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TELEVISION VIEWING HABITS, BODY MASS INDEX, DIETARY
BEHAVIORS AND PHYSICAL ACTIVITY AMONG
UNIVERSITY STUDENTS

by

MARY CATHERINE BALL

(Under the Direction of Anthony V. Parrillo)

ABSTRACT

This study examined the relationship between TV-viewing, BMI, dietary behaviors, and physical activity in a purposive sample of university students. Twenty-three items from the *National College Health Risk Behavior Survey* were used. For data analysis, students were placed into dichotomous categories for TV-viewing risk; dichotomous categories were also created for each DV. Chi-square tests examined relationships between demographic and risk-behavior correlates and *Ss*' self-reports of TV-viewing; subsequent analyses were run for *Ss* who were normal- and overweight/obese. Odds ratios with 95% CI were also computed. TV-viewing was related to decreased use of diet/exercise to control weight and an increased likelihood of doing physical activity, strengthening, and stretching. For normal-weight *Ss*, TV-viewing was associated with decreased use of diet/exercise to control weight and increased risk of consuming fatty foods. Overweight/obese *Ss* at-risk for TV-viewing were more likely to consume fatty foods and less likely to participate in activity, strengthening, or stretching.

INDEX WORDS: Television viewing; Physical activity risk behaviors; Dietary risk behaviors; Body mass index; College students.

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by

MARY CATHERINE BALL

B.S., Georgia Southern University, 2004

A Thesis Submitted to the Graduate Faculty of Georgia Southern University in Partial
Fulfillment of the Requirements for the Degree

MASTER OF PUBLIC HEALTH

STATESBORO, GA

2006

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Electronic Version Approved:
July 2006

DEDICATION

This is dedicated to my friends and family that supported and encouraged me throughout the entire process of completing this piece. Thank you for supplying me with endless love and coffee.

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CHAPTER 1

INTRODUCTION

The current study examined the television viewing habits of Georgia Southern University students as they relate to body mass index (BMI), physical inactivity, and poor dietary behaviors. It was hypothesized that students at GSU may be at-risk, since about one-in-eight (12.6%) report viewing five-or-more hours of television per day (Tedders, Parrillo, & Carter, 2004). Excessive television viewing has been linked to several health issues in adolescents and young adults. The Surgeon General's Report suggests that the prevalence for obesity among adolescents has almost tripled in the last two years, from five to 14% (U.S. Department of Health and Human Services [USDHHS], 2001), and the American Pediatric Association cites television viewing as an avoidable risk factor for obesity among adolescents (Atherson & Metcalf, 2005). Television watching is linked to obesity in four ways: Those that watch television may snack more while watching; they may watch more commercials for foods that have high caloric and saturated fat values and choose these instead of more nutritious foods; they may have a lower metabolic rate due to television watching; and they may substitute television watching for more energy consuming activities (Tai-Seale & Chandler, 2003).

A dose-response relationship exists between TV viewing and obesity in adolescence (Atherson & Metcalf, 2005). Coronary heart disease (CHD) is related to dose-response in that the more television is viewed the more sedentary behaviors are engaged in, thereby creating risks for not only CHD, but for hypertension, non-insulin dependent diabetes mellitus, osteoporosis, colon cancer, anxiety, and depression (Pate, Pratt, Blair, et al.,

1995). Television viewing is an easily modified behavior, and there is great potential to change (Atherson & Metcalf, 2005); however, transitioning from adolescence (high school) to young adulthood (college) creates changes in behaviors that can stay with students into adulthood (Gyurcsik, Bray, & Brittain, 2004). A major life transition, such as beginning a college career, requires a new set of responsibilities, and is characterized by change, ambiguity, and adjustment across a number of previously significant life domains. Students face a new set of barriers that often decrease their physical activity levels and result in poor dietary behaviors that lead to increased BMI (Gyurcsik et al., 2004).

It has been shown that BMI is associated with television viewing in children and adolescents. In one study, the prevalence of obesity in adolescence increased from that in childhood; the lowest obesity rates were among children that viewed one hour of television per day and the highest rates were among those that viewed four-or-more hours per day (Crespo, Smit, Troiano, et al., 2001). Results from another study showed that rates of obesity decreased as television viewing decreased; television viewing was a major risk factor for obesity for both sexes, regardless of race (Atherson & Metcalf, 2005). Physical inactivity and poor diet are often related to television viewing and associated with overweight and obesity. Analysis of the 2001 YRBS revealed a significant increase in obesity as daily television viewing reached five-or-more hours per day in students 12-to-18 years of age (Atherson & Metcalf, 2005). This is disconcerting, especially considering that approximately one-in-eight students on our campus report viewing five-or-more hours of television per day; this behavior places GSU students at-

risk for chronic disease in their adulthood. Although behaviors can be modified, intervention and prevention programs need to be implemented in order to decrease the risk of increased BMI, physical inactivity, and poor dietary behaviors associated with television viewing in university settings.

Review of Literature

Television Viewing Habits Among College Students

A study conducted at one mid-sized Midwestern university found that the vast majority of students (90.3%) were classified in a “not-at-risk” category for television viewing (i.e., they watched four-or-fewer hours per day; the mean number of hours viewed each day was 3.18 (Bernaix, Carr, Covington, Clement, & Schmidt, 2004). However, roughly one-in-eight students at Georgia Southern University (12.6%) report viewing five-or-more hours of television each day, with black students significantly more likely than white students to do so (Tedders, Parrillo, & Carter, 2004). Hours of television viewing appear to be related to reduce levels of physical activity among males, but not females. Negative health effects are also evident; one study has associated television viewing with reductions in cardiovascular fitness and increases in adipose tissue (Suminski, Petosa, Utter, & Zhang, 2002).

Nationwide, black and Hispanic women have reported watching more television than Asian or white females; black and Asian males watched more television per day than did Hispanic or white males. On average, white students report watching the least television, at 2.95 hours per day. Blacks watch the most television, an average of 3.16 hours per day; results suggest that black females view the most television per day (Suminski et al.,

2002). At Georgia Southern, 28.8% of black males and 26.1% of black females are “at risk” from television viewing (i.e., five-or-more hours of television viewing each day) (Teddars, Parrillo, & Carter, 2004).

Dietary Behaviors Among College Students

According to the 1995 National College Risk Behavior Survey, one-in-five college students are overweight. In general, college students adhere to daily dietary guidelines (USDHHS, 2005), but they are not perfect. For example, one study found that college students consumed an adequate number of servings of meat, yet lacked breads and grains, fruits, vegetables, and dairy products in their diets; two-thirds consumed more than the recommended servings of saturated fat, sodium, and cholesterol (Anding, Suminski, & Boss, 2001). In addition, three-in-four college students nationwide do not follow the guidelines related to fruit and vegetable intake, and consume twice the daily dietary guidelines for fat (Douglas, Collins, Warren, Kann, Gold, Clayton, Ross, & Kolbe, 1997). Busy student schedules lead to increases in their snacking; an estimated 25-to-33 percent of students’ total energy intake comes from snacks (Hampl & Betts, 1995). One study suggested that 76% of the students living on-campus consumed the same foods every day (Haberman & Luffey, 1998).

Georgia Southern students are less likely than students nationwide to consume foods typically high in fat; black students on-campus are more likely than whites to consume fatty foods (Teddars, Parrillo, & Carter, 2004). GSU students are more likely than their counterparts nationally to consume five-or-more servings of fruits and vegetables per

day, with black students more likely than white students to report doing so (Teddners, Parrillo, & Carter, 2004).

College students use a variety of methods to lose weight or keep from gaining weight, typically measured within the 30-day period prior to being surveyed; these behaviors include dieting to lose weight or keep from gaining weight, exercising to lose weight or keep from gaining weight, vomiting or taking laxatives to lose weight or keep from gaining weight, and taking diet pills to lose weight or keep from gaining weight (Centers for Disease Control and Prevention [CDC], 1997). Dieting among college students has become more frequent, especially among females. Female students diet on average four times a year to maintain their perception of an ideal weight (Ash & McClelland, 2001). Nationwide, 46.4% of college students are attempting weight loss and 41.6% believe themselves to be overweight; greater than one-in-three actually are overweight (Suminski et al., 2002). Chronic dieting – and the habitually low food intake associated with it – may result in a decrease of essential nutrients.

Among college students nationwide, females (59.8%) were more likely than males (29.6%) to attempt weight loss, and those 25 years of age or older (51.9%) were more likely to attempt weight loss than their 18-to-24 year-old counterparts (43.3%) (CDC, 1997). More than one-half of students (53.6%) reported exercising to lose weight or keep from gaining weight, more likely to occur among males than females. Females were more likely than males to use laxatives or vomiting as the way to lose weight. Nationwide, 2.6% of college students reported vomiting or using laxatives to lose weight or keep from gaining weight; for females, 4.2% reported this behavior. Females at

Georgia Southern University (8.1%) were more than three times as likely as those nationwide to report vomiting or using laxatives as a means of losing weight (Teddars, Parrillo, & Carter, 2004). Nationwide, females (7.0%) were more likely than males (1.1%) to have reported this behavior (CDC, 1997); one-in-five females at Georgia Southern University took diet pills to lose weight or keep from losing weight (Teddars, Parrillo, & Carter, 2004), nearly three times the rate among females nationwide.

Physical Activity Behaviors Among College Students

Colleges and universities typically possess the type of resources students can utilize to provide an impact on their physical activity levels. Judging from the amount of overweight or obese students on college campuses – from one-in-five in one study (CDC, 1997) to one-in-three in another (Suminski et al., 2002) – these resources are hardly being used. Students 18-to-24 years of age were more likely than older students to participate in vigorous activity (Douglas et al., 1997). As early as the mid-1990s (USDHHS, 1996), it was recommended that adults engage in vigorous and moderate activity such as walking, jogging, climbing stairs and cycling at least three-to-five days each week for 30 minutes each session (Keating, Guan, Pinero, & Bridges, 2005). Adults that do not participate in physical activity are at-risk for becoming or being overweight, certain cancers, and heart disease (Mitchell, 2003).

Data from the National College Health Risk Behavior Survey suggest that male college students are more likely to report vigorous or moderate exercise (43.7%) each week than female students (33.0%). In addition, better than one-in-three undergraduates (37.6%) did not participate in moderate or vigorous activity in the week prior to being

surveyed (CDC, 1997). And according to a study conducted by Suminski and colleagues (2002), lack of participation among females and minorities are higher than they are among males. More than one-half of female students surveyed (53.0%) had not engaged in vigorous physical activity in the 30 days prior to their study; however, 40.3% of males reported not engaging in vigorous physical activity. Black students appear more likely to participate in moderate physical activity more often than white students are (Douglas et al., 1997).

For males, there is no significant difference by race regarding physical activity levels, however, female college students, especially those who are Asian or black, have the lowest physical activity levels. In the Suminski et al. study (2002), Asian females were the least active of all groups; greater than one-in-four (28.2%) indicated no physical activity at all during the month preceding being surveyed. Greater than one-in-five females (22.2%) and 11.3% of males reported no physical activity the month preceding the survey (Suminski et al., 2002). College students that do not participate in regular physical activity are predisposed to becoming sedentary adults (Anding, Boss, & Suminski, 2001).

Body Mass Index Among College Students

Body Mass Index (BMI) is a tool for indicating weight status among adults (CDC, 2005). BMI is correlated with body fat composition and the ranges are based upon the effect body weight and height has on disease and death. Calculated BMI determines weight status in the following ranges: a BMI below 18.5 kg/m² is considered to be underweight; a BMI between 18.5 and 24.9 kg/m² is considered to be normal weight; a BMI between 25.0 and 29.9 kg/m² is considered to be overweight; and a BMI \geq 30.0

kg/m² is obese (CDC, 2005). In 1995, 20% of college students nationwide were considered to be overweight (BMI ≥ 27.8 kg/m² for men and ≥ 27.3 kg/m² for women was at that time considered overweight). Black students were 1.72 times as likely as whites to be overweight; black females were nearly twice as likely as white females to be overweight, black males were 45% more likely than white males to be overweight; students are significantly more likely to have a high BMI if they are over the age of 25 (CDC, 1997). Average BMI for white male and female students at Georgia Southern University is within the normal range, (24.2 and 22.7 respectively for white males and females, respectively) whereas the BMI for black male and female students on-campus is borderline overweight (25.5 and 25.3, respectively for black males and females, respectively) (Tedders, Parrillo, & Carter, 2004).

Purpose of the Study

The purpose of the study was to examine the relationship between television viewing habits, body mass index, dietary behaviors, and physical inactivity in a purposive sample of university students.

CHAPTER 2

METHODS

The 2002-2003 College Health Risk Profile data were collected using the National College Health Risk Behavior Survey, an instrument developed by the Division of Adolescent and School Health (DASH) of the CDC to monitor health risk behaviors of college students. Data gathered in the Profile included polychotomous and categorical information about seven risk factor groupings, such as physical activity and dietary behaviors, which were used in this study. Twenty-three items from the ninety-nine item survey were utilized for secondary data analysis. These items assessed television viewing habits, BMI, weight perceptions, weight control behaviors, dietary behaviors, and physical activity behaviors in college students. Four demographic items were also used.

Students who were enrolled in the Healthful Living (HLTH 1520) course were the target population for the study. Because HLTH 1520 is a required course for all students at the university, data collection in this venue theoretically makes it possible to closely approximate population behaviors among the student body at-large. However, in practice, HLTH 1520 is a course normally taken early during one's college career. Since all students are required to take this course, it was anticipated that data collection during the scheduled class time would maximize student responses, and provide a reliable estimate of health behavior. Moreover, behavioral risk information obtained from this survey was relevant and applicable to the health-based nature of this course.

The survey was anonymous, and hard copies of the instrument were administered to numerous sections of the class from May 2002 through April 2003 during regularly

scheduled class time. Faculty members responsible for teaching each class administered the survey. Prior to initiating data collection, the Institutional Review Board at Georgia Southern University reviewed and approved all proposed methods.

All students attending class were given a survey to complete, but participation was voluntary. Students choosing not to participate were asked to sit quietly and return the blank survey when the class was dismissed. As an incentive for completion, students were given extra credit for returning their survey. Extra credit was not awarded based on survey completion, therefore, students returning blank surveys were also awarded credit. A total of 2,268 surveys were returned and usable.

A cross-sectional design (Campbell & Stanley, 1966) was used to assess priority health risk behaviors among a select group of students at Georgia Southern University. The data were analyzed in three steps. In the first phase, students were placed into one of two dichotomous categories for television viewing risk, the independent variable. Students who indicated on the survey that they viewed five-or-more hours of television were placed into one group; those who watched four-or-fewer hours of television were placed into a second group. Descriptive statistics were then generated by gender, race, class standing, and age.

In the second phase, each dependent measure was reconstructed to match national data (CDC, 1997). This created dichotomous risk behavior variables that were used for purposes of the analysis. BMI was calculated, using self-reported height and weight to group students as to whether they were at-risk (overweight or obese: $\geq 25.0 \text{ kg/m}^2$) or “not at-risk” (normal weight: $< 25.0 \text{ kg/m}^2$). The following behaviors were assessed:

perception of self as overweight (yes/no); attempting weight loss (yes/no); dieting to lose weight or to keep from gaining weight (yes/no); exercising to lose weight or keep from gaining weight (yes/no); vomiting/taking laxatives to lose weight or keep from gaining weight (yes/no); taking diet pills to lose weight or keep from gaining weight (yes/no); five-or-more servings of vegetables, fruit juice, fruit, or green salad were eaten in the past day (yes/no); two-or-more servings of fatty foods such as french fries, cookies, donuts, cakes, pies, pizza, hamburgers, hot dogs, or sausages were eaten in the past day (yes/no); engaging in vigorous physical activity three-or-more of the last seven days (yes/ no); engaging in moderate physical activity five-or-more of the last seven days (yes/no); engaging in stretching exercises on three-or-more of the last seven days (yes/no); engaging in strengthening exercises on three-or-more of the last seven days (yes/no); and participating in a team sport (yes/no).

In phase three, two-by-two tables were constructed, and chi-square analyses were performed to examine the relationship between television viewing risk and dichotomous behavioral variables, including: perceiving self as overweight (yes/no); attempting weight loss (yes/no); dieting to lose weight or control weight (yes/no); exercising to lose weight or control weight (yes/no); vomiting or taking laxatives to lose weight or control weight (yes/no); taking diet pills to lose weight or control weight (yes/no); consuming five-or-more servings of fruits and vegetables (yes/no); consuming two-or-fewer servings of fatty foods (yes/no); participating in vigorous physical activity (yes/no); participating in moderate physical activity (yes/no); participating in stretching (yes/no); and participating in strengthening (yes/no). Odds ratios with 95% confidence intervals (CI) were also

computed for each analysis. All tests were performed using $\alpha = .05$ as the level of statistical significance.

In an effort to further explain significant results, additional analyses were conducted; to accomplish this, the Breslow-Day and Cochran-Mantel-Haenszel (CMH) tests were selected. First, the data were stratified by gender (separate tests were conducted for males and females); analyses were then conducted for white males and black males, then for white females and black females. The Breslow-Day Test of Homogeneity was then used to test the hypothesis of no association. When a Breslow-Day test failed to reject the null hypothesis (i.e., when a calculated p -value for Breslow-Day was ≥ 0.05), CMH was used to estimate the average conditional association (or common odds ratio) between the independent variable and each risk behavior variable in the analysis (Rosner, 2000)

Statistical Analysis

Statistical Package for the Social Sciences-Version 12.0 for Windows (SPSS 12.0) (Statistical Package for the Social Sciences, 2003) were used to analyze the data to examine associations between the independent and dependent variables.

Reliability of the Instrument

Data gathered in the NCHRBS include polychotomous and categorical information on seven risk factor groupings, two of which were used in this study: dietary behaviors and physical activity. Specifically, seven items from the NCHRBS were used in the area of dietary-risk, and five questions from the survey were included in the assessment of risk from physical inactivity.

In a previous study using the Georgia Southern data, internal consistency reliability was calculated as follows: total item pool: $r = .55$; dietary behaviors: $r = .28$; weight

control behaviors: $r = .60$; and physical activity behaviors: $r = .77$ (Meadows, 2004).

Since results of this study relied on the accuracy of the multiple-items included in the instrument, coefficients alpha were calculated separately for the total item pool ($r = .55$), dietary behaviors ($r = .28$), weight control behaviors ($r = .60$), and physical activity behaviors ($r = .77$), using criteria for reliability established by Nunnally (1967).

