THE RELATIONSHIP BETWEEN CARDIORESPIRATORY FITNESS AND BMI,

DEPRESSIVE SYMPTOMS, AND SCHOOL ABSENCES AMONG

A RACIAL/ETHNICALLY DIVERSE SAMPLE

OF EARLY ADOLESCENTS

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The current study examined the relationship between cardiorespiratory fitness on differences by sex, race/ethnicity, and SES on BMI, depressive symptoms, and school absences among adolescents. A cross-sectional study was conducted in a north Texas school district, which included 609 Caucasian/Whites, 293 Hispanic/Latinos, and 113 African-American/Black adolescents (10-14 years). Main results of the study showed that that cardiorespiratory fitness was the largest predictor of BMI, followed by race/ethnicity, and then sex. Cardiorespiratory fitness among adolescents was inversely associated with BMI. The relationship between cardiorespiratory fitness on BMI appeared to be more salient for non-Hispanic white females and non-Hispanic black females in that the former group had lower BMI scores than the latter group when cardiorespiratory fitness was taken into account; however, results showed that non-Hispanic white females and non-Hispanic black females had similar cardiorespiratory fitness level. Other results showed that SES and sex predicted depressive symptoms in that low SES females endorsed more depressive symptoms relative to high SES males; however, this relationship was non-existent when cardiorespiratory fitness was entered into the model. Additionally, findings indicated that BMI and depressive symptoms equally predicted school absences in that adolescents who had a higher BMI and endorsed more depressive symptoms had more school absences.

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INTRODUCTION

The health of today's adolescents has been characterized as a "generation in jeopardy" (Crosby, Santelli, & DiClemente, 2009). Adolescents in contemporary times have a far different health risk profile than those of previous generations. Although modern medicine has largely eliminated traditional causes of mortality and morbidity (e.g., polio, whooping cough) other advances have made it easier for adolescents to engage in risky health behaviors (e.g., overeating, lack of exercise) facilitating the emergence of new health concerns including obesity, diabetes, and cardiovascular disease. Importantly, health-mediating behaviors, whether positive or negative, are established during adolescence (Williams, Holmbeck, & Greenley, 2002). Understanding the biopsychosocial characteristics of health behaviors during adolescents can prevent adverse health outcomes into adulthood.

Defining Adolescence

In 2006, there were approximately 63 million adolescents, ages 10 through 24 (Centers for Disease Control and Prevention [CDC], 2007; Rivara, Park, & Irwin, 2009). Adolescence is defined as the period of transition from childhood to adulthood or from puberty to maturity. Adolescents experience rapid physical, emotional, and cognitive development. During this time, adolescence can be divided into three transitional stages between the ages of 10 to 24 (Rivara et al., 2009). Early adolescence or the transition to adolescence ranges between the ages of 10 to 13, followed by middle adolescence ranging between the ages of 14 to 18, and finally late adolescence or the transition to adulthood ranging between the ages of 19 to 24. Adolescents are more prone to engage in risky health behaviors at certain ages. For example, early adolescence is a time when individuals are more likely to be diagnosed with an impulse control disorder

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whereas late adolescence is a heightened period of risk for substance abuse disorders (Kessler et al., 2007). Such data underscores the need to understand the unique health concerns that arise at each developmental stage during adolescence.

In addition to difference by developmental stage, understanding of health risks varies as a function of race and ethnicity. Approximately 60% of adolescents are non-Hispanic white, 17% Hispanic or Latino, 15% non-Hispanic African American, 4% Asian or Pacific Islander, and 1% American Indian or Alaskan Native (CDC, 2007; Rivara, et al., 2009). Hispanic adolescents are the fastest growing population segment as compared to both non-Hispanic whites and non-Hispanic blacks. Research shows that health behaviors, risk, and outcomes among adolescents are not similar across racial/ethnic backgrounds (Choi, Meininger & Roberts, 2006). With an ever-increasing population rate, especially among racial/ethnic minority adolescents, it is critical to understand the unique health challenges facing this population.

Leading Physical, Psychological, and Social Health
Challenges among Adolescents

Obesity and overweight. One of the biggest challenges facing today's adolescent is their weight. Approximately 32% of children and adolescents (ages 2 to 19) are overweight and obese, and about 16% are obese (Roger et al., 2011). The rate of overweight children has been increasing since the 1980s (Wang & Beydoun, 2007). The rise in the prevalence of overweight and obesity parallels the higher rates of both hypertension and diabetes among adolescents (Roger et al., 2011). For example, in national studies between 1988-1999, the rate of pre-high blood pressure (HBP) and HBP increased 2.3% and 1%, respectively in children and adolescents ages 8 to 17 since 1963 to 1988 (Din-Dzietham, Liu, Bielo, & Shamsa, 2007; Roger et al., 2011). More recently (1999-2006), 3.6% of children and adolescents ages 3 to 18 had hypertension

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(Hansen, Gunn, & Kaelber, 2007; Rogers et al., 2011). Similarly, between 2002 and 2005, newly diagnosed cases of Type 1 and Type 2 diabetes among youth (i.e., younger than 20 years) included 19, 200 cases; in 2010, the rate increased exponentially to 215,000 cases (CDC, 2011). The obesity prevalence is also a function of sex and race/ethnicity. For example, among adolescents ages 12 to 19, non-Hispanic black girls (29.2 %) and Mexican-American boys (26.7%) have the highest rates of obesity (Ogden, Lamb, Carroll & Flegal, 2010) compared to non-Hispanic white boys and girls, 16.7% and 14.5% respectively. Moreover, overweight adolescents have a 70% chance of becoming overweight or obese adults (MacKay & Duran, 2007) and are at risk for health problems (e.g., cardiovascular disease, Type 2 diabetes, hypertension, and some forms of cancer) into adulthood (Department of Health and Human Service [DHHS], 2007).

