale-Youth Version as a reliable measure of SSS in adolescents (mean age 14.4 ± 1.6 years). Scores for both the adult and youth scale can range from one to 10 with one being low social status and 10 being the highest social status. Mean values for the few studies that

have used the youth specific SSS scale have ranged from 6.6 to 7.2 for the community ladder (adults), and from 7.3 to 7.6 for the school ladder (youth) (Goodman et al., 2003; Goodman et al., 2001; Goodman, McEwen, Dolan, Schafer-Kalkhoff, & Adler, 2005; Pealer & Weiler, 2003).

The literature supports a strong, inverse association between measures of subjective perceptions of social status and health in adults, entirely independent of objective SES (Adler, Epel, Castellazzo, & Ickovics, 2000; Singh-Manoux, Adler, & Marmot, 2003). In addition, the adult SSS sub-scale has been found to be a better predictor of overall ill-health and changes in health status than objective SES in adults (Singh-Manoux, Adler, & Marmot, 2003; Singh-Manoux, Marmot, & Adler, 2005). The results found in adolescent SSS studies are consistent with findings in adults. In two studies using the adolescent sub-scale, higher SSS was associated with a decreased likelihood of being overweight or obese (Goodman et al., 2003; Goodman et al., 2001). Initial work with this scale among young adolescents revealed that the perceptions of status in the more proximal school community were more strongly associated with health outcomes, more so than with the society subscale, although both were significantly associated with health (Adler, Epel, Castellazzo, & Ickovics, 2000; Goodman et al., 2001). This brings to light the importance and impact of the school community on adolescents and possibly college students. The use of variables that are reflective of school culture (respect, grades, and friendships) is important due to their impact on weight status in adolescents. Nevertheless, it is unclear what factors may be influencing the relationship between SSS and health.

Stress may have a significant influence on the SES-SSS-health relationship (Taylor & Seeman, 1999). Gruenewald et al. (2006) argue that threats to social esteem or status can cause significant changes in cognitive, emotional, and physiological states, that may effect mental and physical well-being. Low SSS has been found to be significantly associated with both chronic and subjective stress (Adler, Epel, Castellazzo, & Ickovics, 2000), as well as increased cortisol responses (a physiological marker for stress) (Gruenewald, Kemeny, & Aziz, 2006). Other psychological responses to stress may occur that create behavioral reactions to stress. One potential behavioral modification may be changes in eating behaviors that occur in times of stress. During times of stress, studies have reported on the significant increase in consumption of "junk food," a positive correlation with snacking, more fatty food intake, less fruit and vegetable intake, and a reduced likelihood of breakfast consumption in college students (Cartwright et al., 2003; Conner, Fitter, & Fletcher; Laitinen, Ek, & Sovio, 2002; Oaten & Cheng, 2005; Oliver & Wardle, 1999). Under stress, one study of college students reported eating more snacks than usual, and the intake of specific foods, such as sweets, chocolate, cakes, and other snacks, increased (Oliver & Wardle, 1999). Another study reported that a majority of undergraduate students significantly increased their between-meal snacking in times of stress versus non-stressful periods (O'Connor & O'Connor, 2004). Therefore, it appears that psychological stress impacts diet, and cannot be ignored when studying dietary behaviors. However, the relationship between stress, diet, and perceptions of social status has yet to be explored.

While exploring health behaviors in college students may have been challenging in the past, the advent of the internet has made accessing the college population a realistic

idea. Studies with college students have revealed that web based health surveys are appropriate for the college population and have good response and completion rates (Pealer & Weiler, 2003). In addition, the number of sensitive items that are completed is increased in web-based surveys compared to mailed paper surveys (Pealer & Weiler, 2003). A study collecting alcohol and drug use data in college students showed that the response rate was significantly higher for the web survey versus paper surveys, web respondents had less missing data, faster response times, and web surveys produced a more representative sample of the undergraduate population than the paper survey (McCabe, Boyd, Couper, Crawford, & D'Arcy, 2002).

The primary aims of this study were to investigate the distribution of SSS in a late adolescent/young adult transitional population (incoming freshmen), and to determine the association between SSS, stress, and unhealthy dietary behaviors. To our knowledge, no studies to date have explored the distribution of SSS or stress in the transitional period between adolescence and young adulthood. Although the impact of stress on diet has been explored, its relationship with subjective perceptions of social status has not. Likewise, the impact of SSS on diet has yet to be investigated. This report tests the following hypotheses: 1) lower SSS will be associated with unhealthy dietary behaviors, and 2) increased stress will be associated with unhealthy dietary behaviors.

Method

Participants

Data for the current study came from Wave I of the "Promoting Healthy, Happy, UT Graduates: Combating Stress and the Freshman 15" study conducted at the University of Tennessee, Knoxville (UTK). The target population for the larger study included all first time freshmen who were younger than 23 years of age and at least 18 years old prior to entering UTK in the Fall 2006 semester. Incoming freshmen were also required to have an established UT email account with the University by July 23, 2006. If incoming freshmen met these criteria (n = 3,951), they were sent an email through the UT email account and invited to participate in a web-based survey about health beliefs and behaviors within a five week time period that spanned the summer weeks prior to their arrival on campus and the first week of classes. As an incentive, students who completed the survey were eligible to be entered into a drawing to win an iPod. The survey and study format was approved by the University of Tennessee Institutional Review Board.

The larger study consisted of two parts (the second of which was optional); however, only the first part contained the variables of interest to this research. Therefore, only participants who completed in full all of the variables of interest in Part I of the study survey were included in the analysis for this study. Those who did not complete all of these variables were excluded from this present research study.

It is University policy that all single enrolled freshmen who do not commute from the home of their parent or legal guardian are required to live in University residence halls. The majority of the freshmen choose to reside in the residence halls. Therefore, in

order to maintain a sample of true *incoming* freshmen prior to arrival on campus, and to avoid any bias that may develop once they arrived on campus, only incoming freshmen who completed the survey prior to the first on-campus move-in day (August 19, 2006) were used in this analysis. Therefore, using the criteria previously described, the final sample used for analysis consisted of 898 incoming freshmen.

Measures

All measures were administered via a web-based survey designed and administered through SPSS mrInterview™ (SPSS, 2002-2005). mrInterview™ can be programmed so that answers are either required or not required to proceed through the survey. All of the variables used in this for this study required an answer in order to proceed to the next question or section and complete the survey.

Subjective social status (SSS). This study measured SSS using the McArthur Scale of Subjective Social Status (Goodman et al., 2003; Goodman et al., 2001). This measurement utilizes two subscales: one that assesses social standing as it relates to American society from a familial perspective, and one that assesses perceptions relative to a more immediate school community (Goodman et al., 2001) (figure 1).

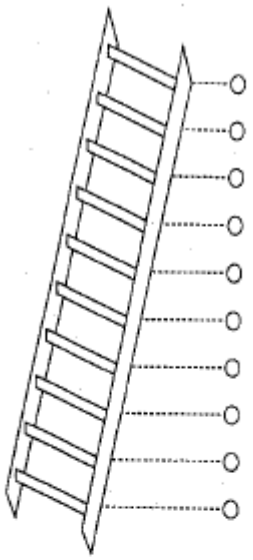
Briefly, each of the two scales utilizes a visual drawing of a ladder with ten rungs and allows the individual to assess his/her placement within a social hierarchy by choosing a ladder rung that reflects his/her standing in that environment. Each of the two subscales has specific directions that use either society or school as a referent environment. Both are scored as 1 to 10, with 1 as low and 10 as high social status.

An adaptation of the youth version of the MacArthur Scale of Subjective Social

1a. Imagine that this ladder pictures how American society is set up.

- At the top of the ladder are the people who are the best off--they have the most money, the highest amount of schooling, and the jobs that bring the most respect.
- At the bottom are people who are the worst off--they have the least money, little or no education, no job or jobs that no one wants or respects.

Now think about your family. Please tell us where you think your family would be on this ladder. **Fill in the circle that best represents where your family would be on this ladder.**



1b. Now assume that the ladder is a way of picturing your school.