CHAPTER 3

RESULTS

The purpose of the study was to examine the relationship between television-viewing habits, body mass index, dietary behaviors, and physical activity among university students.

It was hypothesized that increased TV viewing will be associated with physical inactivity, poor dietary behaviors, and increased BMI- each is associated with being overweight and obese. Overweight and obesity substantially raise the risk of hypertension, elevated cholesterol, as well as type-2 diabetes, cardiovascular disease, and stroke, and a myriad of other conditions. These disease states may be prevented with a healthy diet and increased physical activity.

Overweight and obesity have also been described as the end-result of a complex variety of social, cultural, behavioral, and environmental factors, including television viewing. Viewing television is common among college students, where one-in-eight students at a university in the Southeast reported viewing at least five hours each day. The relation between obesity and TV viewing among adolescents suggests that increasing time spent watching television appears to increase the risk of being obese. Such relationships among college students may be hypothesized, but have yet to be studied.

Results will be presented in the following areas: 1) a demographic profile of study participants; 2) television (TV) viewing risk, weight perceptions, and weight control behaviors; 3) TV viewing risk and dietary behaviors; and 4) and TV viewing risk and physical activity behaviors.

Demographic Profile of Study Participants

A demographic profile of the study participants is presented in Table 1. The sample of university students included 1,735 participants. There were slightly more male participants (52.3%) than female participants (47.7%) in the sample. Three-in-four students were white (75.2%); nearly one quarter (24.8%) were black. Additionally, the vast majority of students were freshman (71.3%), while only two-in-ten students were sophomores (21.7%); very few were either juniors or seniors (6.0% and 1.0%, respectively). The majority of students were 18 and 19 years old (47.3% and 32.7%, respectively). The rest of the participants were 20-to-24 years old.

Table 1

Demographic Characteristics of Participants ($n = 1,735$)

Demographic Characteristic	Frequency	Percent
<i>Gender</i>		
Male	907	52.3
Female	828	47.7
<i>Race</i>		
White	1305	75.2
Black	430	24.8
<i>Class Standing</i>		
Freshman	1237	71.3
Sophomore	376	21.7
Junior	104	6.0
Senior	18	1.0
<i>Age</i>		
18 years old	820	47.3
19 year old	568	32.7
20 years old	201	11.6
21 years old	78	4.5
22 years old	36	2.1
23 years old	23	1.3
24 years old	9	0.5

Association Between Students' Television Viewing Risk and Risk Behaviors

Television Viewing Risk, Weight Perceptions, and Weight Control Behaviors. The association between student's television viewing risk and diet and their nutrition and dietary behaviors is presented in Tables 2 and 3. Overall, students who reported viewing five-or-more hours of television per day (at-risk) were no more likely than those who reported viewing four-or-fewer hours of television per day (not at-risk) to perceive themselves as being overweight, to attempt weight loss, to vomit or take laxatives to lose weight or control their weight, or to take diet pills to lose weight or control their weight.

Students who were at-risk for TV viewing were significantly less likely to report using diet ($X^2 = 9.38; p = .002$) or exercise ($X^2 = 8.16; p = .005$) as a means of losing weight or controlling their weight. When examined by race and gender, there were no statistically significant associations found in the data.

Table 2

Association Between Students' Television Viewing Risk and Weight Perceptions by Race and Gender ($n = 1,735$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Weight Perceptions	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
Perceived self as being overweight (yes/no)	1.14 (0.63-2.04)	1.06 (0.51-2.12)	1.47 (0.69-3.14)	1.35 (0.74-2.48)	1.17 (0.86-1.60)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns
Were attempting weight loss (yes/no)*	1.09 (0.63-1.87)	3.08 (0.93-10.24)	1.61 (0.79-3.28)	1.18 (0.65-2.18)	0.98 (0.73-1.30)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns

* During the 30 days preceding the survey

Table 3

Association Between Students' Television Viewing Risk and Weight Control Behaviors
by Race and Gender ($n = 1,735$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Weight Control Behaviors	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
Dieted to lose/control weight (yes/no)*	0.61 (0.29-1.26)	1.35 (0.64-2.80)	0.85 (0.29-2.45)	0.77 (0.40-1.47)	0.60 (0.43-0.83)
▶TV viewing (yes/no)	ns	ns	ns	ns	.002
Exercised to lose/control weight (yes/no)*	0.89 (0.53-1.49)	1.01 (0.41-2.52)	0.84 (0.43-1.65)	0.65 (0.36-1.20)	0.66 (0.49-0.88)
▶TV viewing (yes/no)	ns	ns	ns	ns	.005
Vomited/took laxatives to lose/control weight (yes/no)*	1.01 (1.00-1.02)	1.09 (0.32-3.72)	1.01 (0.99-1.03)	1.59 (0.37-6.88)	0.67 (0.29-1.58)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns
Took diet pills to lose/control weight (yes/no)*	0.29 (0.04-2.17)	1.30 (0.59-2.86)	1.89 (0.31-11.66)	1.19 (0.40-3.59)	0.69 (0.41-1.16)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns

*During the day prior to being surveyed

Table 4

Association Between Students' Television Viewing Risk and Dietary Behaviors by Race and Gender ($n = 1,735$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Dietary Behaviors	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
Ate five-or more servings of fruits and vegetables (yes/no)*	1.83 (0.77-4.36) ns	1.60 (0.48-5.37) ns	0.89 (0.39-2.01) ns	1.24 (0.52-2.91) ns	1.21 (0.79-1.86) ns
▶TV viewing (yes/no)					
Ate two-or-fewer servings of fatty foods (yes/no)*	1.59 (0.94-2.67) ns	1.57 (0.69-3.57) ns	1.30 (0.69-2.48) ns	1.57 (0.4-2.95) ns	1.80 (1.34-2.43) < .001
▶TV viewing (yes/no)					

* During the day prior to being surveyed

Television Viewing Risk and Dietary Behaviors. Overall, students who reported watching five-or-more hours of television each day were no more likely than those who viewed TV four-or-more hours daily to eat five-or-more servings of fruits and vegetables (Table 4). However, students at-risk from TV viewing were 1.8 times as likely as those not at-risk to consume two-or-fewer servings of fatty foods ($X^2 = 12.76; p < .001$). When analyzed by race and gender, there were no statistically significant associations found in the data.

Television Viewing Risk and Physical Activity Behaviors. Table 5 reports the associations between students' television viewing risk and their physical activity behaviors. Students who watched five-or-more hours of television daily were 1.65 times as likely as those who watched four-or-fewer hours of television to engage in vigorous physical activity ($X^2 = 10.81; p = .001$). Similarly, students who were at-risk for TV viewing were 1.13 times as likely as those who were not at-risk for TV viewing to engage in stretching activities ($X^2 = 5.06; p = .014$) and 1.13 times as likely to participate in strengthening activities ($X^2 = 5.73; p = .009$). When analyzed by race and gender, the data revealed no statistically significant associations in any of the data.

Table 5

Association Between Students' Television Viewing Risk and Physical Activity Behaviors by Race and Gender ($n = 1,735$)

Physical Activity Behaviors	White ♂	White ♀	Black ♂	Black ♀	Total
	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Engaged in...	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
...Vigorous activity	1.64	1.56	1.55	1.41	1.65
(≥3 of previous 7 days)	(0.97-2.77)	(0.76-3.22)	(0.81-2.97)	(0.74-2.69)	(1.22-2.23)
(yes/no)	ns	ns	ns	ns	.001
▶ TV viewing (yes/no)					
...Moderate activity	1.56	0.99	1.11	1.21	1.10
(≥5 of previous 7 days)	(0.75-3.24)	(0.44-2.24)	(0.55-2.26)	(0.60-2.41)	(0.77-1.56)
(yes/no)	ns	ns	ns	ns	ns
▶ TV viewing (yes/no)					
...Stretching	1.15	1.13	1.16	1.01	1.13
(≥3 of previous 7 days)	(0.96-1.37)	(0.88-1.43)	(0.91-1.50)	(0.85-1.21)	(1.03-1.25)
(yes/no)	ns	ns	ns	ns	.014
▶ TV viewing (yes/no)					
...Strengthening	1.12	1.15	1.23	0.99	1.13
(≥3 of previous 7 days)	(0.92-1.34)	(0.96-1.38)	(0.99-1.51)	(0.84-1.16)	(1.03-1.23)
(yes/no)	ns	ns	ns	ns	.009
▶ TV viewing (yes/no)					

Additional Analyses

Additional analyses were conducted to detect any associations between television viewing risk and the dependent measures under study: weight perceptions and weight control behaviors; dietary behaviors; and physical activity behaviors. Participants were placed into dichotomous weight classification groups, according to their BMI: normal weight students (whose BMI is from 18.5-to-24.9 kg/m²); and overweight/obese students, whose BMI is ≥ 25.0 kg/m² (overweight [BMI: 25.0 - 29.9 kg/m²] and obese [BMI: ≥ 30.0 kg/m²]).

Television Viewing Risk, Weight Perceptions, and Weight Control Behaviors Among Normal Weight Students. Results for the association of television viewing and weight perceptions and weight control behaviors for normal weight students are presented in Table 6 and 7. Among all normal weight students, those at-risk for TV viewing were less likely than those not at-risk for TV viewing to have dieted to lose weight or control their weight ($X^2 = 12.77; p < .001$). There were no statistically significant associations found in these data by race and gender. In addition, those at-risk for TV viewing were less likely than those in the not-at-risk category to have exercised to lose weight or control their weight ($X^2 = 8.72; p = .004$). There were no statistically significant associations found in these data by race and gender.

Table 6

Association Between Students' Television Viewing Risk and Weight Perceptions by Race and Gender: Normal Weight ($n = 1,150$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Weight Perceptions	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
Perceived self as being overweight (yes/no)	1.33 (0.29-6.05)	0.38 (0.09-1.66)	0.97 (0.90-1.03)	1.40 (0.40-4.99)	0.58 (0.29-1.17)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns
Were attempting weight loss (yes/no)*	1.19 (0.47-2.98)	3.72 (0.85-16.19)	1.83 (0.30-11.54)	1.09 (0.49-2.42)	0.71 (0.48-1.06)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns

*During the 30 days preceding the survey

Table 7

Association Between Students' Television Viewing Risk and Weight Control Behaviors
by Race and Gender: Normal Weight ($n = 1,150$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Weight Control Behaviors	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value
Dieted to lose/control weight (yes/no)*	0.69 (0.20-2.36)	1.20 (0.49-2.95)	1.05 (1.00-1.11)	0.44 (0.16-1.26)	0.42 (0.26-0.68)
▶TV viewing (yes/no)	ns	ns	ns	ns	< .001
Exercised to lose/control weight (yes/no)*	0.87 (0.43-1.71)	1.60 (0.46-5.54)	0.71 (0.24-2.12)	0.58 (0.26-1.26)	0.57 (0.39-0.83)
▶TV viewing (yes/no)	ns	ns	ns	ns	.004
Vomited/took laxatives to lose/control weight (yes/no)*	1.00 (0.10-1.01)	1.26 (0.28-5.65)	NC ^a	1.86 (0.30-11.62)	0.84 (0.30-2.40)
▶TV viewing (yes/no)	ns	ns		ns	ns
Took diet pills to lose/control weight (yes/no)*	1.02 (1.00-1.03)	1.63 (0.62-4.33)	NC ^a	0.67 (0.07-6.20)	0.56 (0.25-1.23)
▶TV viewing (yes/no)	ns	ns		ns	ns

* During the 30 days preceding the survey

^a NC indicates it was not calculable due to empty cells.

Television Viewing Risk and Dietary Behaviors. Normal weight students who were at-risk for TV viewing were nearly twice as likely as those who were not at risk for TV viewing to consume two-or-fewer servings of fatty foods ($OR = 1.99; p = .001$) (Table 8). There were no statistically significant associations in the data when analyzed by race and gender.

Table 8

Association Between Students' Television Viewing Risk and Dietary Behaviors by Race and Gender: Normal Weight ($n = 1,150$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Dietary Behaviors	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value
Ate five-or more servings of fruits and vegetables (yes/no)*	1.84 (0.54-6.20) ns	1.35 (0.31-5.97) ns	1.07 (0.35-3.28) ns	1.04 (0.34-3.13) ns	1.13 (0.64-2.00) ns
▶TV viewing (yes/no)					
Ate two-or-fewer servings of fatty foods (yes/no)*	1.11 (0.56-2.19) ns	2.02 (0.76-5.38) ns	1.68 (0.70-4.01) ns	1.71 (0.77-3.80) ns	1.99 (1.36-2.91) .001
▶TV viewing (yes/no)					

* During the day prior to being surveyed

Television Viewing Risk and Physical Activity Behaviors: Normal Weight Students.

The association between television viewing risk and physical activity behaviors for those of normal weight is presented in Table 9. For the total sample, no statistically significant associations were found in the data. Similarly, when compared by race and gender, there were no statistically significant associations found in the data.

Table 9

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
by Race and Gender: Normal Weight ($n = 1,150$)

Physical Activity Behaviors	White ♂	White ♀	Black ♂	Black ♀	Total
	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Engaged in...	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
...Vigorous activity	1.31	0.92	1.10	1.02	1.17
(≥3 of previous 7 days)	(0.66-2.56)	(0.38-2.02)	(0.47-2.58)	(0.45-2.31)	(0.80-1.70)
(yes/no)	ns	ns	ns	ns	ns
▶ TV viewing (yes/no)					
...Moderate activity	1.74	1.21	1.22	1.41	1.18
(≥5 of previous 7 days)	(0.66-4.60)	(0.40-3.68)	(0.47-3.12)	(0.57-3.48)	(0.74-1.88)
(yes/no)	ns	ns	ns	ns	ns
▶TV viewing (yes/no)					
...Stretching	1.03	1.09	0.95	0.91	1.01
(≥3 of previous 7 days)	(0.80-1.32)	(0.80-1.49)	(0.63-1.43)	(0.70-1.16)	(0.87-1.16)
(yes/no)	ns	ns	ns	ns	.014
▶TV viewing (yes/no)					
...Strengthening	0.99	1.05	1.14	0.88	1.03
(≥3 of previous 7 days)	(0.75-1.29)	(0.79-1.39)	(0.86-1.52)	(0.70-1.10)	(0.90-1.17)
(yes/no)	ns	ns	ns	ns	ns
▶TV viewing (yes/no)					

Television Viewing Risk, Weight Perceptions, and Weight Control Behaviors:

Overweight/Obese Students. The associations between television viewing risk, weight perceptions, and weight control behaviors among overweight/obese students in the study are reported in Table 10 and 11. There were no statistically significant associations in any of the data analyses performed.

Table 10

Association Between Students' Television Viewing Risk and Weight Perceptions by Race and Gender: Overweight/Obese ($n = 585$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Weight Perceptions	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
Perceived self as being overweight (yes/no)	0.99 (0.45-2.23)	0.66 (0.13-3.37)	1.78 (0.66-4.82)	1.64 (0.54-5.02)	1.17 (0.72-1.91)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns
Were attempting weight loss (yes/no)*	0.91 (0.40-2.04)	0.33 (0.03-3.43)	2.19 (0.80-5.95)	1.42 (0.36-5.64)	1.16 (0.69-1.94)
▶TV viewing (yes/no)	ns	ns	ns	ns	ns

* During the 30 days preceding the survey

Table 11

Association Between Students' Television Viewing Risk and Weight Control Behaviors
by Race and Gender: Overweight/Obese ($n = 585$)

Weight Control Behaviors	White ♂ OR (95% CI) <i>p</i>-value	White ♀ OR (95% CI) <i>p</i>-value	Black ♂ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Total OR (95% CI) <i>p</i>-value
Dieted to lose weight or control weight (yes/no)* ▶TV viewing (yes/no)	0.49 (0.19-1.27) ns	1.22 (0.31-4.73) ns	1.23 (0.38-3.99) ns	1.19 (0.47-3.00) ns	0.78 (0.49-1.24) ns
Exercised to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	0.81 (0.36-1.86) ns	0.19 (0.41-0.87) ns	0.96 (0.36-2.55) ns	0.75 (0.27-2.05) ns	0.67 (0.41-1.08) ns
Vomited/took laxatives to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.04 (1.01-1.06) ns	0.77 (0.09-6.46) ns	1.03 (0.99-1.08) ns	1.24 (0.11-14.30) ns	0.46 (0.12-1.97) ns
Took diet pills to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	0.32 (0.04-2.46) ns	0.72 (0.19-2.78) ns	2.00 (0.31-12.84) ns	1.46 (0.39-5.47) ns	0.76 (0.38-1.54) ns

* During the 30 days preceding the survey

Television Viewing Risk and Dietary Behaviors. Table 12 presents data on television viewing risk and dietary behaviors. Those students at-risk for TV viewing were 1.65 times as likely as those not at-risk to consume two-or-fewer servings of fatty foods the previous day ($X^2 = 4.11$; $p=.046$). When analyzed by race and gender, white males who viewed five-or-more hours of television were 2.83 times as likely as those who viewed four-or-fewer hours of television daily to consume two-or-fewer servings of fatty foods ($X^2 = 6.75$; $p=.020$).

There were no statistically significant associations found in the data between TV viewing risk and fruit and vegetable consumption.