   Exercise and fitness. Lack of physical activity largely contributes to the obesity epidemic among early adolescence. Today's adolescents, especially early adolescents (ages 10-12), are not obtaining the sufficient amount of cardiovascular exercise. For example, results from the Youth Risk Behavior Surveillance System (YRBSS) on high school students (CDC, 2010) and a study using the YRBSS using middle school students (Wu, Rose, & Bancroft, 2006) showed that there were higher rates of inactivity and lower rates of physical activity among middle school students as compared to their high school counterparts. Furthermore, using the National Health and Nutrition Examination Survey (NHANES), 1999-2002 data, researchers found that 33.6% of adolescents (age 12-19) had low fitness levels, which was defined using cut-off points of estimated VO_2max from an existing reference population (Carethon, Gulati, & Greenland, 2005). In this study, cardiorespiratory fitness levels did not differ by sex, but did differ by racial/ethnic status in that non-Hispanic blacks and Mexican Americans were less fit than non-Hispanic

whites. Research also shows that cardiorespiratory fitness is not only adversely related to fat mass (Ball et al., 2004), but also high blood pressure (Sallis, Patterson, Buono, & Nader, 1988), insulin resistance (Kasa-Vubu, Lee, Rosenthal, Singer, & Halter, 2005), and clustering of metabolic risk factors (Brage et al., 2004). Poor cardiorespiratory fitness and a sedentary lifestyle greatly contribute to the obesity epidemic, both of which largely lead to hypertension and diabetes during adolescents and as adults.

Mental health. Another important aspect of adolescent health is their mental health status. According the National Adolescent Health Information Center (NAHIC), one in five adolescents experience symptoms of significant emotional distress and one in ten are emotionally impaired (2008). Adolescents may be more prone to developing a mental illness due to their rapid development, brain growth, and the emerging expressions of genetic risk factors (Walker, 2002). Most mental illnesses first arise before the end of adolescence, with a median age of onset of any mental health disorder at age 14 (Kessler et al., 2007).

Depression is one of the most prevalent psychiatric disorders among adolescents. In fact, in 2007, 8.2% of 12 to 17 year olds had a major depressive episode (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). Additionally, between 14% and 25% of children and adolescents will experience at least one episode of major depression before adulthood (Kessler & Walters, 1998). Depression rates vary by gender, race/ethnicity and SES. For example, depression is more prevalent among adolescent females; specifically, 33.9% of high school females versus 19.1% of males felt depressed (CDC, 2010). Conversely, middle school (6th and 8th grade) females have higher depression rates than males (Saluja et al., 2004). Subsequently, adolescents who experience poverty-related stress are more likely to have symptoms of depression and anxiety (DeCarlo Santiago et al., 2009). Additionally, in an early

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national longitudinal study of adolescent health, Goodman (1999) found that SES was linearly associated with depression and suicide attempts. In respects to racial/ethnic differences on depression, studies show that Hispanic adolescents endorse more depressive symptoms than other racial/ethnic groups (Blazer, Kessler, McGonagle, & Swartz, 1994; Choi et al., 2006; Roberts, Roberts, & Chen, 1997; Roberts & Sobhan, 1992; Twenge & Nolen-Hoeksema, 2002). One study focused on the intersection between race/ethnicity and SES on depressive symptoms among early adolescents (Roberts et al., 1997). In this study, a racial/ethnically diverse sample of adolescents (grades 6 through 8) found that Mexican American adolescents had higher rates of depression than any other racial/ethnic groups. In addition, adolescents who reported that their SES was worse than their peers were more likely to have a higher prevalence of depression. However, there were no significant interactions between race/ethnicity and SES in relation to depression. Depression is thus a major health concerns among adolescents, and is especially problematic among girls, low SES, and Hispanic adolescents.

Mental and physical health. Mental and physical health are closely interwoven during adolescence, and perhaps much more than any other time during development (Williams, et al., 2002). For example, the leading causes of mortality among adolescents (i.e., unintentional injuries, homicide, and suicide) are all related to mental illnesses. Substance abuse, namely alcohol, is associated with a variety of consequences such as motor vehicle injuries, homicide, and suicides (Parrish, 1994). Conversely, homicide and suicide (Malmquist, 1990; Weissman et al., 1999) as well as substance use (Kelder et al., 2001) is linked to depression. For example, in a cross-sectional study of middle-school students, self-reported symptoms of depression were positively and strongly associated with self-reported substance use (Kelder et al., 2001). Other studies show that depressed adolescents are more likely to have a comorbid eating disorders

(Santos, Richards, & Bleckley, 2007), which alternatively adversely affects their physical health, including cardiovascular symptoms, chronic fatigue, chronic pain, infectious diseases, and insomnia during early adulthood (Johnson, Cohen, Kasen, & Brook, 2002). Adolescent mortality and morbidity, thus, can be largely attributed to an underlying psychological ailment.