- At the top of the ladder are the people in your school with the most respect, the highest grades, and the highest standing.
- At the bottom are the people who no one respects, no one wants to hang around with, and have the worst grades.

Where would you place yourself on this ladder? **Fill in the circle that best represents where you would be on this ladder.**

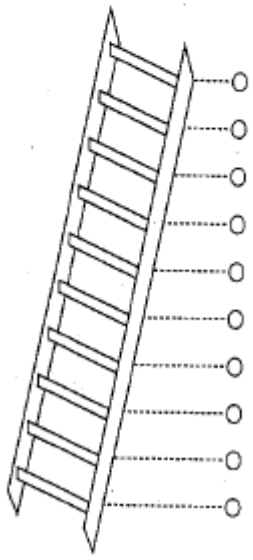


Figure 1.
Adult and youth sub-scales of the McArthur Scale of Subjective Social Status

Status was used to assess subjective perceptions of social status in this study population (Goodman et al., 2001). Verbiage in the directions for the school ladder was changed in order to more adequately portray the most proximal environment for incoming freshmen students (the word "school" replaced with "high school" and the word "GPA" added in next to "grades") (N.E. Adler, personal communications, October 1, 2005). The youth version of the scale has been validated for appropriateness for youth in grade 7 and higher, or approximately age 12 and older (Goodman et al., 2001). A detailed description of the scale validation is described elsewhere (Goodman et al., 2001).

Perceived stress scale (PSS). Stress was measured using the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983). The scale consists of 10 items that assess global measures of non-specific perceived stress. The questions ask individuals about their stress levels in the past month prior to being surveyed and are formatted in a 4-point rating scale from 0 (never) to 4 (very often). In each case, the respondents were asked how often they felt a certain way.

Within the scale, there are positively and negatively stated items. Scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1, and 4 = 0) to the four positively stated items (items 4, 5, 7, and 8). Then, scores are summed across all scale items. Scores can range from 0-40. Higher scores indicate higher perceived stress, while lower scores indicate lower perceived stress levels.

The scale has been designed to be used with subjects with at least a junior high school education. It has been validated for use with health outcomes and behavioral disorders in the college age population (Cohen, Kamarck, & Mermelstein, 1983). This scale is described in detail elsewhere (Cohen, Kamarck, & Mermelstein, 1983).

Dietary behaviors. Specific information regarding students' dietary behaviors for the month prior to completing the survey was gathered. In total, four dietary behaviors were assessed and used to determine the impact of SSS and PSS on diet: 1) average daily frequency of fruit intake, 2) average daily frequency of vegetable intake, 3) average daily snacking frequency, and 4) average weekly frequency of fast food intake. For the purpose of this study, all dietary behaviors were dichotomized to assess "healthy" and "unhealthy" diet behaviors (table 1).

To assess frequency of fruit and vegetable intake, students were asked about the number of times per day in the past month, on average, that they consumed fruit and vegetables. Fruit and vegetable questions used on the survey were adapted from the validated 1995 National College Health Risk Behavior Survey (NCHRBS) (Centers for Disease Control and Prevention, 2004). As with other studies that have used the fruit and vegetable questions from the NCHRBS, number of times per day of fruit and vegetable consumption was translated to daily servings of fruits and vegetables (Centers for Disease Control, 1997).

Table 1.
Dichotomization of dietary variables for logistic regression analysis

Diet Variable	Dichotomized into:
Fruit Intake	0 = < 2 servings per day; did not meet Healthy People 2010 objective 1 = ≥ 2 servings per day; met Healthy People 2010 objective
Vegetable Intake	0 = < 3 servings per day; did not meet Healthy People 2010 objective 1 = ≥ 3 servings per day; met Healthy People 2010 objective
Snacking frequency	0 = < 3 snacks per day; low snacking 1 = ≥ 3 snacks per day; high snacking
Fast food intake	0 = < 4 times per week; low fast food frequency 1 = ≥ 4 times per week; high fast food frequency

Adequacy of fruit and vegetable intake was assessed by dichotomizing fruit and vegetable results using Healthy People 2010 objectives for fruit and vegetable intake (at least two daily servings of fruit and at least three daily servings of vegetables) (U.S. Department of Health and Human Services, November 2000). Therefore, incoming freshmen either met or did not meet Healthy People 2010 objectives (table 1).

Snacking frequency was assessed by asking "During the past month, on average, how many times a day did you snack or eat between meals?" Snacking frequency was also dichotomized for the purpose of this study (table 1). Intake was assessed as high if the participant snacked at least three times per day, as per methods used previously (McNutt et al., 1997). Conversely, snacking frequency was considered low if the participant snacked less than three times per day (McNutt et al., 1997). Snacking questions were adapted from the validated 1995 NCHRBS and the 2001-2002 National Health and Nutrition Examination Survey (NHANES) (Centers for Disease Control, 2004).

One question taken from the National Heart, Lung, and Blood Institute's Growth and Health Study was used to assess weekly frequency of fast food consumption. Participants were asked to report for the previous month, on average, the number of times per week they ate at a fast food restaurant (Schmidt et al., 2005). Participants were asked, "During the past month, on average, how many times per week did you eat food from places like McDonald's, Kentucky Fried Chicken, Pizza Hut, Burger King, Krystal, Sonic, or some other fast-food restaurant?" Frequency of fast food consumption was assessed as follows: low fast food intake frequency (ate food from a fast food restaurant

less than four times per week) and high fast food intake frequency (ate fast food four or more times per week), as described in McNutt et al., 1997 (table 1).

Sociodemographic variables. Student demographics were obtained from the University Registrar's office and merged with study data (age, gender, race). Gender, race/ethnicity, and age have all been associated with differences in SSS (Goodman et al., 2003; Goodman et al., 2001; Singh-Manoux, Adler, & Marmot, 2003). Therefore, these variables were examined as potential confounders or moderating factors in the relationship between SSS, PSS and diet behaviors. For the purposes of this study, race/ethnicity was collapsed into a dichotomous white and non-white variable due to the overwhelming proportion of white students and minimal proportion of minorities (86.6% white vs. 13.4% non-white). Age was also dichotomized into a traditionally aged (18-19 year olds) and non-traditional aged (20-22 years old) variable (96.4% traditionally aged vs. 3.6% non-traditionally aged).

Statistical Analysis

All statistical analyses were performed using SPSS version 14.0 for Windows statistical software (SPSS, 2005). To describe the study population, chi-square tests were used to determine differences in proportions between genders, race, and age groups. To determine the difference in societal SSS and PSS means by dichotomous demographic and dietary variables, bivariate analyses were run using independent sample Student's t-tests for normally distributed variables (society SSS and PSS). Medians are reported for non-normally distributed school SSS scores. The non-parametric Mann-Whitney U test was used to compare differences in medians between dichotomous variables. Pearson's

correlations assessed the relationship between societal SSS and PSS, and Spearman rank correlations assessed the relationship between school SSS and societal SSS and PSS. Finally, logistic regression modeling assessed the independence of associations between social status indicators, PSS, and individual dietary behaviors. All of the dietary variables were assigned a binary value of 0 and 1 as previously described in table 1.

Four separate logistic regression models were run for each dietary outcome variable. In each of the models, societal SSS, school SSS, and PSS were included simultaneously. All models were adjusted for race (white, non-white), gender (male, female), and age (in years). Social status indicators (societal and school SSS) were reversed so that odds ratios (ORs) greater than one represented increased risk for an unhealthy dietary behavior. Means are reported with standard deviations (SD). For logistic models, ORs and 95% confidence intervals (CIs) are reported.

Results

In total, 3,951 incoming freshmen were sent an email to participate in the larger study. Of these, 1,289 (32.6%) accessed the survey. Of those who accessed the survey, 1,100 (85.3% of those who accessed the survey and 27.8% of the total sample who were invited to participate via email) completed all of the variables of interest to this study from Part I of the survey. After excluding those participants that completed the survey after move-in day on campus, we had a response rate of 22.7% of the total eligible sample, and 69.7% of those who accessed the survey (n = 898).