Table 12

Association Between Students' Television Viewing Risk and Dietary Behaviors by Race and Gender: Overweight/Obese ($n = 585$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Dietary Behaviors	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
Ate five-or more servings of fruits and vegetables (yes/no)*	1.88 (0.54-6.52) ns	0.95 (0.19-4.65) ns	0.72 (0.22-2.37) ns	1.59 (0.41-6.24) ns	1.65 (1.01-2.69) ns
▶TV viewing (yes/no)					
Ate two-or-fewer servings of fatty foods (yes/no)*	2.83 (1.26-6.38) .020	2.48 (0.30-20.22) ns	0.93 (0.34-2.54) ns	1.45 (0.50-4.17) ns	1.65 (1.01-2.69) .046
▶TV viewing (yes/no)					

* During the day prior to being surveyed

Table 13

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
by Race and Gender: Overweight/Obese ($n = 585$)

Physical Activity Behaviors	White ♂	White ♀	Black ♂	Black ♀	Total
Engaged in...	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value
...Vigorous activity	2.31	5.12	2.58	2.36	2.93
(≥3 of previous 7 days)	(0.99-5.36)	(1.09-24.16)	(0.90-7.46)	(0.78-7.08)	(1.75-4.90)
(yes/no)	ns	.037	ns	ns	<.001
▶ TV viewing (yes/no)					
...Moderate activity	1.33	0.87	0.99	0.93	0.98
(≥5 of previous 7 days)	(0.44-4.02)	(0.25-3.04)	(0.33-2.93)	(0.31-2.77)	(0.57-1.69)
(yes/no)	ns	ns	ns	ns	ns
▶TV viewing (yes/no)					
...Stretching	2.50	1.82	3.38	1.91	2.54
(≥3 of previous 7 days)	(0.97-6.40)	(0.53-6.24)	(1.02-11.13)	(0.63-5.80)	(1.48-4.35)
(yes/no)	ns	ns	.032	ns	< .001
▶TV viewing (yes/no)					
...Strengthening	2.33	4.59	2.55	1.99	2.51
(≥3 of previous 7 days)	(0.91-5.48)	(0.57-36.82)	(0.84-7.77)	(0.60-6.61)	(1.43-4.40)
(yes/no)	ns	ns	ns	ns	.001
▶TV viewing (yes/no)					

Television Viewing Risk and Physical Activity Behaviors. There were several statistically significant relationships detected between television viewing risk and physical activity behaviors among overweight/obese students (Table 13). In the total sample of overweight/obese students, those who were at-risk for TV viewing were 2.54 times as likely as those who were not at-risk for TV viewing to engage in stretching on three-or-more of the seven days prior to being surveyed ($X^2 = 12.03; p < .001$). Among overweight/obese students, those who were at-risk for TV viewing were also 2.51 times as likely as those no at-risk to participate in strengthening exercises on at least three of the seven days prior to being surveyed ($X^2 = 10.89; p = .001$). In addition, students at-risk for TV viewing were nearly three times as likely as those who were not at-risk to engage in vigorous activity ($X^2 = 17.77; p < .001$). White females at-risk for TV viewing were more than five times as likely as those not at-risk to have participated in vigorous activity ($X^2 = 5.08; p .037$).

Table 14

Association Between Students' Television Viewing Risk and Body Mass Index (BMI) by Race and Gender ($n = 1,735$)

	White ♂	White ♀	Black ♂	Black ♀	Total
Body Mass Index	OR	OR	OR	OR	OR
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value
Normal weight vs.	1.13	2.44	0.95	1.10	1.08
Overweight/Obese	(0.67-1.91)	(1.19-5.03)	(0.50-1.81)	(0.61-2.01)	(0.81-1.93)
▶TV viewing (yes/no)	ns	.015	ns	ns	ns

Television Viewing Risk and Body Mass Index (BMI). Overall, students that reported watching five-or-more hours of television are no more at risk for being overweight/obese than those who viewed four-or-fewer hours of television per day (Table 14). Statistically significant associations were found among white females ($X^2 = 6.21$; $p = .015$). White females that were at risk for television viewing were 2.44 times as likely as those not at risk for television viewing to be at risk for being overweight/obese.

Table 15

Association Between Students' Television Viewing Risk and Weight Perceptions Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests ($n = 907$)

Weight Perceptions	White ♂ OR (95% CI) <i>p</i>-value	Black ♂ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Perceived self as being overweight (yes/no)	1.14 (0.63-2.04)	1.47 (0.69-3.14)	0.597	1.25 (0.79-1.98)
▶TV viewing (yes/no)	ns	ns		ns
Were attempting weight loss (yes/no)*	1.09 (0.63-1.87)	1.61 (0.79-3.28)	0.203	1.05 (0.80-1.37)
▶TV viewing (yes/no)	ns	ns		ns

*During the 30 days preceding the survey

Television Viewing Risk and Weight Perception, and Weight Control Behaviors

Among University Males. The results for homogeneity were non-significant for perception of overweight and attempting weight loss among university males (Table 15). The common odds ratio suggests that males who watched TV five-or-more hours each day (TV viewing risk) were not at increased odds of perceiving themselves as being overweight or attempting weight loss than males who watched TV four-or-fewer hours each day during the 30 days preceding the survey.

The Breslow-Day test for homogeneity detected no significant risk between black and white males in any of the weight control behaviors examined (Table 16). The common odds ratio computed for each weight control behavior suggests that TV viewing risk for males is not associated with increased odds of dieting to lose weight or control weight, exercising to lose weight or control weight, vomiting or using laxatives to lose weight or control weight, or using diet pills to lose weight or control weight.

Table 16

Association Between Students' Television Viewing Risk and Weight Control Behaviors
Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests

(*n* = 907)

Weight Control Behaviors	White ♂ OR (95% CI) <i>p</i>-value	Black ♂ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Dieted to lose weight or control weight (yes/no)* ▶TV viewing (yes/no)	0.49 (0.19-1.27) ns	1.23 (0.38-3.99) ns	0.609	0.67 (0.37-1.22) ns
Exercised to lose/control weight (yes/no)* ▶TV viewing (yes/no)	0.81 (0.36-1.86) ns	0.96 (0.36-2.55) ns	1.000	1.00 (0.09-11.03) ns
Vomited/took laxatives to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.04 (1.01-1.06) ns	1.03 (0.99-1.08) ns	1.000	1.00 (0.09-11.03) ns
Took diet pills to lose/control weight (yes/no)* ▶TV viewing (yes/no)	0.32 (0.04-2.46) ns	2.00 (0.31-12.84) ns	0.141	0.62 (0.18-2.15) ns

* During the 30 days preceding the survey

Table 17

Association Between Students' Television Viewing Risk and Dietary Behaviors Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests ($n = 907$)

Dietary Behaviors	White σ OR (95% CI) <i>p</i>-value	Black σ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Ate five-or more servings of fruits and vegetables (yes/no)* ▶TV viewing (yes/no)	1.88 (0.54-6.52) ns	0.72 (0.22-2.37) ns	0.232	1.30 (0.72-2.32) ns
Ate two-or-fewer servings of fatty foods (yes/no)* ▶TV viewing (yes/no)	2.83 (1.26-6.38) .020	0.93 (0.34-2.54) ns	0.641	1.47 (0.98-2.20) ns

* During the day prior to being surveyed

Television Viewing Risk and Dietary Behaviors Among University Males. The results of the Breslow-Day test of homogeneity for both dietary behavior categories are non-significant among males (Table 17). The common odds ratios suggest that there is no elevated risk for males with regard to their TV viewing, fruit and vegetable intake, and consumption of fatty foods. Though the chi-square test of significance revealed an elevated risk for TV viewing among white males that ate two-or-fewer servings of fatty foods ($p = 0.020$), the Mantel-Haenszel test suggests otherwise.

Table 18

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests

(*n* = 907)

Physical Activity Behaviors	White ♂ OR (95% CI) <i>p</i>-value	Black ♂ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel-Haenszel Common OR (95% CI) <i>p</i>-value
...Vigorous activity (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	2.31 (0.99-5.36) ns	2.58 (0.90-7.46) ns	0.898	1.60 (1.07-2.41) 0.03
...Moderate activity (≥5 of previous 7 days) (yes/no) ▶TV viewing (yes/no)	1.33 (0.44-4.02) ns	0.99 (0.33-2.93) ns	0.514	1.32 (0.79-2.19) ns
...Stretching (≥35 of previous 7 days) (yes/no)	2.50 (0.97-6.40) ns	3.38 (1.02-11.13) .032	0.978	1.47 (0.96-2.25) ns
...Strengthening (≥3 of previous 7 days) (yes/no) ▶TV viewing (yes/no)	2.33 (0.91-5.48) ns	2.55 (0.84-7.77) ns	0.440	1.53 (0.99-2.34) ns

Television Viewing Risk and Physical Activity Behaviors Among University Males.

Each of the Breslow-Day tests of homogeneity were non-significant, suggesting that black and white males were the same regarding physical activity behaviors (Table 18). The common odds ratio conducted for vigorous physical activity was statistically significant ($p = 0.030$), which suggests that males who watched five-or-more hours of television were at elevated risk regarding their vigorous physical activity levels. And though the chi-square test of significance revealed an elevated risk for TV viewing among black males and recommended stretching levels ($p = 0.032$), the Mantel-Haenszel test suggests otherwise.

Television Viewing Risk and Body Mass Index (BMI) Among University Males. The Breslow-Day test for homogeneity for BMI among males was non-significant (Table 19). The common odds ratio calculated for BMI indicates viewing five-or-more hours of TV each day does not result in increased odds for being obese for males.

Table 19

Association Between Students' Television Viewing Risk and Body Mass Index (BMI)
Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests
($n = 907$)

Body Mass Index	White σ OR (95% CI) <i>p</i>-value	Black σ OR (95%CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Normal weight vs. Overweight/Obese	1.13 (0.67-1.91)	0.95 (0.50-1.81)	0.867	1.06 (0.71-1.59)
▶TV viewing (yes/no)	ns	ns		ns

Table 20

Association Between Students' Television Viewing Risk and Weight Perceptions Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests ($n = 828$)

Weight Perceptions	White ♀	Black ♀	Breslow-Day	Mantel-
	OR (95% CI) <i>p</i> -value	OR (95% CI) <i>p</i> -value	Test of Homogeneity <i>p</i> -value	Haenszel Common OR (95% CI) <i>p</i> -value
Perceived self as being overweight (yes/no)	1.06 (0.51-2.12)	1.35 (0.74-2.48)	0.614	1.22 (0.77-1.94)
▶TV viewing (yes/no)	ns	ns		ns
Were attempting weight loss (yes/no)*	3.08 (0.93-10.24)	1.18 (0.65-2.18)	0.151	1.53 (0.91-2.58)
▶TV viewing (yes/no)	ns	ns		ns

*During the 30 days preceding the survey

Television Viewing Risk, Weight Perceptions, and Weight Control Behaviors Among University Females. The Breslow-Day test of homogeneity suggested no significant difference in race existed among females in the sample for each of the weight perceptions variables examined (Table 20) or any of the weight control behaviors (Table 21). The common odds ratio tests suggest that females who viewed five-or-more hours of TV were at no greater risk than those who watched TV four-or-fewer hours with regard to weight perceptions and all weight control behaviors in the 30 days preceding the survey.

Table 21

Association Between Students' Television Viewing Risk and Weight Control Behaviors
Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests

($n = 828$)

Weight Control Behaviors	White ♀ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Dieted to lose weight or control weight (yes/no)* ▶TV viewing (yes/no)	1.35 (0.64-2.80) ns	0.77 (0.40-1.47) ns	0.261	0.99 (0.61-1.60) ns
Exercised to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.01 (0.41-2.52) ns	0.65 (0.36-1.20) ns	0.429	0.75 (0.46-1.23) ns
Vomited/took laxatives to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.09 (0.32-3.72) ns	1.59 (0.37-6.88) ns	0.69	1.27 (0.50-3.22) ns
Took diet pills to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.30 (0.59-2.86) ns	1.19 (0.40-3.59) ns	0.899	1.26 (0.67-2.40) ns

Television Viewing Risk and Dietary Behaviors Among University Females. The Breslow-Day test for homogeneity suggests there is no significant difference in race existed among females in the sample for the dietary behaviors examined (Table 22). The common odds ratios suggested that females who watched TV five-or-more hours each day were no more at-risk than those who viewed four-or-fewer hours for less-than-recommended levels of fruit and vegetable intake or higher-than-recommended levels of fatty foods.

Table 22

Association Between Students' Television Viewing Risk and Dietary Behaviors Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests ($n = 828$)

Dietary Behaviors	White ♀	Black ♀	Breslow-Day	Mantel-
	OR (95% CI) <i>p</i> -value	OR (95% CI) <i>p</i> -value	Test of Homogeneity <i>p</i> -value	Haenszel CommonOR (95% CI) <i>p</i> -value
Ate five-or more servings of fruits and vegetables (yes/no)* ▶TV viewing (yes/no)	1.60 (0.48-5.37) ns	1.24 (0.52-2.91) ns	0.732	1.36 (0.68-2.72) ns
Ate two-or-fewer servings of fatty foods (yes/no)* ▶TV viewing (yes/no)	1.57 (0.69-3.57) ns	1.57 (0.4-2.95) ns	0.715	1.47 (0.99-2.39) ns

* During the day prior to being surveyed

Table 23

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests

($n = 828$)

Physical Activity Behaviors	White ♀ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
... Vigorous activity (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.56 (0.76-3.22) ns	1.41 (0.74-2.69) ns	0.831	1.48 (0.91-2.40) ns
... Moderate activity (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	0.99 (0.44-2.24) ns	1.21 (0.60-2.41) ns	0.717	1.11 (0.65-1.88) ns
... Stretching (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.13 (0.88-1.43) ns	1.01 (0.85-1.21) ns	0.463	1.14 (0.69-1.90) ns
... Strengthening (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.15 (0.96-1.38) ns	0.99 (0.84-1.16) ns	0.440	1.53 (0.99-2.34) ns

Television Viewing and Physical Activity Behaviors Among University Females.

The Breslow-Day tests of homogeneity were non-significant for all of the physical activity behaviors examined in females. Common odds ratios suggest that there are no differences in risk for TV viewing among females for less-than-recommended levels of participation in vigorous physical activity, moderate physical activity, stretching, or strengthening activities (Table 23).

Table 24

Association Between Students' Television Viewing Risk and Body Mass Index (BMI) Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests ($n = 828$)

Body Mass Index	White ♀ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Normal weight vs. Overweight/Obese	2.44 (1.19-5.03)	1.10 (0.61-2.01)	0.093	1.48 (0.93-2.36)
▶TV viewing (yes/no)	.015	ns		ns

Television Viewing Risk and Body Mass Index (BMI) Among University Females.

The Breslow-Day test for homogeneity was non-significant for BMI among females. The common odds ratio suggests that there are no differences in TV viewing risk for females with regard to BMI (Table 24).

Table 25

Association Between Students' Television Viewing Risk and Weight Perceptions Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests: Normal Weight ($n = 540$)

Weight Perceptions	White ♂	Black ♂	Breslow-Day	Mantel-Haenszel
	OR (95% CI) <i>p</i> -value	OR (95% CI) <i>p</i> -value	Test of Homogeneity <i>p</i> -value	Common OR (95% CI) <i>p</i> -value
Perceived self as being overweight (yes/no)	1.33 (0.29-6.05)	0.97 (0.90-1.03)	0.200	1.88 (0.50-7.08)
▶TV viewing (yes/no)	ns	ns		ns
Were attempting weight loss (yes/no)*	1.19 (0.47-2.98)	1.83 (0.30-11.54)	0.681	1.29 (0.57-2.93)
▶TV viewing (yes/no)	ns	ns		ns

*During the 30 days preceding the survey

Television Viewing Risk, Weight Perceptions, and Weight Control Behaviors

Among University Males: Normal Weight. The Breslow-Day test of homogeneity found no significant differences in risk between black and white males for weight perceptions (Table 25) and each of the weight control behaviors (Table 26). Common point estimates were non-significant for each of the weight perceptions and weight control behaviors under study; those at-risk for TV viewing were not at increased odds from any of these measures.

Table 26

Association Between Students' Television Viewing Risk and Weight Control Behaviors
Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests:

Normal Weight ($n = 540$)

Weight Control Behaviors	White σ OR (95% CI) <i>p</i>-value	Black σ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Dieted to lose weight or control weight (yes/no)* ▶TV viewing (yes/no)	0.69 (0.20-2.36) ns	1.05 (1.00-1.11) ns	0.317	0.53 (0.16-1.76) ns
Exercised to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	0.87 (0.43-1.71) ns	0.71 (0.24-2.12) ns	0.750	0.82 (0.45-1.48) ns
Vomited/took laxatives to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.00 (0.10-1.01) ns	<i>NC</i> ^a	0.101	0.99 (0.54-1.81) ns
Took diet pills to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	1.02 (1.00-1.03) ns	<i>NC</i> ^a	0.433	0.95 (0.53-1.72) ns

* During the 30 days preceding the survey

^a *NC* indicates it was not calculable due to empty cells.

Television Viewing Risk and Dietary Behaviors Among University Males: Normal Weight. The Breslow-Day tests of homogeneity were non-significant for each dietary behavior among normal weight university males (Table 27). Common odds ratios computed for each of the dietary behaviors suggests that there are normal weight males at-risk for TV viewing are not at increased odds of consuming less-than-recommended levels of fruits and vegetables or for consuming higher-than-recommended levels of fatty foods.

Table 27

Association Between Students' Television Viewing Risk and Dietary Behaviors Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests: Normal Weight ($n = 540$)

Dietary Behaviors	White ♂ OR (95% CI) <i>p</i>-value	Black ♂ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel CommonOR (95% CI) <i>p</i>-value
Ate five-or more servings of fruits and vegetables (yes/no)* ▶TV viewing (yes/no)	1.84 (0.54-6.20) ns	1.07 (0.35-3.28) ns	0.518	1.41 (0.62-3.18) ns
Ate two-or-fewer servings of fatty foods (yes/no)* ▶TV viewing (yes/no)	1.11 (0.56-2.19) ns	1.68 (0.70-4.01) ns	0.461	1.30 (0.76-2.22) ns

* During the day prior to being surveyed

Table 28

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests:

Normal Weight ($n = 540$)

Physical Activity Behaviors	White σ OR (95% CI) <i>p</i>-value	Black σ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
... Vigorous activity (≥ 3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.31 (0.66-2.56) ns	1.10 (0.47-2.58) ns	0.758	1.22 (0.72-2.07) ns
... Moderate activity (≥ 5 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.74 (0.66-4.60) ns	1.22 (0.47-3.12) ns	0.603	1.46 (0.75-2.86) ns
... Stretching (≥ 3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.03 (0.80-1.32) ns	1.09 (0.80-1.49) ns	0.754	0.99 (0.58-1.70) ns
... Strengthening (≥ 3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	0.99 (0.75-1.29) ns	1.14 (0.86-1.52) ns	0.441	1.13 (0.66-1.97) ns

Television Viewing Risk and Physical Activity Behaviors Among University Males:

Normal Weight. The Breslow-Day test of homogeneity indicates that normal weight males did not differ with regard to race on any of the physical activity variables (Table 28). Common odds ratio results suggest that normal weight males at-risk for TV viewing are not at increased odds of participating in activities at less-than-recommended levels.