Health, educational, and social outcomes. The effect of untreated mental health disorders among adolescents produces a myriad of health, educational, and social problems. For example, depression in adolescents is not only related to completed suicide and suicide attempts (Weissman et al., 1999), but also other negative health outcomes and risk health behaviors, such as decreased quality of life (Vitiello, Rohde & Silva, 2006), higher levels of perceived pain (Williamson, Walters & Shaffer, 2002), development and maintenance of sexual risk behaviors and acquisition of STDs (Mazzaferro et al., 2006, Shrier, 2009), substance abuse (Saluja, 2004), and smoking (Windle & Windle, 2001). Additionally, longitudinal studies show childhood (ages 8-18) depression and anxiety are associated with increased BMI percentiles (Rofey et al., 2009). Beyond health complications, adolescents with mental disorders are more likely to have academic problems (Jaycox et al., 2009) as well as report a lower level of commitment to education, and have a higher truancy rate (Hawkins, Catalano, & Miller, 1992) relative to those without diagnosed mental disorders. Although studies show a relationship between mental health and education difficulties, few studies have examined the relationship between school absences and mental and physical health. In essence, mental disorders in adolescents spill over to multiple facets of daily life and with implications for mental and physical health problems in adulthood.

Summary. Adolescents are increasingly being diagnosed with hypertension and diabetes, which can both be attributed to a higher prevalence of overweight and obesity. Moreover, mental health problems affect physical health problems, and it is not surprising that they go hand and

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hand. Depressive symptoms appear to the most deleterious among adolescents given that depression is associated with a multitude of risky health behaviors and outcomes. The result of mental and physical health overlaps with social problems, especially educational difficulties. Given that today's adolescents are confronted with an obesity epidemic, high rates of depression, which carryover to educational difficulties, the goal of this paper is to examine the interrelationship of biopsychosocial factors among a sample of early adolescents, with an emphasis on the relationship between cardiorespiratory fitness on biological (i.e., sex, BMI), psychological (i.e., depressive symptoms), and social (i.e., school absences, race/ethnicity, and SES) factors. Although the relationship between mental and physical health on school absences has not been studied thoroughly, the present study will use school absences as an explanatory variable.

Mechanisms of Health among Adolescents

Biological influences. Biological underpinnings of adolescent risk-taking behavior are accounted for by genetic predisposition, hormonal influences, pubertal time, and brain and central nervous system development (Sales & Irwin, 2009). For example, in a longitudinal study of parental alcoholism to adolescent substance use, researchers found that adolescents with alcoholic fathers and boys had steeper growth in substance use over time than did adolescents of nonalcoholic fathers and girls (Chassin, Curran, Hussong, & Colder, 1996). In another study of adolescents (ages 14-16) of pubertal timing, sexual activity and self-reported depression was associated with early puberty among females. Although biological models explain a proportion of the amount of why adolescents engage in risk-taking behaviors, psychological and social variables further clarifies adolescents' behaviors.

Psychological influences. Cognitive influences, personality, and dispositional characteristics are among the most influential psychological based theories for adolescent risk taking behavior (Sales et al., 2009). In terms of cognition, for example, national studies on adolescents perception of risk on substance use shows that only 40% of adolescents, age 12 to 17, perceived great risk from having five or more drinks of alcohol once or twice a week (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009). Other psychological risk factors for risky behaviors include self-esteem, depression, and locus of control (Sales et al., 2009). As previously mentioned, depression is associated with suicide attempts, suicide and homicide (Malmquist, 1990; Weissman et al., 1999), and substance use (Kelder et al., 2001).

Social influences. Social influences on physical and mental health are very profound given the impressionability of adolescents. Families serve as adolescents' primary source of transmission of social and cultural factors that influence their health behaviors (Davies, Crosby, DiClemente, 2009). For example, in a longitudinal study on the relationship between parental influence and physical activity, results showed that parents encouragement to be active and parental care for fitness were positively associated with moderate and vigorous physical activity in young adult males (Bauer, Nelson, Boutelle, & Neumark-Sztainer, 2008). Consequently, maternal encouragement was positively associated with moderate and vigorous physical activity in high-school aged females. In addition to parental influence, adolescents are greatly exposed to the media, which having lasting effects on their health. For example, children with a TV set in their bedroom not only watch more TV, but also have a 30% increased risk of a BMI higher than the 85th percentile (Dennsion, Erb, & Jenkins, 2002). Additionally, media replaces physical

activity (Robinson et al., 1993). Social influences are, therefore, major contributors to health choices among adolescents.

A biopsychosocial approach to modeling adolescent risk. The biopsychosocial model has been used to explain risk-taking behaviors among adolescents. Within the model, biological (i.e., pubertal timing, hormonal effects, and genetic predisposition), psychological (i.e., self-esteem, sensation seeking, and cognitive and affective states), and social factors (i.e., peers, parents, and school) all predict adolescent risk-taking behaviors (Sales et al., 2009). For example, in a cross-sectional study for support of the biopsychosocial model, Ricciardelli, and McCabe (2004) found that disordered eating and the pursuit of muscularity in adolescent males were associated with biological factors (i.e., BMI), psychological factors (i.e., negative affect and self-esteem), and sociocultural factors (i.e., peer and parental pressure). Similarly, other research shows that pubertal development, weight pressures, internalization, social appearance comparison, self-esteem, depression, physical self-concept, cardiorespiratory fitness, and BMI all predicted body satisfaction on middle-school aged students, especially among females (Petrie, Greenleaf, & Scott Martin, 2010).

Summary. Adolescence is a time during development in which a variety of health behaviors are acquired. The biopsychosocial model provides a framework for adolescent risk-taking behavior. Biopsychosocial factors largely influence adolescent's health choices, which contribute to both physical and mental problems that become risk factors for morbidity and mortality.