A complete description of the sample can be seen in Table 2. At the time of the survey, the majority of the sample was female (59.02% vs. 40.98% male; $p < 0.001$), white (86.6% vs. 13.4% non-white; $p < 0.001$), and either 18 or 19 years old (96.4% vs. 3.6% between 20 and 22 years old; $p < 0.001$). The mean age of the sample was 18.17 years old. Mean society SSS scores were not different between males and females or between traditionally aged and non-traditionally aged students. However, mean societal SSS scores were significantly higher for white freshmen as compared to non-whites ($p < 0.05$). School SSS medians were not significantly different by gender, race, or age. Stress scores were not significantly different between race or age categories. Females had higher stress scores than males ($p < 0.001$). Overall, the majority of the sample met the Healthy People 2010 objectives for frequency of fruit intake and frequency of vegetable intake, had a low daily snacking frequency, and a low weekly fast food frequency.

Table 2.
Description of study sample (N=898) by social status indicators and stress scores

	Total		Society SSS[a]		School SSS[b]		PSS[c]	
	N	Percentage	Mean ± SD	p-value	Median	p-value	Mean ± SD	p-value
Gender				0.550		0.900		<0.001
Male	368	40.98	5.53 ± 2.005		5.0		13.54 ± 6.544	
Female	530	59.02	5.45 ± 1.982		5.0		15.83 ± 6.613	
Race				0.035		0.954		0.075
White	778	86.6	5.53±2.021		5.0		14.73 ± 6.599	
Non-white	120	13.4	5.16±1.754		5.0		15.90 ± 7.112	
Age				0.887		0.316		0.231
Traditional	866	96.4	5.48 ± 1.993		5.0		14.94 ± 6.670	
Non-traditional	32	3.6	5.53 ± 1.951		4.0		13.50 ± 6.839	
Fruit Intake				0.220		0.195		0.716
Less than 2 servings/day	401	44.7	5.39 ± 2.039		6.0		14.98 ± 6.872	
2 or more servings/day	497	55.3	5.56 ± 1.949		5.0		14.82 ± 6.522	
Vegetable Intake				0.776		0.051		0.729
Less than 3 servings/day	229	25.5	5.45 ± 2.018		6.0		15.02 ± 7.051	
3 or more servings/day	669	74.5	5.49 ± 1.982		5.0		14.84 ± 6.549	
Snacking Frequency				0.583		0.150		<0.001
Low	708	78.8	5.46 ± 2.008		5.0		14.38 ± 6.418	
High	190	21.2	5.55 ± 1.926		6.0		16.77 ± 7.280	
Fast-Food intake				0.475		0.581		0.056
Low	737	82.1	5.46 ± 2.002		5.0		14.69 ± 6.596	
High	161	17.9	5.58 ± 1.942		5.0		15.80 ± 6.987	

Note. All p-values given indicate difference in means or medians between dichotomous categories.
[a] Society SSS ranges from 1-10 where higher score equal higher social status. [b] School SSS ranges from 1-10 where higher scores equal higher social status.
[c] PSS scores range from 0-40 where higher scores equal higher perceived stress.

Frequency distributions for both SSS indicators can be seen in Figure 2 and 3. Society SSS had a normal distribution (mean score 5.48 ± 1.99). However, in contrast, school SSS had a decidedly bimodal distribution (mean: 5.47 ± 3.11, modes: 2 and 9). PSS scores were normally distributed across incoming freshmen and had a mean of 14.89 ± 6.677.

Subjective social status indicators were highly correlated with each other ($r = 0.54$, $p < 0.001$). Neither social status indicator was correlated with PSS scores. Adjustment for age, sex, and race had no effect on these correlations.

Bivariate Associations Between Social Status, Stress, and Dietary Behaviors

There were significant differences in mean social status scores, median stress scores and dietary behaviors (table 2). For fruit intake, there were no differences in mean society SSS or PSS scores. Median school SSS scores were also not significantly different between fruit categories. For vegetable intake, school SSS medians were not significantly different between those who met and did not meet Healthy People 2010 vegetable recommendations, although they approached significance ($p = 0.051$). Societal SSS and PSS means were not significantly different across vegetable categories. PSS scores were significantly higher for incoming freshmen who had a high snacking frequency ($p < 0.001$). PSS scores were not significantly different by frequency of fast food intake categories. Neither social status indicator was significantly different by snacking or fast food intake categories.

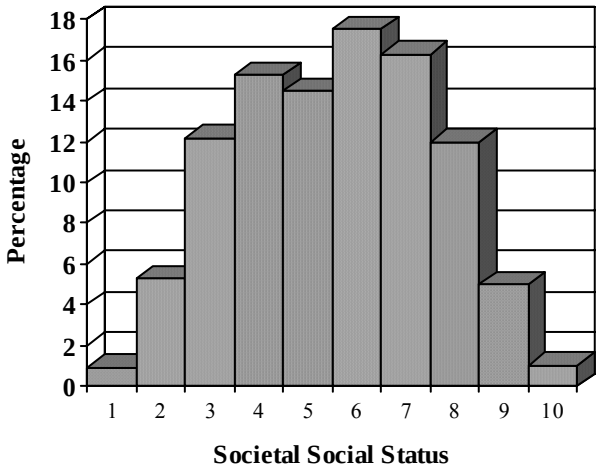


Figure 2.
Distribution of societal social status in incoming freshmen.

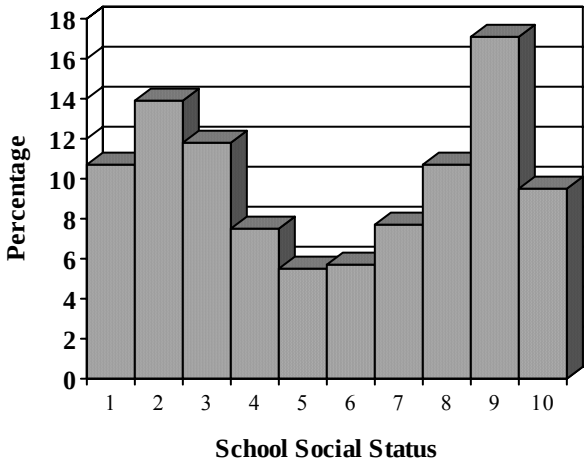


Figure 3.
Distribution of school social status in incoming freshmen.

Logistic Regression Modeling of the Association Between Social Status and Stress with Dietary Behaviors

Results of logistic regression modeling can be seen in Table 3. In the final, fully adjusted model, decreased societal SSS was associated with a 9% reduction in the odds of meeting Healthy People 2010 objectives for fruit intake (OR 0.91; 95% CI, 0.84, 0.99). In contrast, decreased school SSS was associated with a 6% *increase* in the odds of meeting Healthy People 2010 objectives for fruit intake (OR 1.06; 95% CI, 1.01, 1.12). PSS, race, gender, and age were not significantly associated with fruit intake.

For vegetable intake, only lower school SSS was showed a significant association with the odds of meeting the Healthy People 2010 objective for increased vegetable intake (decreased school SSS was associated with an 8% *increase* in the odds of meeting the Healthy People 2010 objective for vegetable intake, OR 1.08; 95% CI, 1.02, 1.15). PSS, race, gender, and age were not significantly associated with vegetable intake.

For snacking, increased PSS was associated (at the $p < 0.001$ level) with a 5% increase in the odds of being a high snacker (greater than or equal to three snacks per day) (OR 1.05; 95% CI, 1.03, 1.08). Neither social status indicator was associated with snacking frequency. In addition, race, gender, and age were not significantly associated with snacking.

Only race and age were significantly associated with the odds of fast food intake frequency. Non-white incoming freshmen showed 72% increased odds of being a high fast food eater (eating fast food four or more times per week) (OR 1.72; 95% CI 1.09, 2.72).