Table 29

Association Between Students' Television Viewing Risk and Weight Perceptions Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests: Normal Weight ($n = 610$)

Weight Perceptions	White ♀	Black ♀	Breslow-Day	Mantel-
	OR (95% CI) <i>p</i> -value	OR (95% CI) <i>p</i> -value	Test of Homogeneity <i>p</i> -value	Haenszel Common OR (95% CI) <i>p</i> -value
Perceived self as being overweight (yes/no)	0.38 (0.09-1.66)	0.97 (0.90-1.03)	0.173	0.71 (0.28-1.79)
▶TV viewing (yes/no)	ns	ns		ns
Were attempting weight loss (yes/no)*	3.72 (0.85-16.19)	1.83 (0.30-11.54)	0.136	1.59 (0.82-3.09)
▶TV viewing (yes/no)	ns	ns		ns

*During the 30 days preceding the survey

Television Viewing, Weight Perceptions, and Weight Control Behaviors Among University Females: Normal Weight. The Breslow-Day test of homogeneity for normal weight females detected no differences by race in their perceptions of being overweight or attempted weight loss (Table 29); similar results were obtained for each of the weight control behaviors (Table 30). Common odds ratios suggest that normal weight females at-risk for TV viewing are not at increased odds for these weight perceptions or behaviors than those who are not at-risk for TV viewing.

Table 30

Association Between Students' Television Viewing Risk and Weight Control Behaviors
Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests:

Normal Weight ($n = 610$)

Weight Control Behaviors	White ♀ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Dieted to lose weight or control weight (yes/no)* ▶TV viewing (yes/no)	1.20 (0.49-2.95) ns	0.44 (0.16-1.26) ns	0.154	0.76 (0.39-1.46) ns
Exercised to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	1.60 (0.46-5.54) ns	0.58 (0.26-1.26) ns	0.167	0.79 (0.42-1.50) ns
Vomited/took laxatives to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.26 (0.28-5.65) ns	1.86 (0.30-11.62) ns	0.749	1.47 (0.46-4.63) ns
Took diet pills to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	1.63 (0.62-4.33) ns	0.67 (0.07-6.20) ns	0.463	1.37 (0.56-3.33) ns

* During the 30 days preceding the survey

Table 31

Association Between Students' Television Viewing Risk and Dietary Behaviors Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests: Normal Weight ($n = 610$)

Dietary Behaviors	White ♀	Black ♀	Breslow-Day Test of Homogeneity <i>p</i> -value	Mantel- Haenszel CommonOR (95% CI) <i>p</i> -value
	OR (95% CI) <i>p</i> -value	OR (95% CI) <i>p</i> -value		
Ate five-or more servings of fruits and vegetables (yes/no)* ▶TV viewing (yes/no)	1.35 (0.31-5.97) n	1.04 (0.34-3.13) ns	0.777	1.15 (0.48-2.77) ns
Ate two-or-fewer servings of fatty foods (yes/no)* ▶TV viewing (yes/no)	2.02 (0.76-5.38) ns	1.71 (0.77-3.80) ns	0.792	1.82 (0.97-3.39) ns

* During the day prior to being surveyed

Television Viewing Risk and Dietary Behaviors Among University Females:

Normal Weight. The Breslow-Day tests for homogeneity suggest there are no significant differences among normal weight females by race in regard both dietary behavior variables (Table 31). The common odds ratios computed indicate that normal weight females who view five-or-more hours of television per day are no more at risk for consuming less-than-recommended servings of fruits or vegetable and more-than-recommended two-or-fewer servings of fatty foods than those who watched TV four-or-fewer hour a day.

Table 32

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests:

Normal Weight ($n = 610$)

Physical Activity Behaviors	White ♀ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
... Vigorous activity (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	0.92 (0.38-2.02) ns	1.02 (0.45-2.31) ns	0.862	0.96 (0.53-1.76) ns
... Moderate activity (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.21 (0.40-3.68) ns	1.41 (0.57-3.48) ns	0.835	1.33 (0.65-2.68) ns
... Stretching (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.09 (0.80-1.49) ns	0.91 (0.70-1.16) ns	0.354	0.92 (0.49-1.72) ns
... Strengthening (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.05 (0.79-1.39) ns	0.88 (0.70-1.10) ns	0.299	0.82 (0.43-1.56) ns

Television Viewing and Physical Activity Behaviors Among University Females:

Normal Weight. The Breslow-Day test of homogeneity indicates that normal weight females did not differ with regard to race on any of the physical activity variables (Table 32). Common odds ratio results suggest that normal weight females viewing five-or-more hours of television each day are not any more likely of participating in physical activity at less-than-recommended levels than those viewing four-or-fewer hours of television each day.

Table 33

Association Between Students Television Viewing Risk and Weight Perceptions Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests: Overweight/Obese ($n = 367$)

Weight Perceptions	White ♂	Black ♂	Breslow-Day	Mantel-
	OR (95% CI) <i>p</i> -value	OR (95% CI) <i>p</i> -value	Test of Homogeneity <i>p</i> -value	Haenszel Common OR (95% CI) <i>p</i> -value
Perceived self as being overweight (yes/no)	0.66 (0.13-3.37)	1.64 (0.54-5.02)	0.376	1.25 (0.67-2.33)
▶TV viewing (yes/no)	ns	ns		ns
Were attempting weight loss (yes/no)*	0.33 (0.03-3.43)	1.42 (0.36-5.64)	0.178	1.29 (0.69-2.42)
▶TV viewing (yes/no)	ns	ns		ns

*During the 30 days preceding the survey

Television Viewing Risk, Weight Perceptions, and Weight Control Behaviors

Among University Males: Overweight/Obese. Results from the Breslow-Day tests of homogeneity for weight perceptions, attempting weight loss (Table 33), and each of the weight control behavior (Table 34) variables were non-significant among white and black, overweight/obese males. Common odds ratios reveal that overweight/obese males at-risk for TV viewing were not at increased odds of perceiving themselves as overweight or attempting weight loss as compared to those who viewed TV four-or-fewer hours. The same result was obtained for all weight control behaviors examined.

Table 34

Association Between Students' Television Viewing Risk and Weight Control Behaviors
Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests:

Overweight/Obese ($n = 367$)

Weight Control Behaviors	White σ OR (95% CI) <i>p</i>-value	Black σ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Dieted to lose weight or control weight (yes/no)* ▶TV viewing (yes/no)	1.22 (0.31-4.73) ns	1.19 (0.47-3.00) ns	0.232	0.68 (0.33-1.41) ns
Exercised to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	0.19 (0.41-0.87) ns	0.75 (0.27-2.05) ns	0.798	0.87 (0.46-1.64) ns
Vomited/took laxatives to lose/control weight (yes/no)* ▶TV viewing (yes/no)	0.77 (0.09-6.46) ns	1.24 (0.11-14.30) ns	NC*	NC*
Took diet pills to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	0.72 (0.19-2.78) ns	1.46 (0.39-5.34) ns	0.164	0.69 (0.19-2.46) ns

* During the 30 days preceding the survey

Table 35

Association Between Students' Television Viewing Risk and Dietary Behaviors Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests: Overweight/Obese ($n = 367$)

Dietary Behaviors	White σ OR (95% CI) <i>p</i>-value	Black σ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel CommonOR (95% CI) <i>p</i>-value
Ate five-or more servings of fruits and vegetables (yes/no)* ▶TV viewing (yes/no)	0.95 (0.19-4.65) ns	1.59 (0.41-6.24) ns	0.269	1.20 (0.52-2.77) ns
Ate two-or-fewer servings of fatty foods (yes/no)* ▶TV viewing (yes/no)	2.48 (0.30-20.22) Ns	1.45 (0.50-4.17) ns	0.088	1.77 (0.95-3.29) ns

* During the day prior to being surveyed

Television Viewing Risk and Dietary Behaviors Among University Males:

Overweight/Obese. Each of the Breslow-Day tests of homogeneity for all dietary behaviors were non-significant, suggesting there are no differences among black and white, overweight/obese university males. Common odds ratios for overweight/obese males at-risk for TV viewing indicate no greater risk for consuming inadequate levels of fruits or vegetables and more-than-recommended servings of foods high in fat than are those not at-risk for TV viewing (Table 35).

Table 36

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
Among University Males by Race Using Breslow-Day and Mantel-Haenszel Tests:

Overweight/Obese ($n = 367$)

Physical Activity Behaviors	White σ OR (95% CI) <i>p</i>-value	Black σ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
... Vigorous activity (≥ 3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	5.12 (1.09-24.16) ns	2.36 (0.78-7.08) ns	0.872	2.41 (1.25-4.66) .012
... Moderate activity (≥ 5 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	0.87 (0.25-3.04) ns	0.93 (0.31-2.77) ns	0.709	1.15 (0.53-2.48) ns
... Stretching (≥ 3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	1.82 (0.53-6.24) ns	1.91 (0.63-5.80) ns	0.097	1.47 (0.82-2.66) ns
... Strengthening (≥ 3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	4.59 (0.57-36.82) ns	1.99 (0.60-6.61) ns	0.142	1.29 (0.72-2.28) ns

Television Viewing and Physical Activity Behaviors Among University Males:

Overweight/Obese. The Breslow-Day tests of homogeneity were non-significant among overweight/obese males for any of the physical activity behaviors (Table 36). The common odds ratio for vigorous physical activity detected a significant finding among overweight/obese males ($p = .012$); suggesting that overweight/obese males at-risk for TV viewing were at an increased risk regarding their vigorous physical activity levels. Common odds ratios for overweight/obese males at-risk for TV viewing indicated no elevated risk for moderate physical activity, stretching, and strengthening activities.

Table 37

Association Between Students' Television Viewing Risk and Weight Perceptions Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests:

Overweight/Obese ($n = 218$)

Weight Perceptions	White ♀	Black ♀	Breslow-Day	Mantel-
	OR	OR	Test of	Haenszel
	(95% CI)	(95% CI)	Homogeneity	Common OR
	<i>p</i>-value	<i>p</i>-value	<i>p</i>-value	(95% CI)
				<i>p</i>-value
Perceived self as being	0.99	1.78		1.26
overweight (yes/no)	(0.45-2.23)	(0.66-4.82)	0.360	(0.50-3.19)
▶TV viewing (yes/no)	ns	ns		ns
Were attempting weight	0.91	2.19		1.06
loss (yes/no)*	(0.40-2.04)	(0.80-5.95)	0.266	(0.33-3.49)
▶TV viewing (yes/no)	ns	ns		ns

*During the 30 days preceding the survey

Television Viewing Habits, Weight Perceptions, and Weight Control Behaviors

Among University Females: Overweight/Obese. The Breslow-Day test for homogeneity were non-significant for overweight/obese females by race with regard to weight perceptions, attempting weight loss (Table 37), and all weight control behavior variables (Table 38). Common odds ratios suggested overweight/obese females viewing five-or-more hours of television each day are no more at risk for perceptions of themselves as overweight, attempting weight loss, and weight loss behaviors than females that view four-or-fewer hours of television each day.

Table 38

Association Between Students' Television Viewing Risk and Weight Control Behaviors
Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests:
Overweight/Obese ($n = 218$)

Weight Control Behaviors	White ♀ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
Dieted to lose weight or control weight (yes/no)* ▶TV viewing (yes/no)	0.49 (0.19-1.27) ns	1.23 (0.38-3.99) ns	0.974	1.19 (0.56-2.57) ns
Exercised to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	0.81 (0.36-1.86) ns	0.96 (0.36-2.55) ns	0.125	0.54 (0.23-1.26) ns
Vomited/took laxatives to lose/control weight (yes/no)* ▶TV viewing (yes/no)	1.04 (1.01-1.06) ns	1.03 (0.99-1.08) ns	0.770	0.93 (0.19-4.55) ns
Took diet pills to lose/ control weight (yes/no)* ▶TV viewing (yes/no)	0.32 (0.04-2.46) ns	2.00 (0.31-12.84) ns	0.462	1.01 (0.39-2.57) ns

* During the 30 days preceding the survey

Table 39

Association Between Students' Television Viewing Risk and Dietary Behaviors Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests:

Overweight/Obese ($n = 218$)

Dietary Behaviors	White ♀ OR (95% CI) <i>p</i>-value	Black ♀ OR (95% CI) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel CommonOR (95% CI) <i>p</i>-value
Ate five-or more servings of fruits and vegetables (yes/no)* ▶TV viewing (yes/no)	1.88 (0.54-6.52) ns	0.72 (0.22-2.37) ns	0.727	1.85 (0.59-5.79) ns
Ate two-or-fewer servings of fatty foods (yes/no)* ▶TV viewing (yes/no)	2.83 (1.26-6.38) ns	0.93 (0.34-2.54) ns	0.666	1.26 (0.53-3.02) ns

Television Viewing Risk and Dietary Behaviors Among University Females: Overweight/Obese Students. The Breslow-Day tests for homogeneity were non-significant among overweight/obese females by race. Common odds ratios suggested that overweight/obese females at risk for TV viewing were no more at-risk for consuming inadequate levels of fruits or vegetables and consuming foods high in fat than overweight/obese females not at-risk for TV viewing (Table 39).

Table 40

Association Between Students' Television Viewing Risk and Physical Activity Behaviors
Among University Females by Race Using Breslow-Day and Mantel-Haenszel Tests:
Overweight/Obese ($n = 218$)

Physical Activity Behaviors Engaged in...	White ♀ OR (95%CI) <i>p</i>-value	Black ♀ OR (95%) <i>p</i>-value	Breslow-Day Test of Homogeneity <i>p</i>-value	Mantel- Haenszel Common OR (95% CI) <i>p</i>-value
...Vigorous activity (≥3 of previous 7 days) (yes/no) ▶ TV viewing (yes/no)	2.31 (0.99-5.36) ns	2.58 (0.90-7.46) ns	0.419	3.16 (1.29-7.67) .015
...Moderate activity (≥5 of previous 7 days) (yes/no) ▶TV viewing (yes/no)	1.33 (0.44-4.02) ns	0.99 (0.33-2.93) ns	0.936	0.907 (0.39-2.06) ns
...Stretching (≥3 of previous 7 days) (yes/no) ▶TV viewing (yes/no)	2.50 (0.97-6.40) ns	3.38 (1.02-11.13) ns	0.463	1.14 (0.69-1.90) ns
...Strengthening (≥3 of previous 7 days) (yes/no) ▶TV viewing (yes/no)	2.33 (0.91-5.48) ns	2.55 (0.84-7.77) ns	0.485	2.61 (0.93-7.28) ns

Television Viewing Risk and Physical Activity Behaviors Among University

Females: Overweight/Obese. The Breslow-Day tests of homogeneity suggest that there are no differences in any of the physical activity behavior variables among overweight/obese females by race. The common odds ratios suggest that overweight/obese females at-risk for TV viewing are at increased odds of participating in less-than-recommended levels of vigorous activity (OR = 3.16; $p = .015$) (Table 40); each of the other common odds ratios computed were non-significant.

CHAPTER 4

DISCUSSION

This study examined the relationship between television viewing habits and its association with dietary and physical activity behaviors in a purposive sample of university students. Students who watched five-or-more hours of television per day (at-risk for TV viewing), were less likely to engage in dieting or exercise or to lose or control their weight as compared to those who watched four-or-fewer hours of television per day (not at-risk for TV viewing). Results of the present study are contrary to those conducted by Levy and Heaton (1993), as over two-thirds of their sample of college students used exercise to lose weight or control weight; high school students have also been known to use this method as the primary method to losing weight (Grunbaum et al., 2004).

There were no relationships detected in the present study regarding perception of self as overweight, attempting weight loss, vomiting or using laxatives, or using diet pills to lose weight or control weight. The present study also did not find that those who watched five-or-more hours of television were any more at-risk than those in the non-risk group regarding fruit and vegetable consumption. However, at-risk TV viewers were more likely to consume fewer servings of fatty foods. Lowry et al. (2003) reported that college students were more likely to consume more snack foods that increased caloric intake. Results from the present study are contrary to the findings from Lowry et al (2003). The hypothesis of this study regarding dietary behavior indicated that students at risk for TV viewing would have a stronger likelihood of consuming more fatty foods but these results indicate otherwise.

There were no associations found between students at risk for TV viewing and moderate physical activity. However, the present study results indicated that those at risk for TV viewing were more likely than those not at-risk for TV to engage in vigorous physical activity. McCreary and Savada's (1999) study found that the more television was watched, the less physical activity was engaged in. The results from the report herein state otherwise. Overall, those at-risk for TV viewing were more likely to engage in stretching/strengthening activities than those that are not at risk for TV viewing. This is particularly true among white males and white females. This is relatively consistent to the results of the National College Health Risk Behavior Survey in that males were more likely to participate in strengthening and stretching activities, particularly black males (CDC, 1997). In this study, white males were more likely to engage in these behaviors. These findings do not support the stated hypotheses related to vigorous physical activity, stretching, and strengthening activities.

The study also investigated the association between television viewing and dietary and physical activity behaviors by BMI. Normal weight students exhibited behaviors similar to those of the total sample. Normal weight students were less likely to engage in dieting and exercising to lose weight or control weight. White females in this study were more likely to attempt weight loss and use exercise as the preferred method of weight management. Hampl et al. (2004) found that the more television viewed the more likely it was that body dissatisfaction was experienced. This could be a reason why white females engaged in these behaviors more than the other groups (although this could not be ascertained by the data). Black females tend to have a healthier body image and not

stress the cultural norm for extreme thinness as white females do. The results from this study are consistent with the extant literature on body image.

Overweight white females at-risk for TV viewing were more likely than those not at-risk to report engaging in vigorous activity. This is a positive finding, because it leads one to question what overweight/obese white females are doing while watching TV. Are they attempting to lead healthier lifestyles by engaging in exercise while viewing a TV monitor? Many health clubs – including the ones on-campus – now mount televisions in their workout rooms. The current study could not ascertain the relationship between the two phenomena, however, future study might include observations that look at them.

TV viewing risk was not consistently associated with BMI in study participants; the only significant association occurred among white females. Those who viewed five-or-more hours of television per day were 2.44 times as likely as those who viewed four-or-more hours of television to be overweight or obese. This result is consistent with the Boynton-Jarrett et al. (2003) study of adolescent participants.