Biopsychosocial Determinants of Overweight and Obesity among Adolescents

Biological influences. Biological determinants of overweight and obesity can be

attributed to sex differences, which largely begins after sexual maturation. Females maturate at a faster rate than males (Tung, Lee, Tsai, & Hsiao, 2004; Shirtcliff, 2009), and have a greater amount of body fat (Daniels, Khoury, & Morrison, 1997). Sex differences are also observed in physical activity levels. For example, in a representative sample of 12 to 19 year olds, males had higher levels of VO_2 max values (i.e., maximal oxygen uptake) than females, indicating better cardiorespiratory fitness (Pate, Wang, Dowda, Farrell & O'Neil, 2006). Additionally, both males and females who were overweight had lower VO_2 max values than those of normal weight adolescents. Conversely, in a European sample of 12 to 17 year old adolescents, females had more sedentary time than males. Additionally, females, but not males, with more sedentary time (greater than or equal to 69%) had lower cardiorespiratory fitness levels even after controlling for BMI and age (Martinez-Gomez, et al., 2011). Although females have higher BMI's, worse cardiorespiratory fitness, and more sedentary time than males, data from the YRBSS among high school students show that males are more likely than females to be obese, although there is no sex difference in overweight status (CDC, 2010).

Psychological influences. As previously mentioned, adolescents is a time of emotional and physical growth, so mood disorders adversely affect adolescent's weight. Studies show a strong relationship between clinically significant weight gain, as indicated by BMI, and depression and anxiety among children (Franko, Striegel-Moore, Thompson, Schreiber, & Daniels, 2005; Pine, Goldstein, Wolk, & Weissman, 2001). Shomaker and colleagues (2011), for example, used an objective indicator of cardiorespiratory fitness (i.e., maximal cycle ergometry exercise test) to examine the effects of depression in obese adolescents (ages 12-17). Results in this study showed that adolescents with elevated depressive symptoms had poorer cardiorespiratory fitness relative to adolescents without elevated depressive symptoms.

Furthermore, the relationship between weight and mood disorders varies by gender. For example, Anderson, Cohen, Naumova, and Must (2006) found that anxious and depressive symptomology in childhood in girls predicted higher weight in adulthood. Another study examined the relationship between mood (depression and anxiety) and BMI percentiles in a non-obese sample of early adolescents, and found that depression and anxiety are associated with BMI percentile. Additionally, when gender differences were examined, researchers found that anxiety was associated with elevated BMIs in both boys and girls, and depression was related to elevated BMIs only for girls. Weight can thus be largely attributed to depressive symptoms among adolescents, and this association appears to be more problematic in girls.

Social influences. Socioeconomic status, which refers to income, education, and occupational status, is amongst the strongest psychosocial predictors of health including all-cause mortality and morbidity (Marmot et al., 1991; McDonough, Duncan, Williams, & House 1997; Rogot, Sorlie, Johnson, & Schnitt 1992; Sorlie, Backlund, & Keller 1995; Williams, 1990). One of the most influential studies that examined the inverse relationship between wealth and health were the prospective cohort "Whitehall" studies (Marmot et al., 1991). In the first Whitehall study, which began in 1967, the authors compared mortality and occupational grade in a sample of more than 18,000 British civil servants. Results indicated that males in the lowest occupational grades (e.g. messengers, doorkeepers, manual labors, etc.) had a threefold higher mortality rate than males in higher grades. The follow-up Whitehall II study confirmed this SES gradient effect in a sample of over 10,000 men and women (Marmot et al., 1991). Additional cohort studies continue to support the Whitehall findings (Borrell et al., 2004; Pickett & Pearl, 2001; Ruiz, Steffen & Prather, in press; Subramanian, Chen, Waterman, & Krieger, 2005; Van

Lenthe et al., 2005). This consistency in outcomes has led to the generalized notion that "wealth equals health."

The SES health disparity is also apparent among adolescents' weight. For example, in a recent meta-analytic review on the association of SES and physical activity, Stalsberg and Pedersen (2010) found that adolescents with higher SES were more physically active than their low SES counterparts. Not only are low SES adolescents less likely to exercise, but are also more likely to have lower cardiorespiratory fitness levels. One study, for example, of Spanish adolescents (ages 12.5-18.5) found that high SES adolescents (i.e., paternal educational level or parental professional level) had higher cardiorespiratory fitness levels than low SES adolescents (Jiménez-Pavón et al., 2010). The effects of poor diets, less physical activity, and low cardiorespiratory fitness levels may very well contribute to the higher prevalence of obesity and overweight among low SES adolescents (Ogden, Lamb, Carroll, & Flegal, 2010)

Socioeconomic status is closely linked to race/ethnicity, in which there is a clear disparity in SES between non-Hispanic whites and racial/ethnic minorities. For example, the poverty rate among Hispanics and non-Hispanic black adults are more than double that of non-Hispanic whites with this disparity nearly three times greater among children (U.S. Census Bureau, 2009). Similarly, weight disparities are observed as a function of race/ethnicity and SES. For example, among 12 to 20 year old adolescents, non-Hispanic black females had the highest prevalence of overweight status, followed by Hispanics of both sexes, and finally non-Hispanic whites (Gordon-Larsen, Adair, & Popkin, 2003). Researchers also found that overweight prevalence decreased linearly with increasing SES among white males; however, this trend was not true for Hispanic males in that they had significantly higher overweight prevalence at mid-to-high SES. As for females in this study, equivalent to their white male counterparts, females had an inverse

relationship between SES and overweight status (i.e., as SES increased, weight status decreased). On the other hand, non-Hispanic black females had a higher prevalence of overweight status if they were of low and high SES, while middle SES adolescents had the lowest overweight prevalence.