Table 3.
Logistic regression modeling of the association between Society SSS, School SSS, and PSS with unhealthy dietary behaviors

	Fruit Intake [a]		Vegetable Intake [b]		Snacking Frequency [c]		Fast Food Frequency [d]	
	OR	**CI**	**OR**	**CI**	**OR**	**CI**	**OR**	**CI**
Gender	0.80	0.61, 1.05	1.05	0.77, 1.43	0.95	0.68, 1.33	0.72	0.50, 1.02
Race	1.21	0.81, 1.79	0.80	0.52, 1.22	1.27	0.81, 2.00	1.72*	1.09, 2.72
Age	1.03	0.85, 1.25	1.09	0.86, 1.39	0.80	0.58, 1.09	0.57*	0.34, 0.95
Society SSS	0.91*	0.84, 0.99	0.93	0.85, 1.02	1.02	0.92, 1.12	0.96	0.87, 1.07
School SSS	1.06*	1.01, 1.12	1.08**	1.02, 1.15	0.95	0.90, 1.02	1.00	0.94, 1.07
PSS	1.00	0.98, 1.02	1.00	0.97, 1.02	1.05***	1.03, 1.08	1.03	1.00, 1.05

Note. Social status indicators (societal and school SSS) have been reversed so that Ors greater than one represents increased odds of performing a dietary behavior.

[a] Comparing those who do not meet Healthy People 2010 objectives for fruit servings per day and those who do. [b] Comparing those who do not meet Healthy People 2010 objectives for vegetable servings per day and those who do. [c] Comparing low snackers (<3 snacks/day) vs. high snackers (>= 3 snacks/day). [d] Comparing low fast food eaters (<4x/week) vs. high fast food eaters (>=4x/wk).

*p < 0.05. **p < 0.01. ***p < 0.001.

The model also showed that as age increased (age ranging from 18-22 years old), incoming freshmen had a 43% reduction in the odds of being a high fast food eater (OR 0.57; 95% CI 0.34, 0.95). Societal SSS, school SSS, PSS, and gender were not significantly associated with the frequency of fast food intake.

Discussion

This study reports on the relationship of subjective social status (societal and school) and perceived stress on unhealthy dietary behaviors in incoming freshmen. While other studies utilizing SSS have focused on overall health status and weight (Adler, Epel, Castellazzo, & Ickovics, 2000; Goodman et al., 2003; Goodman et al., 2001; Singh-Manoux, Adler, & Marmot, 2003; Singh-Manoux, Marmot, & Adler, 2005), this study aimed to explore the relationship of SSS to dietary behaviors known to influence health outcomes in this unique and highly vulnerable population. Our results revealed that while both measures of SSS and stress are associated with dietary behaviors, they do so in different manners. In incoming freshmen, society status and school status were associated with fruit intake. However, while lower societal status predicted decreased fruit intake, lower school status predicted *increased* fruit intake. In addition, lower school society status was also significantly associated with an *increase* in vegetable intake. Stress was significantly associated with both an increase in snacking and an increase in eating fast food. Neither SSS measure was significantly associated with snacking or fast food. In addition, SSS indicators were not correlated with PSS, leading us to believe that stress and social status in this population and for these behaviors do not share a relationship. While SSS has been proven to be related to specific health outcomes in multiple populations (Goodman et al., 2001; Singh-Manoux, Adler, & Marmot, 2003), these results reveal that the relationship between SSS and dietary behaviors, which have been shown to impact health outcomes (Anderson, Shapiro, & Lundgren, 2003; Butler, Black, Blue, & Gretebeck, 2004; Graham & Jones, 2002;

Racette, Deusinger, Strube, Highstein, & Deusinger, 2005), are not similar for this population.

This study also demonstrated the unique distribution of SSS in an incoming freshmen population, known to be a transitional stage in life. The strong correlation between society and school status means in this population was expected. Goodman et al (2001) has shown that as adolescents' age and mature, their perceptions of status in reference to different social environments have also been shown to mature and become more similar. However, while Societal SSS had an expected normal distribution, School SSS had an unexpected bimodal distribution, with the majority of the students perceiving themselves on the very low or high end of the social status spectrum. There are several possibilities for this. First, the period between high school and college can be seen as a significant transition in the life of an adolescent/young adult. Although Goodman et al demonstrated that the more proximal school ladder had a good 2-month test-retest reliability among adolescents (Goodman et al., 2001), it is possible that the transitional period influences the way that the incoming freshmen interpreted the school ladder. An incoming freshmen's lifestyle may have dramatically changed during this short period (i.e. began a short term job, began preparing for the move to campus, increased leisure time with friends, interacted with new peer groups, traveled, lived with parents, etc.) therefore influencing their interpretation of their most proximal environment (school). In addition, this transitional period may also reflect changing levels of maturity. As previously stated, a higher level of maturation has been shown to be reflective of a more reliable perception of social stratification (Goodman et al., 2001). However, not all incoming freshmen will be at the same maturity level. Some may see their school as their

primary environment, while others may have matured and broadened their perception of society, therefore relating to societal status more (Goodman et al., 2001).

Also, although the school ladder asked incoming freshmen to use "high school" as the referent environment, it is likely that many of them were actively thinking about their position in their upcoming new college environment. While students may have been comfortable with their social rank in high school, their thoughts and feelings about the unfamiliar future environment may have influenced status perceptions. In addition, the referent status indicators for the school ladder (respect, grades, and standing/popularity) may not be interpreted in the same manner by all students. One study has shown that attractiveness is a significantly more important factor in popularity than grades (Boyatzis, Baloff, & Durieux, 1998). Another study found that for older students, as studentship went up or improved, popularity actually decreased (Xie, Li, Boucher, Hutchins, & Cairns, 2006). Because Subjective Social Status allows the individual to perceive his/her status as he/she sees fit, it is possible that incoming freshmen may be choosing different indicators to make this decision.

The results of the logistic regression analysis reveal that SSS and stress are related to different dietary behaviors, independent of each other. Our results for the relationship of stress on food choice are supported in the literature, where increased stress has been shown to increase the consumption of high fat foods and increase snacking frequency (Oliver & Wardle, 1999; Zellner et al., 2006). Interestingly, neither SSS ladder shared a significant independent relationship with either of these dietary behaviors. Also, SSS indicators and stress were not significantly correlated. Although stress has been shown to share a strong relationship with subjective status indicators and objective measures of

SES (Adler et al., 1994; N. E. Adler, Epel, Castellazzo, & Ickovics, 2000; Wright & Steptoe, 2005), it appears that stress in the incoming freshmen population may not be a factor when determining social status.

Our results for fruit and vegetable intake were somewhat unexpected and puzzling. As we expected, decreased odds of fruit intake were seen with lower Society Social Status. However, an opposite effect was seen with school SSS for both fruit and vegetable intake. These contrasting results may be an artifact of the referents that the school ladder asks students to use when choosing their social status (respect, grades, and standing). It is widely known in the public health community that the majority of adolescents and young adults are not meeting fruit and vegetable recommendations (Krebs-Smith et al., 1996; Munoz, Krebs-Smith, Ballard-Barbash, & Cleveland, 1997). Researchers have found that perceived friend intake and the direct modeling of behavior between peers have been positively associated with fruit and vegetable intake (Lau, Quadrel, & Hartman, 1990; Rasmussen et al., 2006). Adolescents and young adults may choose to use "standing" as their primary reference when choosing social status. Knowing that social support and popularity are a factor that is assessed when determining social status, it appears possible that adolescents and young adults, who may perceive their status as "high" and rank themselves accordingly, are turning to their peers for influence and are only seeing unhealthy diet behaviors, which in turn, supports their own unhealthy behaviors. However, if an adolescent or young adult chose to use "grades" as the primary referent to determine social status, he/she may perceive his/her social status differently. For example, low academic achievement has been found to be associated with a lower frequency of fruit and vegetable consumption (Rasmussen et al., 2006).

This disconnect between the referent terms for School Social Status may help explain why the social status indicators, although highly positively correlated, showed this opposite relationship.