Limitations of the study may have been a factor in the data results. Since the study was limited to only those students at Georgia Southern University enrolled in Healthful Living courses, the data may not be representative of all students on campus, therein affecting results; the majority of the sample population was of freshman or sophomore class standing, so that behaviors may or may not have been fully developed. While TV viewing may not be quite the risk factor it was assumed to be, university students are still not engaging in enough physical activity and consuming the recommended amounts of fruits and vegetables. Interventions still need to be implemented among Georgia

Southern University students that promote healthier physical activity and dietary behaviors.

The results of this study were not consistent with the majority of the extant literature on television viewing, BMI, dietary behaviors, and physical activity. This could be an indication that television viewing is not actually a risk behavior that affects the risk behavior correlates. In a similar study conducted by Georgia Southern University of adolescents, results were comparable to the current study. Results from that study suggested that those at risk for television were more likely to engage in vigorous physical activity than those not at risk for television viewing. This could be due to the fact that those at risk for television viewing are watching programs that influence healthy behaviors. Males may be watching more sports/health related programs which may increase the likelihood of adequate vigorous physical activity. Females may be viewing programs that are related to cooking and nutrition, thereby influencing healthier dietary behaviors. This “hypothesis” would stand up to the data from the current study that suggests that all students, whether they are normal weight or overweight/obese, are consuming two-or-fewer servings of foods high in fat on the day prior to the study. Television viewing is related to the risk of being overweight or obese among white females, however. Even though at risk white females are engaging in vigorous physical activity more so than not at-risk white females, they still face adverse health conditions due to the increased risk of being overweight or obese.

It also needs to be taken into consideration that the items on the survey may need to be revised. Television viewing risk may actually not be risk simply because students may be watching an hour of television while exercising at a sports facility. Students may

not be engaging in sedentary behaviors, such as watching television, for five-or-more continuous hours per day. The items need to be revised to include in what context the at-risk participant was viewing television. Items regarding time spent doing other sedentary behaviors such as time spent using a computer and video-game or studying should also be considered when determining if sedentary behaviors affect dietary and physical activity behaviors. Students that may not be at-risk for television may be overweight or obese simply because they spend five-or-more hours using a computer per day. Physical activity items also need to be more specific, particularly in relation to risk behaviors. Students that may not be at risk for physical activity may have been identified as at-risk due to the nature of the items in the survey. For example, students may have engaged in three days of moderate physical activity and two days of vigorous physical activity, which would be an adequate amount during a week's time. The weight control and weight perception items were straight forward enough to avoid any confusion but the items regarding dietary behaviors could have been much more specific. Items could have included information regarding the specific recommendations on vegetable and fruit consumption, such as green leafy vegetables and other vegetables for instance.

It seems that white females typically engaged in weight control behaviors more so than white males, black males, and black females. Perhaps the Georgia Southern University student population would benefit from gender and race specific health education and promotion regarding safe and healthy weight management techniques. It would be advantageous for them since 48.5% of the study participants were attempting weight loss during the thirty days prior to the study. Since exercising to lose or control weight is a commonly used method of weight management it would also be beneficial to

incorporate more physical activity into the curriculum. Specifically, moderate physical activity needs to be emphasized. White females, particularly overweight or obese ones, were more likely to engage in vigorous activity yet moderate physical activity was not engaged in very much among the participants. Moderate physical activity has many health benefits and would be a positive way to increase physical activity. Moderate activity would serve the overweight/obese population well since beginning a vigorous physical activity regimen may cause early burn-out and reluctance to continue exercising.

While there may have been significant differences among the odds ratios and chi-square analysis, the Breslow-Day Test of Homogeneity conducted for this study determined that there are no significant differences in risk among black and white males and black and white females. The majority of the CMH tests produced non-significant common odds ratio point estimates. However, common odds ratios suggest that there is elevated risk among overweight/obese university males and overweight/obese university females that view five-or-more hours of television, specifically for vigorous physical activity. Overall, the common odds ratios suggested an elevated risk in relation to vigorous physical activity for all university males. Since there are no differences in race, according to the Breslow-Day Tests of Homogeneity, interventions should be gender specific and target physical activity behaviors for both cohorts on campus. This is of particular concern since the differences were seen mainly among overweight/obese males and females. It seems that viewing five-or-more hours of television primarily affects vigorous physical activity behaviors among both males and females that are overweight or obese, therefore not having much significance on weight perceptions, attempting to lose weight, weight control behaviors, and dietary behaviors of all other students.

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APPENDICES

APPENDIX A

HYPOTHESES, SIGNIFICANCE OF THE STUDY, DELIMITATIONS,
LIMITATIONS, ASSUMPTIONS, DEFINITION OF TERMS

Hypotheses

The following relationships were hypothesized to be found as a result of the analysis:

- 1) Television viewing will be related to body mass index (BMI), that is, students who view five-or-more hours of television per day will be significantly more likely to be overweight and obese than those who watch television fewer than five hours per day.
- 2) Hours of television viewing will be related to dietary risk. Specifically, students who view five-or-more hours of television daily will be significantly more likely to eat two-or-more servings of fatty foods each day and significantly less likely to consume five-or-more servings of fruits and vegetables per day than students who watch television fewer than five hours per day.
- 3) Hours of television viewing and physical activity behaviors will be inversely related, that is, students who view five-or-more hours of television per day will be significantly less likely to participate in vigorous physical activity, moderate physical activity, stretching exercises, and strengthening exercises than students who fewer than five hours of television per day.

Significance of the Study

It was hypothesized that increased TV viewing was to be associated with physical inactivity, poor dietary behaviors, and increased BMI – each is associated with being overweight and obese. Overweight and obesity substantially raise the risk of hypertension, elevated cholesterol, as well as type-2 diabetes, cardiovascular disease, and stroke, and a myriad of other conditions (USDHHS, 2002). These disease states may be prevented with a healthy diet and increased physical activity (Must & Strauss, 1999).

Overweight and obesity have also been described as the end-result of a complex variety of social, cultural, behavioral, and environmental factors, including television viewing (USDHHS, 2002). Viewing television is common among college students, where one-in-eight students at a comprehensive university in the Southeast reported viewing at least five hours each day (Teddors, Parrillo, & Carter, 2004). The relationship between obesity and television viewing among adolescents suggests that increasing time spent watching television appears to increase the risk of being obese (Atherson & Metcalf, 2005). Such relationships among college students may be hypothesized but have yet to be studied.

Delimitations of the Study

The following were delimitations of the study:

- 1) Data were collected in the 2002-2003 *College Student Health Risk Behavior Profile* at Georgia Southern University, a mid-sized university in the southeastern United States.
- 2) This study included questions on height, weight, physical activity, and dietary behaviors, television viewing habits and demographic information.

- 3) This study was a secondary data analysis that included 2,268 participants from the original study.

Limitations of the Study

Limitations of the following study were as follows:

- 1) The study was limited to behavioral items listed in the *Student Health Risk Behavior Profile*. Other psychological or sociological factors, or other constructs found in the literature that may be related to the behaviors under study (e.g. knowledge, attitudes, intentions) were not included.
- 2) The study was purposively selected, limited to students who were enrolled in the Healthful Living course (HLTH 1520).
- 3) The original data were collected between May 2002 and April 2003. Potential confounding due to history and maturation may affect interpretation of results. For example, if a participant indicated “Freshman” as his/her class standing in May 2002, that person potentially would have been on campus for virtually an entire school year; another participant, listing the same class standing in August 2002 may not have had the same experiences as his/her counterpart.
- 4) The data analysis may have been confounded due to the amount of physical activity in which students participated as a result of their enrollment in activity classes. For students in freshman and sophomore years, in particular, enrollment in such classes are common, giving them a potential advantage over their junior and senior counterparts. In addition, while participation in such classes can be controlled for (Q92 asks a yes/no question about enrollment), the number of times

each student participated in activity each week, as well as the intensity of that activity, is not known.

- 5) The instrument used was a paper-pencil questionnaire. As such, all questions may not have been answered by study participants.
- 6) The study included only those students who opted to participate.
- 7) The majority of respondents were in the freshman class. Responses may have reflected prior behavioral patterns, rather than those newly-established or formed at Georgia Southern

Assumptions of the Study

The conduct of this study will be based upon the following assumptions:

- 1) The participants, due to many reasons, may have inaccurately reported height and weight. It is assumed that participants answered each question sincerely.
- 2) Students were able to correctly interpret the meaning of each question correctly, as present in the survey.
- 3) There was no error in the entry and coding of the data.

Definition of Terms

Anorexia Nervosa. (Code 307.1) Refusal to maintain body weight at or above a minimally normal weight for age and height; intense fear of gaining weight or becoming fat, even though underweight; disturbance in the way one's body weight or shape is experienced; in post-menarchal females, amenorrhea (i.e. the absence of at least three consecutive menstrual cycles) (American Psychiatric Association [APA], 2002).

Binge-Eating Disorder. Recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviors characteristic of Bulimia Nervosa (APA, 2002).

Body Mass Index (BMI). Body Mass Index (BMI) is a tool for indicating weight status among adults. BMI is correlated with body fat composition and the ranges are based upon the effect body weight and height has on disease and death. Normal BMI is considered to be ≥ 18.5 ; anything within this range is considered to be healthy. Someone with a BMI measure ≥ 25.0 is considered overweight (not within the healthy range) with an increased chance of health risks. A person with a BMI ≥ 30.0 is considered to be obese, with a markedly increased chance of disease and mortality (CDC, 2005).

Bulimia Nervosa. (Code 307.51) Recurrent episodes of binge eating, characterized by both of the following: 1) Eating, in a discrete period of time (e. g., within any two-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances; 2) A sense of lack of control over eating during the period (e.g., a feeling that one cannot stop eating or control how much one is eating); recurrent inappropriate compensatory behavior in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise. The binge eating and inappropriate compensatory behaviors both occur on average at least twice a week for three months; self-evaluation is unduly influenced by body shape and weight; the disturbance does not occur exclusively during episodes of anorexia nervosa (APA, 2002).

Eating Disorder. The eating disorders are characterized by severe disturbances in eating behavior (APA, 2002).

Eating Disorder Not Otherwise Specified. (Code 307.50) For females, all of the criteria for Anorexia Nervosa are met except that the individual has regular menses; all of the criteria for Anorexia Nervosa are met except that, despite significant weight loss, the individual's current weight is in the normal range; all of the criteria for bulimia nervosa are met except that the binge eating and inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than three months; the regular use of inappropriate compensatory behavior by an individual of normal body weight after eating small amounts of food; repeatedly chewing and spitting out, but not swallowing, large amounts of food (APA, 2002).

Endurance. The ability of the muscle to continue to perform without fatigue (USDHHS, 1996).

Flexibility. A health-related component of physical fitness that relates to the range of motion available at a joint (Wilmore & Costill, 1994).

Moderate Physical Activity. Activities at a minimum level of intensity (e.g. walking and bicycling), performed for at least 30 minutes each session (CDC, 1997).

Obesity. Defined as "...a BMI of $\geq 30 \text{ kg/m}^2$..." (National Heart, Lung, and Blood Institute [NHLBI], 1998, p. xi)

Overweight. Defined as "...a body mass index (BMI) of 25 to 29.9 kg/m^2 ..." (NHLBI, 1998, p. xiii)

Physical Activity. Bodily movement that is produced by the contraction of skeletal muscle, and that substantially increases energy expenditure (USDHHS, 1996).

Physical Fitness. A set of attributes that people have or achieve that relates to the ability to perform physical activity (USDHHS, 1996).

Strength. The ability of the muscle to exert force (USDHHS, 1996).

Vigorous Physical Activity. Activities that make participants sweat or breathe hard for at least 20 minutes each session (CDC, 1997).

APPENDIX B

EXTENDED REVIEW OF THE LITERATURE

Television Viewing Habits Among College Students

More and more, leisure time activities are being substituted with sedentary behaviors such as TV viewing, watching videotapes, and playing video games (Anderson, Crespo, Bartlett, Cheskin, & Pratt, 1998; Robinson, 1999). Children 6-to-11 years-old view an average of 23-hours of television per week, while adolescents view an average of 21 hours per week (Robinson, Hammer, Killen, Kraemer, Wilson, Hayward, & Taylor, 1993). The American Academy of Pediatrics recommends that older children and adolescents view no more than one-to-two hours of television per day. It can be assumed that any more time spent viewing television in excess of two hours per day can contribute to health risks (American Academy of Pediatrics, 2006). Television viewing habits are linked to several health issues, not only in adults, but in adolescents and children as well. The American Pediatric Association recognizes television viewing as one such avoidable risk factor for obesity among adolescents (Atherson & Metcalf, 2005). In fact, children spend more time viewing television per day more than any other activity except for sleep (Boynton-Jarrett, Thomas, Peterson, Wiecha, Sobol, & Gortmaker, 2003). The Surgeon General's Report detailed the prevalence of obesity among adolescents, finding it had almost tripled in the previous two years, from 5-to-14% (USDHHS, 2005). Television viewing possibly relates causally to obesity (Lowry, Weschler, Galuska, Fulton, & Kann, 2002). That said, television watching may cause obesity in four ways: Those that watch television may snack more while watching; they may watch more commercials for foods that have high caloric and saturated fat values and choose these instead of more nutritious

foods; they may have a lower metabolic rate due to television watching; and they may substitute television watching for more energy consuming activities (Tai-Seale & Chandler, 2003).

The relationship between television viewing and obesity in adolescence appears to be strengthened by its' dose response (Atherson & Metcalf, 2005). A study by Pate and colleagues reported that coronary heart disease (CHD) is related to dose response in that the more television is viewed the more sedentary behaviors are engaged in; thereby, creating risks for not only CHD but for hypertension, non-insulin dependent diabetes mellitus, osteoporosis, colon cancer, anxiety, and depression (Pate, Pratt, Blair, Haskell, Macera, Bouchard, Buchner, Ettinger, Heath, King, Kriska, Leon, Marcus, Morris, Paffenbarger, Patrick, Pollock, Rippe, Sallis, & Wilmore, 1995). Television viewing is an easily modified behavior and there is great potential to change (Atherson & Metcalf, 2005); however, transitioning from adolescence (high school) to young adulthood (college) creates changes in behaviors that can affect them into adulthood (Gyurcsik, Bray, & Brittain, 2004). Children and adolescents are particularly susceptible to messages relayed by TV viewing. These images manipulate perceptions and behaviors such as body concept and self image, nutrition and dieting, and obesity (American Academy of Pediatrics, 2001). Since behaviors developed during childhood and adolescence tend to carry into adulthood it is important to create interventions regarding TV viewing and nutrition, physical activity, body weight, and body image. Television has morphed from an insignificant component of life in which it was viewed as a form of entertainment and in some cases a temporary babysitter for children to an object that strongly influences health and other behaviors (Tucker, 1986). The American Academy

of Pediatrics found in 1993, most children spent their time out of school viewing television between 21-23 hours per week. The youngest children were found to have viewed the most (American Academy of Pediatrics, 1995).

McCreary and Savada (1999) suggest that there are two different ways that excessive TV viewing can have on people. One way is displacement, in which individuals use time to watch TV instead of engaging in physical activity or school work. McCreary and Savada suggest that viewing TV for four-or-more hours per day is significantly related to lower math and reading skills and less creativity in children. It was reported that adults and children that view four-or-more hours of TV per day are significantly less physically active than those that watch less than one hour of television a day. Another way in which TV viewing can negatively affect viewers is the content of the actual programs that are viewed. The content on TV creates a non-realistic world in which social norms are produced. Health behavior and prevention on TV are not represented in a way that is conducive to the viewer's health. Typically, TV programs focus on dramatic acute medical problems rather than chronic illness that could affect the viewer and often misrepresents the actual illness and its' treatment (McCreary & Savada, 1999).

A study of 341 participants that were in a prospective study of health status and health behaviors in early adulthood were surveyed about their TV viewing habits, BMI, general health, self- perceived weight and level of physical activity. It was found that the males in the study were significantly more likely to be overweight than females according to their BMI scores and self-perceived weight. However, females considered themselves to be more overweight than males. It was shown that men view more TV per week than the females do yet perceived themselves to be more physically active and less

likely to be overweight. While controlling for BMI and gender, the results concluded that the more TV that was viewed, the more overweight they perceived themselves to be. This was particularly true with females when controlling for BMI and amount of time spent watching TV. It was also reported that females that viewed more TV were more likely to feel less physically active than those that did not view an excessive amount of TV. The study found two significant associations in that there was a negative association between TV viewing and self-perceptions of weight and the amount of TV viewing each week was related to having lower levels of physical activity and general health, particularly for women (McCreary & Savada, 1999).

TV viewing is hypothesized to be one of the most easily modified behaviors that contribute to obesity. A study of children in third and fourth grade suggested that the findings were related to displacement and content of programming that children viewed. The participants were randomly separated into a control group and an intervention group. The intervention group received lessons at school that taught them self regulation of TV viewing and encouraged a 7-hour per week allowance of TV. Parents were included in the intervention and were provided with methods to ensure the 7-hour per week allowance for their children and also how to adapt this to the entire family. The effects of the intervention on weight and body fat compared with those in the control were statistically significant in that there were decreases in BMI, triceps skin-fold thickness, waist circumference, and waist-to-hip ratios. The children in the intervention group, although not statistically significant, were reported to consume fewer servings of high-fat foods than those in the control group. The intervention group did not show any differences in snacking behaviors but since TV viewing was decreased it is assumed that

less high-fat snacks were consumed as a result. Another factor in a diet lower in fat could be contributed by not seeing TV programs that include high-fat foods in the content (advertisements and other programs). These findings are consistent with other studies related to children, adolescents, and young adults (Robinson, 1999).

Results from the *Third National Health and Nutrition Examination Survey (NHANES III)*, found a relationship between TV viewing, physical activity, and body composition. It was reported that children who watched more TV and were less likely to report physical activity had higher BMIs. High rates of TV viewing (four-or-more hours per day) were found among approximately one-in four of U.S. children. Female children (23%) were less likely to view four-or-more hours of TV per day than male children (29%). There were differences in race in that black children (42.8% for boys and 43.1% for girls) were more likely than Hispanic children (33.3% for boys and 28.3% for girls) which were more likely than white children (24.3% for boys and 15.6% for girls) to view four-or-more hours of TV per day (Anderson et al., 1998). The results from the 2003 *National Youth Risk Behavior Surveillance (YRBS)* are consistent with the NHANES III results. It reports that overall, 38.2% of high school students viewed ≥ 3 hours of television per day. Regarding race, the results were similar with the NHANES III in that black students (67.2%) and Hispanic students (45.9%) viewed ≥ 3 hours of television per day while only 29.3% of white students reported this behavior (Grunbaum et al., 2004). The results from both surveys indicate that black and Hispanic students are at risk due to viewing increased amounts of television.