Summary. A leading physical health concern among adolescents is their weight. Research shows that cardiorespiratory fitness and depression varies by sex, race/ethnicity, and SES. Females, racial/ethnic minorities, and low SES adolescents have worse cardiorespiratory fitness and are more likely to endorse more depressive symptoms. The effects of low cardiorespiratory fitness and depression both lead to a higher prevalence of overweight and obesity among adolescent females, racial/ethnic minorities, and low SES adolescents. Finally, the SES gradient on overweight prevalence appears to apply to non-Hispanic white adolescents of both sexes, but the trend does not hold true for Hispanics and non-Hispanic black adolescents.

CURRENT STUDY

Given that today's early adolescents are confronted with high rates of obesity, depression, and low rates of cardiorespiratory fitness, which carryover to educational difficulties, the goal of this paper is to examine the interrelationship of biopsychosocial factors. An emphasis of this paper is on the effects of cardiorespiratory fitness on biological (i.e., sex, BMI), psychological (i.e., depressive symptoms), and social (i.e., school absences, race/ethnicity, and SES) factors among middle-school students (ages 10 to 14) in a north Texas school district. The following hypotheses were explored:

Body Mass Index

1. Sex will significantly predict BMI. In accordance to previous research, females will drive this effect.

2. Race/ethnicity will significantly predict BMI. In accordance to previous research, differences between ethnic/minorities and Whites will drive this effect.

3. Socioeconomic status will significantly predict BMI. In accordance to previous research, low SES will drive this effect.

4. An interaction between race/ethnicity, sex, and SES will predict BMI. In accordance to previous research, non-Hispanic black females and Hispanic males of low SES will drive this effect.

5. Given that cardiorespiratory fitness helps decrease weight, I predict that higher cardiorespiratory fitness will be associated with lower BMI. Additionally, adding cardiorespiratory fitness into the model with control for differences in sex, race/ethnicity and SES.

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Depressive Symptoms

1. Sex will significantly predict depressive symptoms. In accordance to previous research, females will drive this effect.

2. Race/ethnicity will significantly predict depressive symptoms. In accordance to previous research, differences in endorsed depressive symptoms between Hispanic/Latino adolescents and White/Caucasians adolescents will drive this effect.

3. SES will significantly predict depressive symptoms. In accordance to previous research, low SES adolescents will endorse more depressive symptoms relative to high SES adolescents.

4. There will be an interactional effect between race/ethnicity, sex, and SES on depressive symptoms. In accordance to previous research, race/ethnicity and SES will interact to predict depressive symptoms, in which low SES and racial/ethnic minorities will endorse more depressive symptoms.

5. Given that past research shows that poorer cardiorespiratory fitness is related to elevated depression among adolescents, adding cardiorespiratory fitness will control for the differences in sex, race/ethnicity, and SES on depressive symptoms.

School Absences

1. There will be a relationship between race/ethnicity and school absences. This relationship will be driven by differences between racial/ethnic minorities and non-Hispanic whites.

2. There will be a relationship between SES and school absences.

3. There will be an interaction between race/ethnicity and SES on school absences.

4. After adding cardiorespiratory fitness into the model, the differences by race/ethnicity and SES as well as sex on school absences will be non-existent.

5. Give the small literature on the relationship between physical health and education, the current study will explore if there is a relationship between BMI and school absences.

6. Given the small literature on the relationship between psychological health and educational outcomes, the current study will explore whether depressive symptoms relates to school absences.

METHODS

Participants

This study examined a racially/ethnically diverse sample of 1556 students from six middle schools in a north Texas public school district. The analysis sample included Hispanic/Latino, White/Caucasian, and Black/African American adolescents ages 11-16 (M =12.34; SD = .98). The sample included 790 (49.2%) females and 766 (50.8%) males.

Measures

The school district provided information on the students' race/ethnicity, age, grade level, and socioeconomic status (SES), and absences. Body mass index (BMI) and cardiorespiratory measures were provided by FITNESSGRAM® (Cooper Institute, 2007).

Socioeconomic status. Socioeconomic status (SES) was based on federal guidelines for determining which students qualified for free or reduced lunch based on family income. The United States Department of Agriculture (USDA) determines income eligibility by comparing household size and total household income. Household size consists of individuals who reside in the same household and/or utilize significant income and expenses. Total household income is determined by reportable income and current income. Reportable income is gross earned income or any money received on a persistent basis. Income includes earning from work, welfare/child support/alimony, retirement/disability benefits, or any other money that can be used to pay for children's meals. Current income is assessed, during the application process to receive free or reduced lunch, by income received for the current month, the amount estimated for the first month the application is made or the month prior to the application (U*SD*A, 2008). For the study,

SES was dichotomized by low and high. Low SES adolescents were defined as receiving free or reduced lunch while high SES adolescents were defined as not receiving any federal lunch aid.

School absences. The school district also provided information about the students' absences by type. According to the School District Student Handbook and Student Code of Conduct (2007-2008), parents/guardians must contact the school when their child is absent and in lieu of no contact by the parents/guardians the school attempts to call the parent to notify them of the absence and ask the reason. The child is still required to bring a note, within 48 hours of returning to school, which explains the reason for their absence. If the child does not provide an excuse the absence is recorded as unverified. The school district provided the researchers with a spreadsheet of each student's absence by type, which were classified as: excused absent, medically excused absent, in school suspension but not absent, tardy but not absent, extracurricular but not absent, field trip but not absent, and unverified absent. These absences were further broken down by morning and afternoon absences, total days missed, and total half days missed (i.e. either by morning or afternoon absence). For the study, total days missed was used to determine academic absences.