There are several limitations to this study. The validity of the diet variables themselves may be influencing the relationships in this study. Neither the fruit nor the vegetable question defined what a fruit or vegetable was. Because of this, high calorie or high fat foods, such as fruit juice and potatoes or French fries, may have been considered a fruit or a vegetable (Champagne, Bogle, & Karge, 2002; Krebs-Smith et al., 1996). This would cause a superficial increase in the frequency of fruit and vegetable intake and thus skew the results. Second, although the school SSS ladder has been validated for use among adolescents (mean age 14.4 years old) (Goodman et al., 2001), it has not been validated in this highly transitional period of adolescence to young adulthood. Perhaps the school ladder is no longer valid once adolescents reach a certain state of maturity. In addition, it is still unclear where school status and societal status finally meet and overlap. The strong linear correlation between the two scales would suggest that this is happening during this significant life change; however, further research in this area is warranted. Because this study is cross-sectional, we could not explore causal mechanisms that could explain the associations seen in this paper. Further studies must be initiated to determine the impact of other potentially important factors on diet, such as objective measures of SES, parental intake, school related factors, psychological factors, and self efficacy (Baranowski, Cullen, & Baranowski, 1999; Chung, Hoerr, Levine, & Coleman, 2006; Feunekes, de Graaf, Meyboom, & van Staveren, 1998; Greene et al., 2004; Krebs-Smith et al., 1995; Laforge, Greene, & Prochaska, 1994; Neumark-Sztainer,

Wall, Perry, & Story, 2003; Sax, 1997; Trudeau, Kristal, Li, & Patterson, 1998). Although the study consisted of a large sample size, the sample is not representative of other Universities and Colleges within the country. In addition, the study was designed so that students would self-select themselves to participate in the online survey (only 27.8% of the eligible incoming freshmen sample did so). To allow this study to be more generalizable to the full incoming freshmen population, when admission statistics are available from the University of Tennessee, self-selected non-responders can be compared with non-responders and weights can be created to account for demographic differences in responses. However, these admission results are not yet available. Lastly, although the use of web-based health surveys has shown to be as or more effective than paper-based surveys (McCabe, Boyd, Couper, Crawford, & D'Arcy, 2002; McCabe, Boyd, Young, & Crawford, 2004; Pealer & Weiler, 2003), the questions used in this study have not been previously validated for use in a web-based survey. This limitation most significantly impacts the interpretation of the social status ladders, as it is unclear whether or not the ladder visual was interpreted in a similar manner as it is on paper.

Despite these limitations, the results of this study shed light on the shared relationship between social status and stress. Although social status is associated with health outcomes in both adolescent and adult populations, it is clear from this research that, in the incoming freshmen population that was studied, it is not necessarily associated with dietary behaviors that have been shown to influence these health outcomes. Our findings also add to the growing body of evidence that psychosocial determinants of health share a significant relationship with health behaviors. Future

research should be aimed at measuring social status in diverse populations, in addition to studying the mechanisms by which social status influences weight status.

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Appendix

Expanded Methodology

Introduction

This study described SSS in the incoming freshmen population, and assessed the relationship of social status and perceived stress on dietary behaviors. Specifically, this research:

1. Described the distribution of societal and school SSS among incoming freshmen students, in terms of socio-demographic categories such as race (white vs. non-white), age (traditional ages vs. non-traditional ages), and gender (male vs. female).
2. Determined the relationship between perceived stress levels and SSS indicators (Societal and School status).
3. Determined the association between SSS (mean scores for societal SSS and median scores for school SSS) and specific dietary behaviors, in terms of daily fruit intake frequency, vegetable intake frequency, snacking frequency, and fast food intake frequency.
4. Determined the relationship between perceived stress scores (mean scores) and specific dietary behaviors, in terms of daily fruit intake frequency, vegetable intake frequency, snacking frequency, and fast food intake frequency.
5. Analyzed if higher stress (perceived stress scores) and lower SSS (society and school Status) increased the likelihood of poor dietary behaviors (frequency of daily fruit intake, frequency of daily vegetable intake, snacking frequency, and fast food frequency) in incoming freshmen at the University of Tennessee.

Brief methodologies were provided in Part II of this thesis. The following details the expanded methodology of this project. First, an overview of the *Promoting Healthy, Happy, UT Graduates: Combating Stress and the Freshman 15* pilot study is provided, followed by a description of the methods used to complete this thesis.

Research Design and Methods

Promoting Healthy, Happy, UT Graduates Pilot Study as Source of Secondary Data Analysis

Data for this study were baseline results from Promoting Healthy, Happy, UT Graduates: Combating Stress and the Freshman 15, a pilot study aimed at understanding health behaviors and beliefs of college students that lead to unhealthy behaviors and ultimately to poor health outcomes, such as dietary behaviors and weight. By identifying students at risk, the researchers hope to be able to be proactive in promoting lifetime healthy weight and academic success. The survey and study format was approved by the University of Tennessee Institutional Review Board.

As this study is still underway, complete methods from this study are not yet fully available; however, select methodology and results from the study are described in the following text.

The pilot study has been divided into three waves over one academic year at the University of Tennessee. The study was funded by a grant from the University of Tennessee, Knoxville. Incoming freshmen students were first invited to participate in the web-based survey prior to coming to the university, and will be invited to participate in two more waves during 2-week time periods during their first year at UT. Participation for wave 1 occurred in a two week time period prior to entering UT (July 24-August 7, 2006). This time period was then extended another three weeks to August 26 (which crossed the first day of school) in order to increase participation rates. It is anticipated that wave 2 will occur at the end of fall semester (November 6-20), and wave 3 at the end of spring semester (April 9-23).

The two-semester, three wave survey pilot study is designed to provide preliminary data for submission of an NIH grant to fund a 5-year longitudinal study. A series of formative studies (focus groups, ethnographic studies) were conducted in Spring 2006 to determine important health and academic behaviors of students, as well as preferred incentives and interest in participation in the pilot survey. This information was then incorporated into the pilot study, web survey, and methods of the study. Wave I of the pilot was conducted by the Department of Nutrition and the Center for Physical Activity and Health as part of a larger collaboration including a multidisciplinary team across The University of Tennessee.

The web-based survey was accomplished through the use of SPSS mrInterview online survey software (SPSS, 2002-2005). This program allows for web-based survey and subsequent data collection in an easy-to-use format. The program can be manipulated so that a response is required for questions in order to proceed. For the Promoting Healthy, Happy, UT Graduates pilot study, answers were required for the majority of questions, but not for all. Criteria for requiring or not requiring an answer was determined according to the level of sensitive information that a question collected. For the research study discussed in this thesis, all of the variables included in the analysis required an answer when taking the survey. The use of the survey program is managed by the University statistician.

The wave I survey was divided into two portions (parts I and II) in order to improve participation and completion rates by decreasing the respondent demand. Completion of part I was required in order to be eligible for the incentive. Part II of the

survey was not required. More detailed behavior questions were asked in part II. The anticipated completion time for each part of the survey was 5-10 minutes.

At the beginning of the study, students were informed of the risks, benefits, and purpose of the study in the study information sheet that appeared when the students began the survey. As compensation for completing the study, students were informed that they would be entered into a drawing to win one of 100 1GB iPod nano Mp3 players. Students were given the same option of eligibility for the iPod drawing after completing part I, but were also given the opportunity to "double-dip" and have their name entered into the drawing twice by completing part II. This was done in order to improve response rates.

Participants

The target population for the larger study included all first time freshmen who were younger than 23 years of age and at least 18 years old prior to entering UTK in the Fall 2006 semester. Incoming freshmen were also required to have an established UT email account with the University by July 23, 2006. If incoming freshmen met these criteria (n = 3,951), they were sent an email through the UT email account and invited to participate in a web-based survey about health beliefs and behaviors within a five week time period that spanned the summer weeks prior to their arrival on campus and the first week of classes. The Student Data Resources (SDR) center at the UTK Registrar's Office sent NetID's (unique university identifiers that are assigned to all students) to a university statistician. The statistician then created a listserve containing the UT email addresses of the eligible incoming freshmen and this listserve email address was sent to

the researchers. The principal investigators then sent out a recruitment email to all incoming freshmen via this listserve. A simple website was created for this study by the study statistician and the website was inserted as a link into the email. By clicking the link within the email, the student was then directed to the website, and within this website the incoming freshmen could then be linked to the live web-based survey. The live survey link was very lengthy and messy, so this procedure allowed the participant to easily access the survey through a clean link. The recruitment email read as follows:

July 24, 2006

TO: UT Freshmen
FROM: Freshman 15 Study Coordinators
SUBJECT: Your invitation to participate in the "Healthy, Happy UT Graduates: Combating Stress and the Freshman 15 Study" and a chance to win one of 100 1GB iPod nanos!