A risk imposed upon children and adolescents that view three or more hours of television per day is the influence of media on food choices and consumption. Dietz and

Gortmaker (2001) suggest that the high rate of advertising for food products highly influences children and their dietary choices. Exposure to these advertisements can lead to incorrect dietary beliefs among children and adolescents. These advertisements focus upon foods with little or no nutritional qualities while avoiding nutrient dense foods such as fruits and vegetables (Lowry, Weschler, Galuska, Fulton, & Kann, 2002). These choices can be circumvented by parental knowledge and supervision of television viewing habits. In addition to dietary behaviors, physical activity among children and adolescents is displaced due to the time spent viewing television and the advertising therein. It is suggested that the effects of the actual advertising may be more detrimental than the inactivity that takes place. Children and adolescents that regularly view advertisements for foods high in fat and sugar and fast foods are at risk for increased caloric intake in conjunction with physical inactivity (Dietz & Gortmaker, 2001).

A study that analyzed data from the 1999 *National YRBS* examined television viewing and its' association with overweight, physical inactivity, and poor dietary behaviors among high school students among the total student population, those that viewed two-or-more hours of television per day are at risk for being overweight. It was found that white and Hispanic females and white males were more likely than the other groups to be overweight due to excessive television viewing. Snacking is a behavior that can increase caloric intake (Lowry et al., 2003), since snack foods and beverages typically contain a high amount of dietary fat and sugar (Boynton-Jarrett et al., 2003). According to Lowry et al., snacking and television viewing is related to the amount of television viewed, thereby increasing the risk for overweight among the study population. Television viewing was also associated with a sedentary lifestyle among white, black,

and Hispanic female students however, there is an inverse relationship between black male students and a sedentary lifestyle (Lowry, et al, 2002). It was also shown that students from lower grades were more likely to view excessive television than were older students. This was also true among black students (73.7%) and Hispanic students (52.2%) in comparison to white students (34.2%) (Lowry et al., 2002). These percentages have decreased somewhat compared to the results from the 2003 *National YRBS* but the prevalence of excessive television viewing is still the same in regards to race and grade status. Overall, television viewing has decreased from 42.8% of students (in 1999) viewing more than two hours of television per day to 38.2% in 2003 (Grunbaum et al., 2004).

Lowry et al. found that television viewing is associated with consuming inadequate amounts of fruits and vegetables in the entire student population, particularly among white male and female college students. Hispanic males had an inverse association in regards to television viewing and adequate fruit and vegetable intake (Lowry et al., 2002). A randomized, controlled study of 548 young adolescents, in which baseline data and follow-up data was collected, suggested that television viewing may contribute to a decline in fruit and vegetable consumption in adolescents. This can be related to dose response in that the more time spent viewing television resulted in less fruits and vegetables consumed. According to Boynton-Jarrett et al. (2003), an adolescent that viewed three-or-more hours of television per day consumed, on average, 2.25 fewer servings of fruits and vegetables per week than those adolescents in the study that did not watch television. Since advertising has such forceful marketing schemes that shape nutritional beliefs, attitudes, knowledge, and consumption patterns among children and

adolescents, it is obvious why dose response plays such an intricate role in the association between television viewing and fruit and vegetable intake (Boynton-Jarrett et al., 2003). Hampl et al. (2004) found that adolescents that viewed prime time television were more apt to follow eating behaviors seen on these programs. The study surveyed 524 adolescents between the ages of 12-and-17 years old that viewed 10 popular primetime television programs. It was reported that 50.5% of the participants watched at least two hours of television per day and 58.8% reported that they did not engage in the recommended amount of physical activity per day. There was a significant amount of participants that consumed soda (63.9%) per day and beer and wine was the most commonly viewed beverage consumed on these programs (Hampl, Wharton, Taylor, Winham, Block, & Hall, 2004). In addition to dietary behaviors, it was also reported that messages about "...sex appeal, thinness, and alcohol may have a powerful impact on adolescents' self-esteem, body dissatisfaction, and health behaviors." (Hampl et al., 2004, p. 92) Media not only has an impact on the foods that are consumed by children and adolescents but it also seems to have an impact on food restriction as well.

The media creates an ideal for thinness that is unrealistic and has been shown to generate feelings of low self esteem and body image, particularly among females. Adolescents are in a stage of development in which they are defining their own self-identity and the images of extremely thin actresses and actors has created a national fixation and perception of body image that may lead to unhealthy behaviors (Botta, 1999). Over four decades (1950s-to-1990s) body size has changed dramatically in American and Canadian young adults, ages 18-to-24 years old, and among models

(centerfolds and Miss America contestants) in the media. There is a significant difference in body size among American women in comparison between the 1950's and the 1990's.

The average BMI for American women has approached the upper limit of the normal weight category; implying a large percentage of American young women is overweight. While the size of centerfold models has decreased slightly, the size of Miss America contestants has decreased significantly. Bombardment from these images in daily television and other media has led to the cultural norm that all women should be thin and body dissatisfaction can result; the gap between American women and those in the media has increased drastically over those four decades, increasing body dissatisfaction among average size women (Spitzer, Henderson, & Zivian, 1999). Botta (1999), in a study of 214 high school girls, reported results consistent with those in Spitzer et al. (1999); the average BMI was 22.0, well within the healthy weight range. Participants were surveyed about body image disturbance and thin ideal endorsement due to television viewing. The more that girls reported comparing themselves to the characters they saw on television, the more they were dissatisfied with their own bodies. In the Botta study, bulimic action tendencies were more likely to be engaged in when participants reported comparing themselves to television characters (Botta, 1999).

Body Mass Index, Overweight, and Obesity Among College Students

An increase in overweight and obesity has created risk factors such as increased cardiovascular disease, type 2 diabetes, sleep apnea, stroke, respiratory problems, and some types of cancer. Overweight and obesity occurs when the amount of energy (calories) consumed exceeds that of which is expended. Other factors play a definite

role in overweight and obesity such as genetics, metabolic rates, and behaviors such as a poor diet and physical inactivity. Culture, environment, and socioeconomic status are also important components to increasing overweight and obesity (USDHHS, 2000). Body Mass Index (BMI) is the measurement used to determine if one is underweight, normal weight, overweight, or obese. A BMI below 18.5 is considered to be underweight; a BMI below 25 is considered normal weight; a BMI below 30 is considered to be overweight; and BMI ≥ 30.0 is obese (CDC, 2005). A BMI of less than 25 has been identified as the upper limit of the normal range since chronic disease risk increases above this point. In 1988 to 1994, nearly 55% of American adults are overweight. The percentages of those that have a BMI of ≥ 30 have increased from 14.5% to 22.5% during this time. The trend of increasing overweight and obesity is continuing in children ≥ 6 years old of both genders and all populations (USDHHS, 2000).

Healthy People 2010 state that overweight and obesity are prevalent in all populations but obesity is notably present among Hispanic, black, Native American, and Pacific Islander females. Currently, 25% of adult females and 20% of adult males are obese (USDHHS, 2000). Excess weight is a concern for males and females of all races/ethnicities and ages. Moderate weight gain is associated with significantly increasing the risk of heart disease and total mortality among middle aged females (Lewis, Smith, Wallace, Williams, Bild, & Jacobs, 1997) “Obesity is a better predictor of cardiovascular disease risk in younger than older men, and it has greater effects on cardiovascular risk factors, such as diabetes mellitus and hypertension, in the young.” (Lewis et al, 1997, p. 635). Objective 19-1 in Healthy People 2010 is to increase the proportion of adults who are at a healthy weight from 42% of adults with a BMI less than

25 to 60% of adults that have a normal, healthy weight. Objective 19-2 seeks to reduce the proportion of adults that are obese from 23% of adults aged 20 years or older with a BMI of ≥ 30 to 15% of adults that are obese (USDHHS, 2000).

In the Coronary Artery Risk Development in Young Adults (CARDIA) study, some 5,115 eligible participants beginning in 1985/86 with follow up exams in 1987/88, 1990/91, and 1992/93. Over seven years the participants were followed and there were significant differences in demographic and behavioral characteristics between the ethnic groups and baseline. It was reported that the greatest increase in overweight was among black females (32% at baseline and 51% at year seven) and was the lowest among white females (from 13%-to-24%). However, there were increases in

Leenders et al. reported that 15% of females and 33% of males in the study were overweight or obese. Since these measures were self -reported, it was easy to see that weight perception is skewed among females more so than the males in the study. Females (47%) were significantly more likely to perceive themselves as overweight or obese even though only 15% were actually overweight or obese. Males were less likely to perceive themselves as overweight or obese, in that 33% actually were overweight or obese and 24% had the perception of being overweight or obese (Leenders, Sherman, & Ward, 2003).

Dietary Behaviors Among College Students

Dietary behaviors are associated with four out of the ten leading causes of death in the United States: coronary heart disease, some types of cancer, stroke and type 2-diabetes (USDHHS, 2000). Nutrition is essential for proper growth and development, health and well being but dietary behaviors in Americans are lacking in variety of foods

that promote health. The American diet is becoming higher in foods that contain sodium, saturated and total fats, and cholesterol and lower in dietary fiber, iron, and calcium due to the increase in consuming foods from away-home-sites (fast food restaurants, restaurants, school cafeterias, vending machines, and other sources (USDHHS, 2000). Recommendation for dietary behaviors may vary for special populations but for a reference 2,000 calorie intake are outlined in the Food Guide Pyramid. It is suggested that two cups of fruit and two and half cups of vegetables be consumed per day. It is important to consume a variety of dark green, orange, starchy vegetables, legumes and other vegetables during the week. It is recommended to consume three cups of fat-free or low-fat milk or milk equivalents per day, especially for children, adolescents, and pregnant women. It is recommended to consume three or more ounce-equivalents of whole grain products per day, with the rest of the grains coming from enriched or whole grain products. In general, whole grains should constitute at least half of grain consumption. It is recommended that approximately 5.5 ounces of meat or other protein be consumed daily as well. Fats, oils and sugars should be used sparsely (USDHHS, 2005).

Overall, American adults, especially college students, are not adhering to the Dietary Guidelines for Americans (DGA). It is suggested that college students exceed recommended amounts of total and saturated fats in their diets (Anding, Suminski, & Boss, 2001). Research has indicated that the transition to college can be difficult due to the stress of being newly independent. It is during this time in which critical life behaviors are developed, including dietary behaviors (Hampl & Betts, 1995). College

students often consume sodium-rich foods in that they are known for consuming foods from vending machines and salty foods (Anding, Suminksi, & Boss, 2001).

Dietary Intake of Fruits and Vegetables

Cardiovascular disease and cancer are the leading causes and death and it is suggested that consuming at least five servings and fruits and vegetables per day will reduce the risks of these diseases (Hung, Joshipura, Jiang, Hu, Hunter, Smith-Warner, Colditz, Rosner, Spiegelman, & Willett, 2004). Healthy People 2010 Objective 19-5 recommends that the percentage of those aged 2 years or older consume at least two daily servings of fruit increase from 28% to 75%. Objective 19-6 recommends that the proportion of those aged 2 years or older, who consume at least three daily servings of vegetables, with at least one third being dark green or orange vegetables increase from 3% to 50% (USDHHS, 2000). In the U.S., populations of all ages do not consume the recommended amount of fruits, vegetables, and grains. While a variety of fresh, frozen, and canned fruits and vegetables are available fried potatoes account for approximately one third of vegetable servings for those ages 2-to-19 years old (USDHHS, 2000). In a study by Hung et al. (2004), increased fruit and vegetable consumption was associated with a moderate but not statistically significant reduction in risk factors for chronic disease. The benefits appeared to effect cardiovascular disease more so than types of cancers. It was found that green leafy vegetables showed the strongest inverse association with major chronic diseases but fruits and other vegetables were beneficial as well. There were no significant differences between genders regarding consumption; the median intake for women was 5.3 servings per day and 5.2 servings per day for men. There was no

reported correlation between cancer and fruit and vegetable consumption, however, the benefits of consuming these foods outweigh not consuming them (Hung et al., 2004).

The 2003 *National Youth Risk Behavior Surveillance* found that only 22.0% of high school students had eaten the recommended amount of fruits and vegetables five-or-more times per day during the seven days preceding the survey. Male high school students (23.6%) were more likely to consume the recommended amount than female high school students (20.3%). Hispanic (24.4%) and white (20.5%) students were more likely than black students to consume the recommended amount of fruits and vegetables. Younger students, ninth- and tenth-graders (23.3% and 23.0%, respectively), were also more likely to consume adequate amounts of fruits and vegetables as opposed to their older counterparts (twelfth-graders: 19.5%) (Grunbaum et al., 2004).

The 1995 *National College Health Risk Behavior Survey* found that college students (26.3%) consume less fruits and vegetables than high school students do. Male college students (27%) ages 18-to-24 years old were more likely than female college students (23.3%) 18-to-24 years old to consume an adequate amount of fruits and vegetables per day. Black males (38.8%) were more likely than any race/gender to consume the recommended amount of fruits and vegetables while white females (23.6%) were less likely to consume the recommended amount. Overall, Hispanics as a group were more likely to fulfill recommendations (CDC, 1997).

In a study of 2,155 college students, one in four students consumed ≥ 5 servings of fruits and vegetables per day. It was reported that the percentage of males (24%) in the study that consumed ≥ 5 servings of fruits and vegetables were lower than females (28%)

that consumed an adequate amount of fruits and vegetables (Leenders, Sherman, & Ward, 2003).

Consumption of Foods Typically High in Fat

The number of Americans that eat away from home has increased to 47.5% in 1999 from 34% in 1994 of total food sales from restaurants. The majority of these sales come from fast food restaurants. These establishments contribute to obesity due to the general nature of fast food which is high in saturated fats, total fat and energy, and low in vitamins A and C, dietary fiber, calcium, and folate. Satia, Galanko, and Siega-Riz (2004), conducted a study among blacks in North Carolina and the association between high fat diets, fast food restaurants, and obesity. The Surgeon General (2001) reports that black females (69%) are more likely than white (47%) or Hispanic females (70%) to be overweight or obese; black males (58%) were less likely than white (62%) or Hispanic males (69%) to be overweight or obese, however, the percentage is still significantly high (USDHHS, 2001). There were 658 participants surveyed about their 'fast food' dietary behaviors. It was reported that those participants that usually/often frequented fast food restaurants had higher intake in saturated and total fat (39.0 g total fat/day) while those that rarely/never consumed fast food had a significantly lower amounts of saturated and total fat (28.3 g total fat/day). Participants that were reported as younger, never married and physically inactive typically consumed the most fast food, therefore consuming more total and saturated fats (Satia, Galanko, & Siega-Riz, 2004).

Hampl and Betts (1995) surveyed 66 males and 159 females reporting a three day intake of 30% or less of energy from fat and 370 males and 467 females that reported a three day intake of more than 30% of energy from fat. Young women in the study that

fell into the high fat diet group consumed more total fat from foods like whole milk, oils, condiments, potatoes/potato products, salty snacks, and other fatty foods. There were similar findings among the males in the study as well, typically consuming the same foods listed above under young women. The study did show that young adults made healthier food choices than their older counterparts. Younger males that consumed a low-fat diet incorporated more legumes, rice, and fruits that did older males. Younger women that consumed low-fat diets typically consumed more low-fat dairy products, rice, and fruits. However, both groups did consume over the recommended daily amounts of sodium, which can be found in foods high in fat and snack foods (Hampfl & Betts, 1995).

Dieting to Lose Weight or Keep from Gaining Weight

According to Heatherton, Nichols, Mahamedi, & Keel (1995), dieting has decreased among males and females between 1982 and 1992. The study was conducted in 1982 and 1992 at a northeastern university and 1,200 students were surveyed each time in order to determine weight patterns over a ten year time frame. It was reported that the intensity and method of dieting changed over time. In 1982, the most common diets were low-calorie or low-carbohydrate. The 1990's shifted dieting methods significantly toward low-fat diets for males and females. Females were significantly less likely to use high protein diets especially in the 1990's but use of Weight Watchers increased during that time. The use of low-carbohydrate diets decreased significantly in the 1990's for males and females (Heatherton, Nichols, Mahamedi, & Keel, 1995).

Exercising to Lose Weight or Keep From Gaining Weight

The 1992 *Weight Loss Practices Survey* found that dieting and exercise were the most common way to lose weight. Currently, approximately 40% of females and 20% of men are trying to lose weight. A greater percentage has attempted weight loss in the past year but has been unsuccessful. It was reported that 33% of women and 20% of men reported that they currently engaged in weight loss behaviors. Over two-thirds of the sample used a diet and exercise to lose weight. It was reported that 30% of the sample maintained a diet plan (30%) for over a year and 20% used questionable methods to lose weight. Younger adults were more likely to use exercise and diet but not for long-term plans. It was shown that as BMI increased the prevalence of exercise decreased. As BMI increased it was more likely for the participant to use other methods such as using weight loss pills, fasting, and taking laxatives (Levy & Heaton, 1993).

The 1992 *Weight Loss Practices Survey* also reported that participants attempting weight loss exercised for approximately three hours per week. Females were more likely to engage in walking and aerobic exercise than males, who were more likely to engage in weight training. There were differences in exercising to lose weight regarding gender and BMI. Males that had higher BMIs were less likely to exercise while females in the highest BMI group exercised more than females in the middle BMI group. There was also a difference in race, in that, blacks that were attempting to lose weight were more likely to be overweight and use questionable practices to lose weight than whites (Levy & Heaton, 1993).

The 2003 YRBS reported that adolescents nationwide exercised to lose weight or keep from losing weight more so than any other weight loss method. Females (65.7%)

typically used this method to lose weight, as compared to their male counterparts (49.0%). Over one-half of white and Hispanic students used exercise as a means of losing weight, while less than half of black students reported similar exercise patterns (Grunbaum et al., 2004).