Depressive symptoms. The 20-item Center for Epidemiological Studies – Depression Scale for Children (CES-DC; Faulstich, Carey, Ruggiero, Enyart, & Gresham, 1986; Petrie et al., 2010) measures behavioral and cognitive domains of depression in addition to general levels of happiness. The participants responded to each item using a 4-point Likert type scale, which ranged from 0, *not at all*, to 3, *a lot*. The total score was calculated by the sum of items, and ranged from 0, *no symptoms*, to 60, *high level of symptoms*. The CES-DC is psychometrically validated for depression in 12-18 year olds (Fendrich, Warner, and Weissman, 1990; Petrie et al., 2010). The Cronbach's alpha for the current sample was .89.

Cardiorespiratory fitness. The Progressive Aerobic Cardiovascular Endurance Run (PACER), provided by FITNESSGRAM®, is represented by the number of 20-meter laps students completed within a particular timeframe and pace. The PACER is a reliable and valid instrument of cardiorespiratory fitness. For further psychometric properties of the PACER, refer to the FITNESSGRAM/ACTIVITY manual (Cooper Institute, 2007; Petrie et al., 2010).

Body composition. Body mass index (BMI), which is represented in kg/m^2, provided by FITNESSGRAM® (The Cooper Institute, 2007), was used to assess body composition. Weight was measured using a Seca digital scale (Model 882) and recorded to the nearest 0.1 lb. Height and weight was transformed into BMI within the FITNESSGRAM® program. For further psychometric properties of BMI, refer to the FITNESSGRAM/ACTIVITY manual (Cooper Institute, 2007; Petrie et al., 2010).

Procedure

This study was part of a larger investigation examining a variety of psychosocial and physical constructs. This study was approved from the university's IRB for Human Subjects Research, the school district administrative offices, and the principals at each of the six middle schools. Parental consent and child assent was obtained prior to the study. Research assistants and physical education instructors administered the FITNESSGRAM® protocol, which included BMI and PACER measurements. Students then completed questionnaires that took approximately 30 minutes during their physical education class. As an incentive for participation, students at each school were entered into a lottery drawing for cash prizes (Petrie et al., 2010).

RESULTS

Data Normality

In order to determine assumptions of normality, means, standard deviations, kurtosis, and skewness of the predictive variables (total days absent, depression, cardiorespiratory fitness, and body mass index; BMI) were computed. Analyses indicated that the Progressive Aerobic Cardiovascular Endurance Run (PACER) displayed kurtosis. However, kurtosis problems were mitigated by the large sample size (Tabachnick & Fidell, 2007). Further analyses were conducted to ensure no violation of the assumptions of linearity, multicollinearity, and homoscedasticity. Finally, a matrix correlation was also conducted on all the variables used in this study (see Table 1).

Sex and Racial/Ethnic Equivalence on Key Variables

Independent-sample t tests were used to evaluate sex differences in demographic and the primary independent and dependent variables. As shown in Table 2, there were no differences between males and females, at the specified .05 level, on age, grade level, school absences, and BMI. There were statistically significant sex differences by PACER laps and depressive symptoms. Males ran more laps on the PACER and had lower depressive symptoms as compared to females (see Table 1). Additionally, a chi-square test for independence indicated no significant association between sex and race/ethnicity, χ^2 (2, n = 1556) = 4.43, p = ns, phi = .05, as well as between sex and SES, χ^2 (1, n = 1064) = .83, p = ns, phi = .01.

An analysis of variance (ANOVA) was conducted to compare differences between race/ethnicity on the primary independent and dependent variables. As shown in Table 2, there were no significant racial/ethnic differences on age, grade level, school absences, and PACER

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laps. There were significant racial/ethnic differences on BMI and depressive symptoms. White/Caucasian adolescents had the lowest BMI scores compared to both Black/African American and Hispanic/Latino adolescents. White/Caucasian adolescents and Black/African American adolescents endorsed lower depressive symptoms than Hispanic/Latino adolescents (see Table 3). Furthermore, a chi-square test for independence showed a significant association between race/ethnicity and SES, χ^2 (2, n = 1064) = 317.22, $p < .0001$, phi = .55. White/Caucasian adolescents had the highest SES compared to both Black/African American and Hispanic/Latino adolescents. Black/African American adolescents had a higher SES compared to Hispanic/Latino adolescents, and consequently Hispanic/Latino adolescents had the lowest SES compared to both Black/African American and White/Caucasian adolescents.

Main Analyses

Body mass index. A standard multiple regression was used to assess the relationship between race/ethnicity, sex, and SES on BMI and whether cardiorespiratory fitness controlled for these relationships. Race, sex, and SES were entered at Step 1, explaining about 2% of the variance in BMI (see Table 4, Model 1). As shown in Figure 1, race/ethnicity was the only significant predictor of BMI. Follow-up analysis revealed that White/Caucasians had significantly lower BMI relative to Black/African Americans ($M = 20.65$ vs. $M = 22.66$), F (1, 717) = 13.34, $p < .001$. To test the hypothesis that this relationship was due to fitness levels, a second model was conducted where the PACER was entered in Step 2. This model explained about 16% of the variance in BMI with the second step contributing significantly to the overall fit (see Table 4, Model 2). Consistent with expectations, higher PACER scores were associated with lower BMI. As shown in Figure 2, when the PACER was added to the model, sex became a

significant predictor of BMI, and race/ethnicity remained significant. Follow-up analysis

revealed that this relationship was driven by differences in BMI scores between White/Caucasian

females ($M = 20.98$, $SE = .35$) and Black/African females ($M = 23.51$, $SE = .58$), F (2, 1002) =

3.06, $p = .05$. The PACER explained most of the overall variance in this model. In the third

model, interactions between sex and the PACER as well as between race/ethnicity and the

PACER were included in a third step to determine if these interactions explained more of the

variance between the above predictors and BMI. Results indicated that this model explained the

same amount of variance as the previous model; about 16% (see Table 4, Model 3) as neither

interaction term was significant. Additionally, overall results indicated that SES did not appear to

predict BMI in this sample.