Dear UT Freshman,
Several departments on campus are asking your help to understand your opinions about eating, physical activity, stress, and other interesting facts by completing a survey. The information gathered from the survey will be confidential and the results will only be presented as group means – no individual identifiers will be used and no one will be able to link you to your responses.

There are two parts to the survey. Each part will take about 5-10 minutes to complete. If you choose to complete only part I, you will be eligible to win one of 100 1GB iPod nanos to start your freshman year!

If you choose to complete BOTH parts I and II, your name will be entered into the drawing TWICE!

We hope you will enjoy taking both parts of the survey and we thank you for Volunteering!!

To begin, please click on this link: http://cehhs.utk.edu/mylife.html
Please keep this email; if you run out of time, you can come back and finish the survey any time until August 25

The survey website appeared as follows:

Welcome to the "Promoting Healthy, Happy, UT Graduates: Combating Stress and the Freshman 15" Study!

We thank you for your participation and wish you luck on winning one of 100 1GB iPod nanos!

When you click the link below, you will be asked to provide a password. The password is your NetID, which is the first part of your new UT email address (for example, if your email were utstudent@utk.edu, "utstudent" would be your NetID). Once you enter your password, you can begin the survey.

If you run out of time, you can come back and finish the survey at any time until August 25. Just click on the same link below, re-enter your NetID, and you will re-start at the place where you left off.

Click here to log into the survey.

On July 23, 2006, this first participation email was sent to incoming freshmen via their University given email address. After one week, using data collected by the UT statistician, all participants who had completed the survey were dropped from the eligible participant listerve. A second, very similar follow-up email was sent to the remaining eligible sample of incoming freshmen one week after the initial email. This process continued for two more weeks, where incoming freshmen who had not completed the survey were sent reminder emails inviting them to participate in the study. Reminder emails were sent a total of three times. Once classes began on August 23, 2006, students continued to be invited to participate via a website advertisement on the internet site www.facebook.com (a popular college internet community and blogging site) and through a school newspaper advertisement (in the Daily Beacon) into the first week of the start of classes. The survey was closed to students after August 26, 2006.

In total, 3,951 incoming freshmen were emailed to participate in the study. Of these, 1,289 (32.6%) accessed the survey. Although the complete survey consisted of two parts (the second of which was optional), only the first part contained the variables of interest to this current study. Of those who accessed the survey, 1,100 (85.3% and 27.8% of the total eligible) completed part I of the survey. It is University policy that all single enrolled freshmen who do not commute from the home of their parent or legal guardian are required to live in University residence halls. The majority of the freshmen choose to reside in the residence halls. Therefore, in order to maintain a sample of true *incoming* freshmen prior to arrival on campus, and to avoid any bias that may develop once they arrived on campus, only incoming freshmen who completed the survey prior to the first on-campus move-in day were used in this analysis. Students who completed the survey after August 18, 2006 were dropped for the purposes of this study. Therefore, the final sample used for analysis consisted of 898 incoming freshmen.

Measures

Measures for adult SSS, stress, and dietary variables are discussed in detail in previous sections of this thesis.

Adapted version of the McArthur scale of Subjective Social Status. In order to relate the previously validated youth version of the McArthur scale of SSS to incoming freshmen (in transition from adolescence to adulthood), changes to verbiage were discussed via email with Nancy E. Adler, PhD, a primary investigator in the development of the ladder for adults and validation of the scale in adolescents. In response to a list of questions sent to her on October 1, 2005, Nancy Adler replied:

1. *I would definitely ask the SES ladder in relation to their families. College students are in a transition period from family to independence, and there is some homogeneity in terms of their own SES (they all have the same educational level, occupations are not yet relevant and income differences are less substantial since even students from affluent families may not have substantial incomes themselves).*
2. *In terms of the community ladder, I would tend towards using the university as the reference. The dorm is quite narrow and it's not clear how much of a reference this is for all students. My guess is that students develop their own communities within the university but this may not be based on dorm residence but other factors (e.g. fraternity or sorority, sports team, theater group, people in their major). For freshmen, the dorm may be somewhat more relevant, but this will then change if you want to do this over time.*
3. *It would be interesting to see change in SSS over time. Although it would be very interesting to see the change from high school to college (where my guess, like yours, is that relative status is likely to drop on average), you'll have to interpret this with caution since the high school ratings would be done retrospectively and there could be either a "rosy glow" of positive memory or a negative skew if they are now feeling low on the totem pole.*
4. *Negative affect and/or depression would be good to get; it may serve as confounders of reporting but, more importantly, it may mediate the effects of lower status on behavior and emotion PSS and depression have a high correlation so it may not be necessary if you are short on time. PSS measures a global sense of overload--you might also consider the Impact of Event Scale which assesses responses to a specific stressor (which, for freshmen, would be starting college)--it gives you a measure of intrusive thoughts and avoidant responses.*

   Hope this is helpful. Let me know if you would like to discuss this further. In any event, I hope you'll keep me posted on the findings! Nancy

Based on these responses, it was decided that wave I of the pilot would ask about social status in the context of both familial status (the adult version, unchanged) and in an adapted version that uses "high school" as the reference instead of the more broad "school" reference. The use of "high school" as the reference environment was necessary, due to the fact that the students had not yet entered college, and their only

local reference was their former high school environment. Substitution of the words "high school" for the word "school" and the addition of GPA as an additional reference for grades are the only items that wer altered in the youth version of SSS.

Part I, Wave I of the Promoting Healthy, Happy, UT Graduates pilot study. Once incoming freshmen accessed the survey website via the survey webpage, they were prompted for their University given netID. If they had not yet completed the study, they were then directed to the study information page. Study information was broken up across three screens. In order to proceed and begin the survey, the student was instructed to click on a button marked "next" clearly marked on the bottom of each of the screens once they had completed reading that section. The "next" button was located at the bottom of every survey page. In addition, a button marked "stop" was located to the left of the "next" button, so that survey participants could stop at any time. If they clicked the stop button, participants were routed back to the survey website. Participants could re-enter the survey at any time and begin where they had left off until they completed the survey in its entirety. Each time participants re-entered the survey, they were prompted for their netID so that completion could be verified. Survey questions were divided among internet pages according to subject, readability, space, and appearance. Questions were grouped together on the same screen if they could fit in the viewing screen without having to scroll down to read questions. No more than three separate questions were grouped on a page together. Questions that consisted of the same answer options were usually grouped onto grids with minimal scrolling. The following is the complete text version of Part I, Wave I of the *Promoting Healthy, Happy, UT Graduates* pilot study.

Promoting Healthy, Happy, UT Graduates:

Combating Stress and the Freshman 15 web-based survey (Wave 1) pilot.

Study Information Sheet

Introduction

You have been invited to participate in a research project. The purpose of this study is to understand your opinions about weight change, eating, physical activity, stress, and other interesting facts. The primary researchers for this study are professors from The University of Tennessee and there are no commercial sponsors. In addition, if you complete the survey, you will be eligible to be entered into a drawing to win one of 100 1GB iPod nano Mp3 players! Also, at the end of this survey, you will be able to to complete a second, optional survey. If you complete the second survey, your name will be entered twice into the drawing and you will double your chances of winning!

Information about your involvement in this study

To participate in this study, you must be at least 18 years old, and a first-time freshman student enrolled in the fall 2006 semester. As a participant in this study, your task is to complete an online survey that asks a series of questions regarding your life before you begin college.

To begin, you will be asked to register by providing your NetID. No identifying information will be associated with your responses. A statistician at the Statistical Consulting Center (SCC) will first link your demographic information (age, sex, etc.) that you provided to the University to your NetID. Then, the statistician will remove your NetIDs and replace them with a random number before giving the data to the research team. All results will be reported as group means or averages. No one other than the research team will have access to the data.

The first few questions will ask general information about you. The next questions will ask about your diet, physical activity, stress, and other interesting things about yourself. The second survey asks more detailed questions.

The expected amount of time needed to complete each survey is 5-10 minutes (a total of 10-20 minutes if you complete both surveys).