Vomiting or Using Laxatives to Lose Weight or Keep From Gaining Weight

The National Institute for Mental Health (NIMH) (USDHHS & NIMH, 2001) lists symptoms of the eating disorder known as bulimia nervosa as recurrent episodes of binge eating followed by compensatory behaviors to prevent weight gain from food eaten such as self-induced vomiting, misuse of laxatives, or other forms of purging behavior. Fasting or excessive exercise are other compensatory behaviors used to prevent weight gain after an episode of binge eating (USDHHS & NIMH, 2001). Vomiting or use of laxatives as purging behaviors are also associated with anorexia nervosa; while those suffering from bulimia use these and other methods to prevent weight gain from a large amount of food eaten during a binge, those suffering from anorexia use these purging behaviors to supplement a lowered food intake to keep weight at a lower level than is normal and healthy (USDHHS & NIMH, 2001). Vomiting can over time cause bleeding in the throat and may rarely lead to ruptures in the esophagus, as well as erosion of enamel on teeth due to the acidity of stomach contents (HEDC, 2005); if ipecac syrup is used to induce vomiting it can damage both the nervous system and the heart. Frequent abuse of laxatives in purging can cause serious intestinal problems (HEDC). Over time the combination of laxatives, vomiting and diuretics in purging can lead to hypokalemia, a lack of potassium in the body, which can cause interruptions in heart rhythms or cause the heart to stop contracting (HEDC).

Schwitzer, Bergholz, Dore, and Salimi (1998) studied eating disorders that came under the category “not otherwise specified” by not meeting DSM-IV clinical definitions of anorexia or bulimia among college women. Behaviors of these eating disorder trends included regular compensation for foods eaten by purging or extreme exercising in order to lose or control weight as the authors report. Other behaviors included constant worry about food and weight, body dissatisfaction, and obsession with caloric and fat intakes (Schwitzer et al.). These behaviors caused interruptions to activities of daily life, as well as mental distress; prevention of these disorders in susceptible college students, as well as interventions and treatment of these eating disorders and behaviors, are needed as well as those services specifically for clinical anorexia and bulimia.

Thompson and Schwartz (1982) compared three groups of women exhibiting three types of eating behaviors including anorexia, anorexia-like behavior not at clinical levels, and normal eating patterns. This seminal study found that current vomiting episodes (fewer than twice per week) were common among one-third of anorexic like-women, but not among normal women (Thompson & Schwartz). For anorexic-like women, bingeing, vomiting, and laxative use were related, although laxative use was relatively rare; one-in-five anorexic-like women and three percent of normal women had used laxatives to control their weight; anorexic-like women reported feelings of struggling with their college work and feelings of inadequacy, although their behavior did not keep them from their studies; these women also reported having greater feelings of anxiety and depression than did normal women. The anorexic-like women were from varying backgrounds, but the majority experienced similar levels of stress, and had social support network for their dieting behaviors (Thompson & Schwartz). The difference in psychological state and

social contact, as well as other factors between anorexic and anorexic-like women suggests the adoption of these behaviors may have been temporary, relative to the particular life stage the anorexic-like college women were experiencing. The continuum of behaviors among women who do not have anorexia was a concern, as was the prevalence of these behaviors and the psychological distress felt by women in this study, in terms of eating behaviors and life stress (Thompson & Schwartz).

An early study by Pyle, Mitchell, Eckert, Halvorson, Neuman, and Goff (1983) examined the prevalence of DSM-III bulimia in 1,355 college freshmen; a small percentage (2.1%) was found to meet the criteria for clinical bulimia (4.5% of females and 0.4% of males). A small percentage – one percent of the total population and two percent of females – had been previously treated for anorexia nervosa or bulimia (Pyle et al.). Of all non-bulimic students, 34.6% reported weight control attempts by vomiting, laxative use, diuretics, enemas, or fasting (26.1% of non-bulimic men, 47.0% of non-bulimic women) as this study found. Pyle and colleagues also found that bulimic female students were significantly more likely than non-bulimic female students to report attempted weight control by vomiting, laxative use, diuretics, enemas, or fasting.

A more recent study by Pyle, Neuman, Halvorson, and Mitchell (1991) examined the prevalence of bulimia nervosa in 911 female and 925 male college freshmen. In this study, fewer than one-in-twenty (4.7%) freshmen females and less than one percent (0.4%) of freshman males reported having an eating disorder (Pyle et al.). Of females, (2.2%) reported bulimia nervosa; while 1.1% reported bulimia with weekly bingeing and purging; of males, none reported bulimia with weekly bingeing and purging; less than one percent (0.3%) reported bulimia nervosa.

Heatherton, Nichols, Mahamedi, and Keel (1995) studied college students over a ten year period – 1982-to-1992. During this time, the percentage of women reporting any indication of disordered eating, as well as the prevalence of bulimia, significantly decreased. Laxative use did not change from its low level of prevalence. For current and past vomiting behavior a slight decline was shown for women and men although the prevalence of current vomiting increased very slightly (Heatherton et al.). Vomiting behavior was reported at very low levels among these students. Although symptoms of disordered eating decreased over the period, the prevalence of eating disorders remained high, with one-in-ten women reporting symptoms of a clinical or near-clinical level of disordered eating in 1992; among men, the prevalence of eating disorders had decreased and was much less common in men than in women (Heatherton et al.).

Among students participating in the 1995 NCHRBS, 2.6% of all students reported vomiting or taking laxatives to lose weight or keep from gaining; females (4.2%) were far more likely than males (0.6%) to report vomiting or taking laxatives for weight control (CDC, 1997). In his study on risk behaviors among students attending historically black universities, Fennell (1997) found slightly more than one percent of students (1.2%) vomited to lose weight or keep from gaining weight in the one-week period prior to having been surveyed.

The prevalence of purging behaviors among high school students was almost twice as high as that recorded for college students; these results were reported in the 2001 Youth Risk Behavior Survey (Grunbaum et al., 2002). Among high school students, one-in-twenty (5.4%) reported vomiting or taking laxatives to lose weight or keep from gaining weight in the month prior to being surveyed (Grunbaum et al.). Females (7.8%) were

more likely than males (2.9%) to report this behavior; white females (8.2%) were more likely than black females (4.2%) to do so.

Cooley and Toray (1996) studied 225 female college freshmen, finding that initiation levels of bulimia and restraint behaviors at the beginning of the students' freshman year were the most significantly related factors to disordered eating at the end of that year. This research suggests that risky behavioral patterns established prior to enrollment in college will continue to plague students well into their college years; the demands of transition from high school to college may also increase the likelihood of disordered eating for vulnerable students (Cooley & Toray).

Vohs, Heatherton, and Herrin (2001) also studied transitional dieting behaviors among high school females in their senior year and collegiate females in their freshman year. Increases in body dissatisfaction and increases in perceptions of self as overweight were associated with the transition, however, dietary behavior changes did not appear to occur among these students. Any eating disorders reported by females as high school seniors did not change significantly when they entered college, implying that behaviors begun in high school may remain problematic into the college years (Vohs, Heatherton, & Herrin).

In their research with college students, Klesges, Mizes, and Klesges (1987) reported that almost two-thirds of females (61%) reported using laxatives, appetite suppressants, or skipping meals; males were significantly less likely to report these behaviors (26%). In the same year, Gray, Ford, and Kelly compared the prevalence of bulimia in black and white college students. Among blacks, a small percentage of females (three percent) reported bulimia using DSM-III criteria. Fewer students (two percent) reported vomiting,

while five percent reported the use of laxatives, and six percent reported using diuretics (Gray et al.).

Seymour, Hoerr, and Huang (1997) studied 101 young adults who were college students, college graduates, or non-students, ranging in age from 18-to-24 years old. College students were more likely than both non-students and college graduates to report inappropriate dieting behaviors, including vomiting and use of laxatives more than twice in the previous month. A very high percentage of female college students in the study (43.3%) reported these behaviors, compared to 9.7% of male college students (Seymour, Hoerr, & Huang). Females in the entire sample were 10.5 times as likely as males to report engaging in these behaviors.

Arriaza and Mann (2001) studied disordered eating behaviors among college students of varying ethnicities. Although eating disorders were hypothesized to be more prevalent among white females, results of this study show that similar rates and patterns of weight concerns exist across all racial/ethnic categories (Arriaza & Mann). Chandler and Abood (1997) also compared white and black female college students. For both racial groups, females with higher-than-ideal weights showed dissatisfaction with their bodies and desired to lose weight (Chandler & Abood). Although many factors may contribute to eating disorders, the extent to which disordered eating and pathogenic eating behaviors and attitudes had developed among black females was lower than it was among white females (Chandler & Abood). And though these behaviors may not have developed to a great extent among black females, similar concerns and issues were present in both racial groups.

Rucker and Cash (1992) also compared body image attitudes and perceptions, eating behaviors, and weight concerns in female college students. Whites reported significantly more frequent bingeing than did blacks, however, the black females surveyed reported more positive attitudes toward overall appearance and less focus on dieting, fatness, and weight fluctuations. In contrast, white females reported a stronger drive for thinness, more frequent dieting, and greater eating restraint than did black females (Rucker & Cash).

Allison and Park (2004) compared 48 female students who were members of a sorority and 54 female students who were not in a sorority. Over a three-year period, sorority females' drive for thinness remained constant, while the same measure among non-sorority females decreased significantly. No differences between the groups were found on the other variables of disordered eating under study, which included disordered eating, depression, self-esteem, and ideal weight (Allison & Park). One of the many influences of sorority membership may be an emphasis on thinness to an extent not found among those not belonging to a sorority group.

Taking Diet Pills to Lose Weight or Keep From Gaining Weight

Those who have anorexia nervosa or bulimia nervosa may use diuretics as a purging, compensatory behavior to either supplement a reduced food intake to keep their weight at a level lower than normal and healthy in anorexia, or to prevent weight gain from an episode of binge eating in bulimia (USDHHS & NIMH, 2001). The Harvard Eating Disorder Center (2005) warns that use of diet pills can cause disturbances in heart rhythms as well as changes in pulse and blood pressure. If students are taking anti-

depressant medication such as monoamine oxidase inhibitors, or MAOIs, the interaction of this medication with diet pills may cause severe side effects.

For students participating in the 1995 NCHRBS, 4.3% reported the use of diet pills to lose weight or keep from gaining; more females than males (7.0% and 1.1% respectively) reported current use of diet pills for weight control (CDC, 1997). Grunbaum et al. (2002) reported a higher level of diet pill use (diet pills, powders or liquids) among high school students than that reported among college students. Nearly one-in-ten students reported using diet pills, powders, or liquids to lose or keep from gaining weight in the month prior to taking the survey. Females (12.6%) were more likely than males (5.5%) to use diet pills, and white students (9.5%) were more likely than black students (6.0%) to do so (Grunbaum et al.).

In the Seymour, Hoerr, and Huang (1997) study, one-in-three females and nearly one-in-ten males reported the use of inappropriate dieting behaviors, including using diet pills, powders or liquids, more than twice in the 30-day period preceding being surveyed; females were 10.5 times as likely as males to report these behaviors. College students of both genders reported the highest frequencies of these behaviors (43.3% for females and 9.7% for males). Neither BMI among females nor current dieting status among males was significantly correlated with inappropriate dieting behaviors including use of diet pills to lose weight or keep from gaining weight (Seymour, Hoerr, & Huang). George and Johnson (2001) reported a similar percentage of students who abused diet pills; about four-in-ten females (41%) compared to one-in four males (23%) in order to lose weight. Additionally, one-in-ten female students and five percent of male students reported taking pills for weight control in the previous month (George & Johnson).

In the Klesges, Mizes, and Klesges (1987) study, use of diet pills to suppress appetite was reported in conjunction with laxative use and skipping meals by almost two-thirds of female students (61%); male students were significantly less likely to report these dieting behaviors (26%). Encouragingly, trends reported during 1982-to-1992 suggested that the use of diet pills among female students had significantly decreased (Heatherton, Nichols, Mahamedi, & Keel, 1995). However, a decade later, in a study by Sanchez and Holcomb (2003), nearly one-half of female college students who perceived themselves as being overweight (45.1%) had either considered using, or had used, diet pills. Comparatively, among female students who perceived themselves to be of normal weight, only 29.6% considered using, or had used, diet pills (Sanchez & Holcomb). In another study of 297 college students, diet pill use was prevalent in 12.9% of all students sampled, especially so among overweight females attempting to lose weight (19.6%) (Volicer, Quattrocchi, Candelieri, & Nicolosi, 2003).

Physical Activity Among College Students

The benefits of regular physical activity have long been regarded as an important part of a healthy lifestyle. Physical inactivity patterns are listed among the leading causes of death in the United States (Dinger, 1999), and are responsible for at least 250,000 deaths each year, which is approximately 12 percent of all deaths (Pate, Pratt, Blair, Haskell, et al., 1995). Regularly-active individuals have lower rates of morbidity and mortality and evidence suggests that physical activity behaviors established during adolescence and young adulthood can determine quality of life later on (Gyurcsik, Bray, & Brittain, 2004). The continuation of a sedentary lifestyle creates health risk factors such as colon cancer, osteoporosis (Dinger, 1999), coronary heart disease, some cancer, total mortality and is

associated with hypertension, diabetes mellitus, and hypercholesterolemia (Lewis et al, 1997). Physical activity also improves risk factors such as resting blood pressure in borderline hypertensives, body composition, glucose tolerance and sensitivity, bone density and immune function (Pate et al., 1995). Not only does physical activity prevent the occurrence of chronic physiological disease, but also has many psychological benefits such as mood improvement and depression and anxiety management (Pinto & Marcus, 1995).

Physical activity is defined as: “Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure.” (USDHHS, 1996, p. 21) Physical activity is similar, yet distinctive from, exercise and physical fitness often involves a series of planned, structured, and repetitive movements to improve or maintain physical fitness. Physical fitness is characterized as: “A set of attributes that people have or achieve that relates to the ability to perform physical activity.” (USDHHS, 1996, p. 21) Activity levels are organized into three levels: light; moderate; and hard/vigorous. Light activity is performed at an intensity of < 3.0 METs – estimates of the metabolic costs (in oxygen consumed) of physical activity – (or < 4 kcal/min⁻¹). Examples of light physical activity are walking slowly (one-to-two mph), golf, bowling, and home care. Moderate activity is performed at an intensity of 3.0-to-6.0 METs (or 4-to-7 kcal/min⁻¹). Examples of moderate physical activity include walking briskly (three-to-four mph), racket sports, swimming (moderate effort), and cycling for pleasure or transportation. Hard/vigorous activity is performed at an intensity of >6.0 METs (or >7 kcal/min⁻¹). Examples include walking briskly uphill or with a load, cycling (>10 mph), and moving furniture (Pate et al, 1995).

The standards for physical activity have evolved over time; the two classifications for physical activity are related to the intensity of activity and the number of days per week needed to provide a benefit to the participant. In the mid-1990s, the *Surgeon General's Report on Physical Activity and Health* recommended that adults participate in vigorous activity (i.e., activities that make you sweat or breathe hard) 3-to-5 times each week for about thirty minutes each session (USDHHS, 1996). In contrast, *Healthy People 2010* (USDHHS, 2000) recommend at least twenty minutes of moderate physical activity (i.e., walking, mowing the lawn, etc.) at least five times per week. The American College of Sports Medicine recommends a more detailed schedule of physical activity that develops overall fitness, including "...muscular strength and weightlifting, flexibility exercise, and cardiovascular endurance for a duration of longer than 10 minutes each time more than twice a week at an intensity greater than 40% to 50% of maximum capacity." (Keating, Guan, Pinero, & Bridges, 2005, p. 118)

Regardless of the recommendations and obvious benefits of physical activity, nearly one-in-four adults is sedentary. Approximately 15% of adults exercise regularly and only 22% engage in light-to-moderate physical activity for at least 30 minutes per day (Dinger, 1999); 24%-or-more are totally sedentary (Pate et al., 1995). The evidence suggests that college students are not meeting recommended guidelines and are at more risk than other adults in the population. The 1995 *National College Health Risk Behavior Survey* found that few students had engaged in vigorous (37.6%) or moderate (19.5%) physical activity at recommended levels (CDC, 1997); other published studies suggest that between forty and fifty percent of college students are physically inactive (Keating et al., 2005). Epidemiologic evidence reveals that a large majority of the student population not engaging in

satisfactory amounts of vigorous activity; students become increasingly less active with age, with the most striking decline occurring between adolescence and young adulthood (Gyurcisk et al, 2004), most especially between ages 18-to-24 (Dinger, 1999). Results from the most recent *Youth Risk Behavior Survey* show that 62.6% of high school seniors had engaged in regular vigorous activity (Grunbaum et al., 2004); the data on students in college demonstrates the drop-off, with 37.6% participating in regular vigorous activity (CDC, 1997). In a longitudinal study by Bray and Born (2004), one-third of the students became inactive once they began college, despite having been active during high school. While physical activity among adolescents is not being examined in the current study, it is important to note that many college students were once very physically active and, during the transition from high school to college, these important activity behaviors were discontinued. Perhaps this major transition necessitates a new set of responsibilities and is characterized by change, vagueness, and adjustment across many significant life domains. Perhaps this could serve as part of the explanation why previously adequate physical activity behaviors have been replaced by other behaviors (Gyurcsik et al., 2004). Re-initiation and maintenance of a physical activity regimen may be difficult for some young adults due to the focus on short-term costs and disadvantages. Physical activity can be viewed as inconvenient, uncomfortable, or even embarrassing, and these factors often take precedence over the obvious long-term advantages (Hall & Fong, 2003). It is important to encourage and promote physical activity behaviors among college students in order to reduce morbidity and mortality associated with inactivity.

Differences in physical activity levels among college students exist by gender, age, race/ethnicity and geographic region. A study by Driskell, Kim and Goebel (2005) found

that a higher proportion (45.6%) of underclassmen walked for more than 30 minutes per day, as compared to their junior- and senior-level counterparts (28.6%). Students with a freshman or a sophomore class standing (47.8%) participated in aerobic activity at higher levels than did juniors and seniors (42.0%). However, most students with the lower-level of class standing lived on campus in proximity to various recreation centers. The typical reasons that students gave for exercising were for enjoyment, health, competition, social interaction, weight management, and to lose weight (Driskell, Kim, & Goebel, 2005).