Depressive symptoms. A standard multiple regression was used to assess the relationship

between race/ethnicity, SES, and sex on depressive symptoms, and whether cardiorespiratory

fitness controlled for these relationships. Race/ethnicity, sex, and SES were entered at Step 1,

explaining about 4% of the variance in depressive symptoms (see Table 5). Sex accounted for the

most variance, which was then followed by SES (see Figure 3). Follow-up analysis revealed that

this relationship was driven by a higher endorsement of depressive symptoms by females, F (1,

1052) = 19.71, $p < .001$ and low SES adolescents; F (1, 1052) = 6.34, $p = .01$. Race/ethnicity did

not related to depressive symptoms. Given that sex and SES were significant predictors of

depressive symptoms, in Step 2, the interaction between sex and SES were added to the model.

Results showed that the interaction was significant, accounting for approximately 5% of the

variance (see Table 5 and Figure 4). Follow-up analysis revealed that differences between low

SES females ($M = 17.01$, $SE = .84$) and high SES males ($M = 11.10$, $SE = .89$) drove this

relationship. Sex continued to account for the most variance, followed by SES, and then finally

the interaction between sex and SES. Race/ethnicity continued to not account for differences in depressive symptoms. In step 3, the PACER was added to the model to test the hypothesis that this relationship was due to cardiorespiratory fitness levels. Results indicated that this model explained about 6% of the overall variance (see Table 5). Sex continued to account for the most variance, followed by the PACER, and finally SES. Finally, the interaction between sex and SES became non-significant when the PACER was added into the model (see Figure 5).

School absences. A standard multiple regression was used to assess the relationship between race/ethnicity, SES, and sex on school absences, and whether cardiorespiratory fitness, depressive symptoms, and BMI controlled for these relationships. Race/ethnicity, sex, and SES were entered at Step 1, and indicated no significant difference on school absences (see Table 6). In Step 2, the PACER was added to the model; contrary to the proposed hypothesis, there was no relationship between cardiorespiratory fitness and school absences (see Table 6); however, this model explained about 1% of the variance in school absences. In Step 3, depressive symptoms were added, and showed to significantly predict school absences explaining 1% of the model (see Table 6). In the final model, BMI was added in Step 4, and indicated showing a significant difference in school absences explaining 2% of the model. In this last model, BMI and depressive symptoms appeared to account for the same amount of variance on school absences (see Figure 6), and explained the most variance to the overall model.

DISCUSSION

Using a biopsychosocial approach, the aim of the current study was to examine the relationship between cardiorespiratory fitness on differences by sex, race/ethnicity, and socioeconomic status (SES) on body mass index (BMI), depressive that symptoms, and school absences among early adolescents.

Respective of BMI, results showed significant racial/ethnic differences on BMI in that non-Hispanic white adolescents had the lowest BMI relative to Hispanic and non-Hispanic black adolescents. In this study, BMI was used as a continuous variable; therefore, cut-off scores were not used to differentiate adolescents by weight status (i.e., normal weight, overweight, obese, morbidly obese). Nevertheless, this finding parallels the obesity rate among racial/ethnic minorities, in that non-Hispanic white adolescents have the lowest BMI compared to both non-Hispanic blacks and Hispanic adolescents (Ogden et al., 2010). Somewhat surprisingly, there were no sex differences or racial/ethnic and sex interaction on BMI. This finding is inconsistent with previous findings that support non-Hispanic black females and Mexican-American boys having higher rates of obesity than non-Hispanic white boys and girls (Ogden et al., 2010). Additionally, other findings also showed that non-Hispanic black females had the highest prevalence of overweight status, followed by Hispanics of both sexes, and finally non-Hispanic whites (Gordon-Larsen et al., 2003). The inconsistency in findings may be due to the fact that the current sample had a normal average BMI and the BMI data were examined continuously as opposed to differentiation by weight status, both of which may explain why there were no sex or racial/ethnic and sex interactions on BMI. Finally, results showed no SES differences on BMI. This finding is also inconsistent with previous observations that overweight prevalence decreased linearly with increasing SES among white males and females (Gordon-Larsen et al.,

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2003). The inconsistency in differences on SES may be due to how SES was measured in the current study (free or subsidized lunch as low SES vs. unsubsidized lunch as high SES).