Risks

The risks of participating in this study are minimal and no greater than those encountered in daily life. Confidentiality of data will be maintained by the investigators. No identifiers will be used to link you back to the information you have entered into the survey unless you choose to participate in a more detailed laboratory study and give us permission. All data will be stored on secure servers in the SCC. Although all efforts

will be made to maintain confidentiality, researchers cannot fully control confidentiality of research conducted through the internet. The presence of internet hackers poses minimal risk to this study.

Benefits
The results from this study will provide greater knowledge regarding how eating, physical activity, stress, and other health behaviors change between high school and college. The long term benefit of such research is to assist students' health behaviors while in college so that you may have better health outcomes later in life. Nevertheless, specific benefits cannot be guaranteed for any individual participant. The chance to win an iPod is an added incentive.

Confidentiality
As previously stated above, confidentiality of data will be maintained throughout the study and all data will be stored securely. Data will only be available to the persons conducting the study unless you specifically give permission in writing to do otherwise. No reference will be made in oral or written reports which could link you to the study.

Compensation
If you complete this study, you will be eligible for a random drawing for one of 100 1GB iPod nano Mp3 players! In addition, if you complete the second optional survey, you will be entered into the drawing again and your chances of winning will be doubled! You must complete each survey in its entirety to be entered into the drawing. Only one entry per person per survey will be accepted.

Contact
If you have questions at any time about the study or procedures, you may contact the researcher, Dr. Lisa Jahns, at 213C Jessie Harris, or (865) 974-6248. If you have questions about your rights as a participant, contact the Office of Research Compliance Officer at (865) 974-3466.

Participation
Your participation in this study is voluntary, and you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at anytime without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed, your data will be destroyed. Completion of the online survey (questionnaire) constitutes your consent to participate.

If you are ready to begin the survey, click the button marked "next".

PART I

<u>General Information</u>

Where do you plan to live this semester? (Please choose only one answer)
1 College dormitory or residence hall
2 Fraternity house
3 Other university/college housing
4 Off-campus house or apartment
5 Parent/guardian's home
6 Other

With whom do you plan to live this semester? (Please choose only one answer)
1 Alone
2 Spouse/domestic partner
3 Roommate(s)
4 Parent(s)/guardian(s)
5 Other relatives
6 Your children
7 Other

The next few questions ask about your current diet, physical activity, and feelings about your weight.

During your senior year in high school, were you on a varsity athletic team?
1 yes
2 no

If yes is chosen, participant will be routed to:
Please list sport(s) played

_____
_____
_____

IPAQ
We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days.** Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ **days per week**

No vigorous physical activities → **Skip to question 3**

2. How much time did you usually spend doing vigorous physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

No moderate physical activities → **Skip to question 5**

4. How much time did you usually spend doing moderate physical activities on one of those days?

_____ **hours per day**
_____ **minutes per day**

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

No walking → **Skip to question 7**

6. How much time did you usually spend walking on one of those days?

_____ **hours per day**

_____ **minutes per day**

Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**
_____ **minutes per day**

Don't know/Not sure

What is your height without shoes?
Feet_____ Inches_____

What is your weight in pounds?
_____

How do you describe your weight?
1 Very underweight
2 Slightly underweight
3 About the right weight
4 Slightly overweight
5 Very overweight

This summer, how has your weight changed?
1 Stayed the same
2 Decreased a lot
3 Decreased a little
4 Increased a little
5 Increased a lot

In the past month, which of the following were you trying to do about your weight?
1 Lose weight
2 Gain weight
3 Stay the same weight
4 I am not trying to do anything about my weight

How do you tend to eat on days when you feel <u>moderately</u> stressed?
1 Much less than usual
2 Moderately less than usual

3 No change
4 Moderately more than usual
5 Much more than usual

How do you tend to eat on days when you feel <u>extremely</u> stressed?
1 Much less than usual
2 Moderately less than usual
3 No change
4 Moderately more than usual
5 Much more than usual

During the past month, on average, how many times a day did you eat fruit?
1 0 times
2 1 time
3 2 times
4 3 or more times

During the past month, on average, how many times a day did you eat vegetables?
1 0 times
2 1 time
3 2 times
4 3 or more times

On average, how many alcoholic drinks do you usually drink each week? (a drink is bottle beer, glass of wine, mixed drink)

<u>Answer: (drop down box from 0-24+, including no answer)</u>

<u>If answered anything except 0 or no answer above:</u>

On average, when you drink alcohol, what kind do you normally drink?
1. regular beer
2. light beer
3. wine
4. wine cooler/breeze/sweet beverage
5. mixed drink

On average, how many caffeinated beverages do you usually drink each week? (a drink is a can of caffeinated soda or a cup of caffeinated coffee or tea)

<u>Answer: (drop down box from 0-24+, including no answer)</u>

<u>If answered anything except 0 or no answer above:</u>

Please describe the type of caffeinated beverage you normally drink, and how much (i.e. cups, small, medium, large, tall, grande, venti, etc.)

_____
_____
_____

When you feel stressed, does your intake of caffeinated beverages change?
1 Decreases a lot
2 Decreases a little
3 Stays the same
4 Increases a little
5 Increases a lot

During the past month, on average, how many times a day did you snack or eat between meals?
1 0 times
2 1 time
3 2 times
4 3 or more times

During the past month, on average, how many times per week did you eat food from places like McDonald's, Kentucky Fried Chicken, Pizza Hut, Burger King, Krystal, Sonic, or some other fast-food restaurant?

1 Never or less than 1 time per week
2 1 to 3 times per week
3 4 to 6 times per week
4 7 to 9 times per week
5 10 or more times per week

The questions in this scale ask you about your feelings and thoughts during the **last month**. In each case, please indicate with a check how often you felt or thought a certain way.

In the last month, how often have you been upset because of something that happened unexpectedly?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you felt that you were unable to control the important things in your life?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you felt nervous and "stressed"?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you felt confident about your ability to handle your personal problems?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you felt that things were going your way?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you found that you could not cope with all the things that you had to do?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you been able to control irritations in your life?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

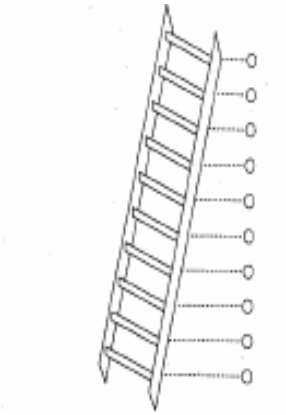
In the last month, how often have you felt that you were on top of things?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you been angered because of things that were outside of your control?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
0 Never
1 Almost never
2 Sometimes
3 Fairly often
4 Very often

The next 2 questions ask about where you and family "fit" into society.

Imagine that this ladder pictures how American Society is set up.



- At the top of the ladder are the people who are the best off – they have the most money, the highest levels of education, and the jobs that bring the most respect.

- At the bottom of the scale are the people who are the worst off - they have the least money, little or no education, no job or jobs that no one wants or respects.

Now think about your family. Please tell us where you think your family would be on this ladder. **Fill in the circle that best represents where your family would be on this ladder.**

Imagine that this ladder is a way of picturing your high school.

- At the top of the ladder are the students in your school with the most respect, the highest grades, and the highest standing.

- At the bottom of the scale are the students who no one respects, no one wants to hang out with, and have the worst grades.

Where would you place yourself on this ladder? **Fill in the circle that best represents where you were on this ladder during your last year in high school.**

Would you be willing for us to contact you again to ask you to participate in a separate detailed study of weight gain, physical activity, and diet? You are not committing to participate; we would only like to ask your permission to email you.

1 Yes
2 No

Would you like to participate in a second survey to double your chances of winning a 1GB iPod nano Mp3 player? This survey should take approximately 10 minutes to complete.

1 Yes If "yes", continue on to PART II survey.
2 No If "no", continue to comments section and end survey.

We value your opinion, and thank you for comments and/or suggestions regarding this survey. Please provide any comments and/or suggestions in the space provided.-

No answer

CONGRATULATIONS! For completing this survey, you are now entered into a random drawing to win one of 100 1GB iPod nano Mp3 players!!! If you are selected as a winner of the drawing, you will be contacted by email after August 28 to collect your prize.