Overall, physical inactivity is more likely to occur among females than among males, among blacks and Hispanics than among whites, and among older adults as compared to younger adults (USDHHS, 1996). Roughly one-in-seven young adults reported engaging in no recent vigorous or moderate physical activity; reported rates were higher among females, and higher among black females than whites females (USDHHS, 1996). In one study (Suminski et al., 2002), 53.0% of women and 40.3% of men had not participated in any vigorous activity during the month preceding the survey. Racial/ethnic- and gender-specific rates of physical inactivity among females were as follows: Asian (28.1%); black (23.5%); Hispanic (20.3%); and white (17.4%). The rates among males were as follows: Hispanic (13.8%); white (12.0%); Asian (11.7%); and black (7.7%). Although results of the study document higher physical inactivity rates among females, particular attention is drawn to Asian and black women, as approximately one-in-four were physically inactive (Suminski, Petosa, Utter, & Zhang, 2002).

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Vigorous Physical Activity Among College Students

The more a person engages in vigorous physical activity, the greater are the health benefits. Many studies report that the risk of coronary heart disease and related diseases is reduced as physical activity is increased (Pate et al, 1995). *Healthy People* recommends that by the year 2010, at least 30% of adults engage in vigorous physical activity 20-or-more minutes per session on three or more days each week (Objective 22.3) (USDHHS, 2000). The rationale behind such a recommendation is simple: physical activity reduces the risk of coronary heart disease through a variety of physiological and metabolic mechanisms, which include increasing levels of high-density lipoprotein cholesterol (HDLs), reducing triglyceride levels, reducing high blood pressure, reducing the risk of acute thrombosis, enhancing glucose tolerance and insulin sensitivity, and reducing the risk of ventricular arrhythmias (Pate et al., 1995). Physical activity also decreases a person's risks of certain cancers, anxiety, depression, and non-insulin dependent diabetes mellitus (NIDDM), or (type-II diabetes) (Pate et al., 1995; Lewis et al., 1997).

Vigorous physical activity patterns often differ between adolescents and college and university students. Evidence indicates that activity patterns established in childhood, adolescence, and young adulthood can well determine quality of life in one's later years (Gyurcsik, Bray, & Brittain, 2004). Physical inactivity increases with age, and the most rapid increase occurs in late adolescence and early adulthood (Behrens & Dinger, 2003). Bray and Born (2004) reported that one-third of their sample (33.1%) had been active in the last eight weeks of high school, but had become inactive during the first eight weeks of college. This trend is consistent with data from the national data from high school and college studies – six-in-ten high school students participated in vigorous physical activity,

while fewer than four-in-ten college students reported doing so (Grunbaum et al., 2004; CDC, 1997). Nationally, high school males were more likely than females to participate in vigorous physical activity (70.0% vs. 55.0%, respectively). White males (71.9%) were more likely than black (65.0%) and Hispanic (66.7%) males to report sufficient levels of vigorous physical activity; white females (58.1%) were more likely than black (44.9%) and Hispanic (51.8%) females to participate in vigorous activity (Grunbaum et al., 2004). Vigorous activity was also reported to be highest among ninth-grade students (73.1% and 63.6%, respectively, for males and females, respectively), with steady decreases observed as students progressed from grade-to-grade; lowest participation levels were reported by twelfth-graders (males: 63.7%; females: 46.4%) (Grunbaum et al., 2004).

Results from the *National College Health Risk Behavior Survey* (1995) illustrate the decline in the prevalence of vigorous physical activity in young adulthood, as fewer than one-in-four college students in the survey (37.6%) reported participating in activities that caused them to sweat and/or breath hard 20-or-more minutes on at least three of the seven days during the week preceding their being surveyed (CDC, 1997). There are similarities to the high school YRBS in that males in college (43.7%) were more likely than females in college (33.0%) to participate in vigorous physical activity. Black males in the sample (50.3%) were more likely than white (43.8%) and Hispanic (41.7%) males to engage in vigorous physical activity. Similarly, white females (34.7%) were more likely than black (27.6%) and Hispanic (30.6%) females to say that they participated in vigorous physical activity. Participation in vigorous physical activity declined with age: students 18-to-24

years old (41.8%) were more likely to participate in vigorous activity than were students 25 years of age or older (30.6%) (CDC, 1997).

Many young adults on college campuses are not meeting current physical activity recommendations, and substantial proportions are leading sedentary lifestyles (Behrens & Dinger, 2004). The *College Student Health Risk Behavior Profile*, conducted at Georgia Southern University, suggests that males are more likely than females to report engaging in vigorous physical activity. Black males (47.9%) had a slightly higher percentage of participation in vigorous activity than white males (47.8%); white females (42.2%) were significantly more likely than black females (29.2%) to report this behavior. Black males were the only group not above the national level for vigorous physical activity, however, the differences among males and females, regardless of race, were marginal as compared with the national data (Tedders, Parrillo, & Carter, 2004).

The literature includes data that raise concerns regarding those who *do* participate in vigorous physical activity, but *do not* meet recommendations regarding the frequency and length of physical activity sessions. Participation in vigorous physical activity decreases from an average of 3.8 days per week in high school to 2.3 days per week during college (Calfas, Sallis, Lovato, & Campbell, 1994), consistent with a later study, in which 69% of 2,155 undergraduate students participated in vigorous activity, however, exercised only 2.6 days each week for an average 36 minutes per session (Leenders, Sherman, & Ward, 2003). The study found that, while the length of each session was adequate according to recommendations, students did not engage in vigorous activity with enough frequency to provide the maximum health benefit. Females were significantly less likely to participate in adequate vigorous activity compared to males (66% vs. 71%, respectively). Although

most students took part in physical activity outside structured physical education classes, one-in-three did not. Females were also less likely to engage in physical activity outside the classes than were males. Reasons students gave for participating in vigorous physical activity did not include anything with regard to health benefits. Female students' top two reasons for exercise were to learn a new activity and to have fun; male students' top two reasons were to have fun and to learn a new activity. Improving physical fitness was the last item listed by both male and females – one in every eleven students listed this as one of their reasons for participation (Leenders, Sherman, & Ward).

Dinger's (1999) study reported that students participated in vigorous physical activity an average of 2.39 days during the week preceding the survey. The sample included 743 students living in either residence halls or fraternity/sorority (F/S) houses. Overall, males reported participating in vigorous activity with more frequency (mean number of days per week: 2.71) than female students (mean number of days per week: 2.06). The sample was comprised of 89.4% white students and 6.4% black students, but no statistical differences were detected by race. However, those who lived in F/S houses (2.79 days per week) did participate in vigorous physical activity more often than students who lived in residence halls (2.28 days per week) (Dinger, 1999). A similar study by Huang and his colleagues (2003) surveyed 736 college students 18-to-27 years of age. Students engaged in vigorous physical activity an average of 2.8 days in the one-week period preceding being surveyed (± 2.1 days). Males reported an average of 3.1 days (± 2.0 days) of this type of physical activity per week; females reported an average of 2.5 days (± 2.1 days) of such activity. One-in-nine males (11.0%) and better than one-in-five females (21.5%) reported that they

did not participate in *any* physical activity during the seven days prior to being surveyed (Huang, Harris, Lee, Nazir, Born, & Kaur, 2003).

A convenience sample of 116 college women 18-to-24 years of age who attended a mid-sized Midwestern university comprised participants in a study by Clement and her colleagues (2004). Among the women surveyed, 46.6% reported regularly engaging in strenuous activity and 72.4% reported engaging in vigorous physical activity or labor on three-or-more days each week. In this study, the majority of the sample engaged in the recommended frequency guidelines set forth in the *Surgeon General's Report* (Clement, Schmidt, Bernaix, Covington, & Carr).

Another study by Driskell, Kim, & Goebel (2005) compared both lower- and upper-division college students. Among the 114 students in the lower-division, less than half (47.8%) reported engaging in physical activity at least three times a week; upper-division students (42.0%) were less likely than those in the lower-division to engage in vigorous physical activity at least three times per week. This may have been due to proximity to campus facilities, since the majority of students in the freshman and sophomore classes live in residence halls, while juniors and seniors are more likely to live in off-campus housing. There were also significant differences in the length of time that students said they engaged in physical activity. The data reflect that 48.2% of lower-division students participated in vigorous activity for more than 30 minutes daily, while only 36.4% of upper-division students reported doing so (Driskell, Kim, & Goebel).

Research conducted by Ainsworth and colleagues (1992) examined physical activity levels in black students, concluding that activity levels, especially among college-aged black females, were low. Similar results in a similar population were reported in another

study, conducted by Adams, LaPorte, Haile, and Kuller (1986): black females (54.0%) were significantly more likely than males (34.0%) to report engaging in no physical activity at all. The work of Kelley and Kelley (1994), though classified as a preliminary investigation, found similar results. The study, conducted at a historically black college in the South, involved 253 freshmen; greater than seventy percent of females and nearly one-half of males were classified as having “low” or “very low” physical activity levels. The follow-up study reported more encouraging results, however, approximately 42% of males and 65% of females remained classified as having “low” or “very low” levels of activity. Interestingly enough, among those who were classified in the “high” activity group, males and females both (22% and 4%, respectively) had the lowest percentage of being overweight or obese. Results suggest that a large proportion of black freshmen college students, especially females, have less-than-favorable physical activity habits (Kelley & Kelley). Another study, conducted by Suminski, Petosa, Utter, and Zhang (2002), supports that gender and racial differences in physical inactivity among college students. Overall, 53% of the females in the study reported they did not participate in vigorous physical activity during the month preceding the survey; males (40.3%) were less likely to report not engaging in physical activity. Minority students were more likely than white students to report not participating in any physical activity much less vigorous activity (Suminski, Petosa, Utter, & Zhang).

Moderate Physical Activity Among College Students

While vigorous physical activity has greater health benefits, it is still recommended that people participate in moderate physical activity, particularly if a sedentary lifestyle is the alternative. Participating in moderate physical activity for at least 30 minutes per day

will expend an adequate amount of calories, thus providing health benefits (USDHHS, 2000). If daily activity were increased to include a weekly expenditure of 1,000 calories would greatly benefit those who are sedentary, and prevent cardiovascular disease and deaths from all causes. It is recommended that those who have been sedentary increase the frequency and intensity of physical activity gradually to produce successful behavior change (USDHHS, 2000). *Healthy People* recommends that adults engage in moderate activity for at least 30 minutes per day, five-or-more days per week; Objective 22-2 seeks to increase the level of adult participation in moderate physical activity, from 15% (2000) to 30% (2010) (USDHHS, 2000).

High school and college students are at-risk from not receiving health benefits due to the lack of moderate physical activity in their lives. The *Youth Risk Behavior Survey* in 2003 reported that one-fourth (24.7%) of high school students participated in sufficient moderate physical activity for 30-or-more minutes on at least five of the seven days that preceded the survey. The prevalence rate of moderate activity was higher among males (27.2%) than among females (22.1%). White males (28.9%) had higher rates of engaging in moderate activity than black males (25.8%), while white females (23.3%) reported higher levels of participation than black females (17.5%). Ninth-graders participated regularly in moderate activity to a higher degree than their older counterparts (Grunbaum et al., 2004).

In the *National College Health Risk Behavior Survey* (CDC, 1997), college students (19.5%) appeared less likely than high school students to participate in moderate physical activity. Females 18-to-24 years of age (20.8%) were more likely to engage in moderate physical activity than males (19.6%), however, the cohort of students 25 years of age and

older was less likely to participate in moderate activity. Females in this group (17.0%) were less likely than males (19.9%) in the group to report having participated in moderate physical activity (CDC, 1997).

Many studies have reported on the decreases in physical activity among students who are transitioning from high school to college, however, there are also differences in those transitioning from college to their post-graduate adult lives. For example, Callis, Sallis, Lovato, and Campbell (1994) examined differences in physical activity between college students and alumni from San Diego State University. In the study, 194 current students and 204 alumni comprised the sample. Results suggest that physical activity decreased in the transition, however, there was one noteworthy trend in the data: students who actively maintained a moderate physical activity regimen in college (an average of 3.66 days per week) were more likely than alumni to maintain moderate physical activity (an average of 2.90 days per week) (Calfas, Sallis, Lovato, & Campbell, 1994). Other studies have examined the association between lower- and upper-division students. Driskell, Kim, and Goebel (2005) reported that students in the lower-division were more likely than those in the upper-division to participate in moderate physical activity. Lower-division students (47.8%) typically walked for more than 30 minutes daily, as opposed to 36.4% of those in the upper-division (Driskell, Kim, & Goebel). Dinger's (1999) study, which examined vigorous activity, also found that students living in fraternity or sorority houses typically engaged in fewer days of moderate physical activity than those who lived in the residence halls. Females – at 2.85 days per week on average – actually engaged in more moderate physical activity than males – at 2.37 days per week on average.

Racial/ethnic differences in the adoption of moderate physical activity among college students have also been demonstrated in the empirical literature. For example, in a study of 189 students at an historically black southern university, 82% of females and 52% of males were classified as having “low” or “very low” activity levels; these students did not engage in sufficient levels of moderate physical activity (Ainsworth, Berry, Schnyder, & Vickers, 1992). Another study at an historically black university supported this finding, as females (38.2%) were again more likely than males (22.3%) to engage in moderate physical activity (Kelley & Kelley, 1994). While moderate physical activity may be an easier pursuit for college students, low levels of participation appear to be the rule, not the exception. One area of concern is that older, minority, and female students tend to engage in lower levels of moderate physical activity than their counterparts.

Stretching Exercises Among College Students

While vigorous and moderate physical activities are imperative in preventing chronic disease, flexibility should not be overlooked. *Healthy People 2010* recommends that the percentage of adults 18 years of age or older who perform physical activities that enhance and maintain flexibility increase, from 30% (at 2000 levels) to 43% (in 2010) (Objective 22-5) (USDHHS, 2000). *The Surgeon General's Report* defines flexibility as the ability to move a joint through the full range of motion without discomfort or pain (USDHHS, 1996). In order to develop and maintain range of motion, flexibility exercises should be included in an overall fitness regimen. A stretching routine that exercises major muscle/tendon groups should use static, ballistic or modified contract/relax, hold/relax, active/assisted techniques. Static stretches should be held 10-to-30 seconds. Modified contract/

relax, hold/relax, active/assisted techniques (proprioceptive neuromuscular facilitation stretching) should be held for six-seconds followed by 10-to-30 seconds of assisted stretching. Ballistic stretching involves repetitive bouncing motions whereby tendons and muscles are rapidly stretched and relaxed (Pollock, Gaesser, Butcher, et al., 1998). At minimum, four repetitions per group should be completed two-to-three days each week.

Nationwide, one-in-three college students (34.1%) participated in stretching exercises that included leg stretching, knee bending, and toe touching on at least three of the seven days prior to the survey (CDC, 1997). Students 18-to-24 years old reported engaging in stretching at comparable levels (36.0%); black males (44.1%) and white females (35.6%) had the highest prevalence rates for stretching, as compared to black females (29.4%) and white males (33.0%) (CDC, 1997). Dinger (1999) noted that students reported stretching 1.77 days during the week prior to the survey; males (1.73) stretched fewer days than females (1.81). Those who lived in the residence halls stretched on a greater number of days in a week than those living in fraternity or sorority houses (Dinger).

Physical activities that improve one's flexibility are also known to improve activities of daily living (ADL). In the elderly, this is important because it provides independence and reduces the need for long-term care should a fall occur. ADLs measure independence in basic self-care and other necessary functions. The consequences of rigid joints affect all aspects of life, including walking, standing, sitting, avoiding falls and driving a car. The loss of range of motion due to lack of flexibility will eventually lead to disability and decrease quality of life (USDHHS, 2000).

Strengthening Exercises Among College Students

Strengthening exercises are also a component of physical fitness that should be incorporated into a physical activity program. Objective 22-4 in *Healthy People* states that the proportion of adults that perform activities that enhance and maintain muscular strength and endurance should increase to 30% by 2010. Strength and endurance are developed by "...increasing more than normal the resistance to movement or frequency and duration of activity. Muscular strength is best developed by using heavier weights (that require maximum or near maximum tension development) with few repetitions and muscular endurance is best using lighter weights with a greater number of repetitions." (Pollock et al, 1998, p. 982) Strengthening activities are especially important for adults as they age (USDHHS, 2000). Initiating a strengthening program would be beneficial in adolescence especially since physical activity decreases during young adulthood (Pinto & Marcus, 1995). The ACSM recommends that strength and resistance training be done two-to-three times per week with adequate intensity to enhance muscular strength and endurance. The minimum regimen includes engaging in one set of eight-to-ten exercises that work the major muscle groups two-to-three times per week. The ACSM guidelines suggest that most people engage in eight-to-twelve repetitions, or near fatigue levels, for each exercise. Those that are frail or older may benefit from 10-to-15 repetitions, but the intensity of the resistance training may increase an individual's risk of injury or cardiac events. Increasing the frequency and intensity of resistance training may produce larger gains; the improvements in older adults are usually going to be smaller (Morey, 1999). That is why recommendations differ according to three factors: 1) a practical amount of time to perform resistance training; 2) a level of training that provides improved muscular

strength and endurance; and 3) the suitability of the level of resistance training for most adults (Morey, 1999).

The 2003 YRBS reported that 51.9% of students had engaged in activities that would increase muscular endurance and strength (i.e., push-ups, sit-ups, or weightlifting) on at least three of the previous seven days. Males (60.1%) were more likely to report doing strength training than females (43.4%); whites (53.6%) and Hispanics (51.5%) were more likely than blacks (45.4%) to do so. Strength training declined as students got older; ninth-graders (55.8%) reported the highest prevalence rates, followed by tenth- (54.7%), eleventh- (51.2%), and twelfth-graders (44.6%). This trend was the same for males and females, respectively. White females (46.1%) and Hispanic females (43.6%) were more likely to report this behavior than were black females (31.3%) (Grunbaum et al., 2004).

Data from the 1995 *National College Health Risk Behavior Survey* revealed that college students (29.9%) were less likely than high school students to engage in strength training. There were significant differences in all demographic categories. Males (33.9%) were more likely than females (26.8%) to strength train; 18-to-24 year-olds (33.4%) were more likely than those 25-or-older (23.5%) to strength train; and black males (46.3%) were more likely than white males (32.5%) to engage in strength training (CDC, 1997).

Huang et al. (2003) reported that males were more likely than females to participate in strength training activities. Males engaged in strength training for 2.3 days per week (± 2.2 days), while females strength trained 2.0 days per week (± 2.0 days). Younger students (≤ 19 years old) engaged in strength training (2.2 days per week) more often than older students (≥ 20 years old; 1.6 days). Findings are consistent with other studies suggesting that overall physical activity decreases after students begin college.

ADDITIONAL REVIEW OF LITERATURE REFERENCES

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