UT provides support for students as you transition into college. If you have questions or concerns please contact the student counseling center:

Address: 900 Volunteer Blvd, Knoxville, TN 37996-4250

Phone: (865) 974-2196

Email: studentcounseling@utk.edu

End of interview. Thank you for your participation.

Methods for this Thesis

This section provides an expanded discussion of the methods not discussed in previous sections of this thesis.

Expanded Statistical Analysis

Concurrent with a primary objective of this study, the researcher explored the use of stepwise logistic regression analysis in order to determine the individual and combined relationship of PSS and SSS on dietary behaviors. Stepwise logistic regression allows researchers to examine the relationship of independent variables to both the outcome variable and with each other.

Separate logistic regression models were run for each social status indicator and PSS. Next, in successive order, all possible combinations of the three dependent variables were tested in logistic regression models (society SSS and school SSS; society SSS and PSS; school SSS and PSS; and societal SSS, school SSS, and PSS). These models assess the relationships and possible interactions between independent variables and how these interactions impact the model's relationship with the individual dietary behaviors. All models were adjusted for race/ethnicity (white, non-white), gender (male, female), and age (in years). Social status indicators (Societal and School SSS) were reversed so that odds ratios (ORs) greater than one represented increased risk for an unhealthy dietary behavior. Means are reported with standard deviations (SD). For logistic models, ORs and 95% confidence intervals (CIs) are reported.

Expanded Results

Results of the stepwise modeling can be seen in table 4. None of the separate indicator models were significantly associated with meeting the Healthy People 2010 objective for fruit intake. Lower school SSS was associated with an increase in the odds of meeting the Healthy People 2010 objective for vegetable intake (i.e. lower school SSS associated with higher intakes of vegetable consumption) (OR, 1.05; 95% CI, 1.00, 1.11). PSS was independently associated with the odds of high snacking frequency (OR, 1.05; 95% CI, 1.03, 1.08) and high fast food frequency (OR, 1.03; 95% CI, 1.00, 1.05).

For snacking frequency, PSS maintained the same ORs and levels of significance throughout each of the regressions, regardless of the social status indicators in the model. PSS was not associated with fast food intake. Neither social status indicator was significantly associated with increased snacking or fast food frequency in any of the models. In the final, fully adjusted model, increasing PSS was significantly associated with a 5% increase in snacking frequency (OR 1.05; 95% CI, 1.03, 1.08) and a 3% increase in fast food frequency (OR 1.03; 95% CI, 1.00, 1.05).

In contrast, the association between social status indicators and fruit and vegetable intake changed as the models changed. Although neither society nor school SSS were independently associated with fruit intake in the separate indicator models, both societal indicators developed significance when they were entered in the models together. As society SSS decreased, the odds of meeting the Healthy People 2010 objective for fruit intake also decreased (OR 0.91; 95% CI 0.84, 0.99). Conversely, as school SSS decreased, incoming freshmen showed a significant increase in the odds of meeting

Healthy People 2010 objectives for fruit intake (i.e. lower SSS was associated was with increased fruit intake) (OR 1.06; 95% CI, 1.01, 1.12).

Table 4.
Stepwise logistic regression modeling of the association of society SSS, school SSS, and PSS with unhealthy dietary behaviors.

	Indicators used in the model									
	Separate indicator models		society SSS + school SSS		society SSS + PSS		school SSS + PSS		society SSS+ school SSS + PSS	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
Fruit intake[a]										
Society SSS	0.96	0.90, 1.03	**0.91**	0.84, 0.99	0.96	0.98, 1.12			**0.91**	0.84, 0.99
School SSS	1.03	0.98, 1.07	**1.06**	1.01, 1.12			1.03	0.98, 1.07	**1.06**	1.01, 1.12
PSS	1.00	0.98, 1.02			1.00	0.98, 1.02	1.00	0.98, 1.02	1.00	0.98, 1.02
Vegetable Intake[b]										
Society SSS	0.99	0.92, 1.07	0.93	0.85, 1.02	0.99	0.92, 1.07			0.93	0.85, 1.02
School SSS	**1.05**	1.00, 1.11	**1.08**	1.02, 1.14			**1.05**	1.00, 1.11	**1.08**	1.02, 1.15
PSS	1.00	0.97, 1.02			1.00	0.97, 1.02	1.00	0.97, 1.02	1.00	0.97, 1.02
Snacking Frequency[c]										
Society SSS	0.97	0.90, 1.06	1.01	0.91, 1.11	0.98	0.90, 1.06			1.02	0.92, 1.12
School SSS	0.96	0.92, 1.01	0.96	0.90, 1.02			0.96	0.91, 1.01	0.95	0.90, 1.02
PSS	**1.05**	1.03, 1.08			**1.05**	1.03, 1.08	**1.05**	1.03, 1.08	**1.05**	1.03, 1.08
Fast food Frequency[d]										
Society SSS	0.96	0.88, 1.05	0.96	0.86, 1.06	0.96	0.88, 1.05			0.96	0.87, 1.07
School SSS	0.99	0.94, 1.05	1.00	0.93, 1.07			0.99	0.93, 1.04	1.00	0.94, 1.07
PSS	**1.03**	1.00, 1.05			**1.03**	1.00, 1.05	**1.03**	1.00, 1.05	**1.03**	1.00, 1.05

Note. Models adjust for age, gender (male vs. female), and race (white vs. non-white).
[a] Comparing those who do not meet Healthy People 2010 objectives for fruit servings per day and those who do. [b] Comparing those who do not meet Healthy People 2010 objectives for vegetable servings per day and those who do. [c] Comparing low snackers (<3 snacks/day) vs. high frequency snackers (>=3 snacks/day). [d] Comparing low fast food eaters (<4x/week) vs. high fast food eaters (>=4x/wk)

The social status indicators only maintained significance when they were included in the models together. In addition, they maintained the same strength of association while controlling for PSS. PSS was not significantly associated with fruit intake in any of the models. In the final, fully adjusted model, decreased society SSS was associated with a 9% decrease in the odds of meeting Healthy People 2010 objectives for fruit intake (OR 0.91; 95% CI, 0.84, 0.99). In addition, decreased school SSS was associated with a 6% increase in the odds of meeting Healthy People 2010 objectives for fruit intake (OR 1.06; 95% CI, 1.01, 1.12).

In models where societal SSS was included, the strength of the association between school SSS and vegetable intake was increased (OR 1.08; 95% CI 1.02, 1.14). For vegetable intake, lower school SSS maintained its significant association with the odds of meeting the Healthy People 2010 objective for increased vegetable intake in all of the models. PSS did not affect the relationship between social status indicators and vegetable intake. In the final, fully adjusted model, decreasing school SSS was significantly associated with an 8% increase in the odds of meeting Healthy People 2010 objective for increased vegetable intake (OR 1.08; 95% CI, 1.02, 1.15). Neither PSS nor society SSS was significantly associated with fruit intake in any of the models.

Although the results of the stepwise logistic regression were interesting, the researchers did not feel that this statistical method was appropriate for this study. There were several reasons for this. First, the results from this analysis provide information much broader than the stated aims for this research study. Second, it was not a goal of the researchers to establish interactions between the independent variables (society SSS, school SSS, and PSS). In addition, the primary aims of the study were able to be clearly

answered using a simple logistical model, without stepwise regression. Therefore, it was determined that stepwise modeling would not be used for the purposes of this study. Further research examining relationships and interactions between stress and social status would benefit from the use of stepwise logistic regression analysis.

Vita

Eriko Grover was born in Miami, Fl on October 6, 1981. She was raised in Miami, and attended Sunset Park Elementary School where she realized her love for music. From there she attended South Miami Middle School and New World School of the Arts where she played the oboe. There, her interest in science grew and afterwards, she attended the University of Florida in Gainesville, Fl where she received a Bachelor of Science in Food Science and Human Nutrition with a specialization in Dietetics.

Eriko is currently pursuing a Master's of Science in Nutrition (Public Health Nutrition option) and Master's of Public Health (Community Health Education concentration) at the University of Tennessee, Knoxville.