With respect to fitness, findings showed that adolescent males ran significantly more laps on the Progressive Aerobic Cardiovascular Endurance Run (PACER) than females, indicating better cardiorespiratory fitness, which is consistent with previous research (Pate et al., 2006), but inconsistent with national findings that show no sex difference on cardiorespiratory fitness (Carethon et al., 2005). In this study, there were no significant racial/ethnic differences in cardiorespiratory fitness. This is surprising given that a national study found that non-Hispanic blacks and Mexican Americans had poorer cardiorespiratory fitness than non-Hispanic whites (Carethon et al., 2005). Given that the current study had a fairly large sample size and was normally distributed, inconsistencies in findings may not be due to data issues, but rather to the way cardiorespiratory fitness was measured. In the current study, cardiorespiratory fitness was measured by the PACER (i.e., 20-meter laps students completed within a particular timeframe and pace) whereas previous research used cut-off points of estimated VO_2max from an existing reference population (Carethon et al., 2005). Additionally, results showed SES differences in cardiorespiratory fitness in that high SES adolescents ran more laps on the PACER than low SES adolescents. Despite differences in SES measurements, this finding is consistent with a study of Spanish adolescents (ages 12.5-18.5) that showed that high SES adolescents (i.e., paternal educational level or parental professional level) had higher cardiorespiratory fitness levels than low SES adolescents (Jiménez-Pavón et al., 2010).

Given that past researchers have found sex, racial/ethnic, and SES differences on cardiorespiratory fitness and BMI, and the current study showed differences by sex on cardiorespiratory fitness and race/ethnicity on BMI, I hypothesized that adding cardiorespiratory

fitness to the model would control for sex, race/ethnicity, and SES differences on BMI. Contrary to the proposed hypothesis, results showed that there was not a relationship between cardiorespiratory and sex, race/ethnicity and SES on BMI. Instead, results showed that cardiorespiratory fitness was the largest predictor of BMI, followed by race/ethnicity, and then sex. Interestingly, sex was initially not a significant predictor of BMI, and only became significant when the cardiorespiratory fitness was added to the model. Cardiorespiratory fitness among adolescents was inversely associated with BMI, which is consistent with previous findings (Ortega et al., 2005). Additionally, the relationship between cardiorespiratory fitness and BMI appeared to be more salient for non-Hispanic whites and non-Hispanic blacks in that the former group had lower BMI scores than the latter group when cardiorespiratory fitness was taken into account. The relationship between sex and BMI was driven by differences in BMI between non-Hispanic white females and non-Hispanic black females in that the former group had lower BMI scores than the latter group. These findings suggest that although non-Hispanic black females had higher BMI relative to non-Hispanic white females, they ran as many laps on the PACER, which further suggests that non-Hispanic black females higher BMI may not be due to adiposity, but rather muscle mass, something future research should examine directly. While this may be an accurate finding in this cohort, the rising of BMI, may very well nullify the former sex difference.

Results showed a sex difference in depressive symptoms whereby females endorsed more depressive symptoms than males, which is also consistent with past findings (CDC, 2010; Jackson & Goodman, 2011; Saluja et al., 2004). Additionally, results in this study showed racial/ethnic differences on depressive symptoms. Specifically, Hispanic adolescents endorsed significantly more depressive symptoms than non-Hispanic whites. These findings are consistent

with past research that shows that Hispanic adolescents endorse more depressive symptoms than any other racial/ethnic group (Blazer et al., 1994; Choi et al., 2006; Roberts et al., 1997; Roberts et al., 1992; Twenge et al., 2002). These findings document a clear mental health disparity between Hispanic and non-Hispanic adolescents. Additionally, results showed SES differences on depressive symptoms in that low SES adolescents endorsed more depressive symptoms than high SES adolescents, which are consistent with recent and past findings (DeCarlo Santiago et al., 2009; Goodman, 1999; Jackson et al., 2011).

The current study sought to examine possible relationships in understanding sex, racial/ethnic, and SES differences in depressive symptoms among adolescents. Although significant racial/ethnic differences were observed in depressive symptoms (e.g., Hispanic adolescents had higher depressive symptoms than non-Hispanic whites), subsequent analyses demonstrated that when sex and SES were accounted for, there were no racial/ethnic differences on depressive symptoms. Additionally, contrary to the proposed hypothesis and other studies (Roberts et al., 1997), there was no interaction between race/ethnicity and SES on depressive symptoms. These findings may be due to how SES was measured in this study and other studies that showed an effect. Other studies (Roberts et al., 1997) used a subjective comparison between their peers of SES whereas the current study used lunch status (free and subsidized vs. unsubsidized) determined by parental income. Concurrent with the literature, there was an interaction between sex and SES on depressive symptoms (DeCarlo Santiago et al., 2009; Goodman, 1999). These relationships were driven by differences in low SES females and high SES males. However, when cardiorespiratory fitness was entered into the model, the relationship between sex and SES on depressive symptoms became non-existent. These findings suggest that cardiorespiratory fitness may act as a buffer in preventing depressive symptoms among low SES

females. This is consistent with longitudinal research that shows that higher frequency of moderate to vigorous exercise is associated with psychological well-being among adolescents (Rees & Sabia, 2010). The finding in the current study not only adds to the literature on the benefits of exercise on mental health, but also that having better cardiorespiratory fitness overall is a predictor of lower depressive symptoms among low SES female adolescents.

The current study also sought to examine exploratory differences in race/ethnicity, SES, and sex on school absences, and to determine if BMI, cardiorespiratory fitness, or depressive symptoms were related to demographic differences. Results of the study showed that race/ethnicity, SES, and sex did not predict school absences. Inconsistent with the proposed hypothesis, cardiorespiratory fitness did not have a relationship between sex, race/ethnicity, and SES on school absences. However, consistent with the proposed hypotheses, BMI and depressive symptoms predicted school absences. Adolescents who had a higher BMI had more school absences. This finding shows that not only does BMI related to adolescent's physical health, but also adolescent's ability to attend school. Further results suggested that higher endorsement of depressive symptoms predicted higher rates of school absences. This finding is consistent with research that shows that mental health has an adverse relationship on schooling (Hawkins, et al., 1992; Jaycox et al., 2009); however, more research is needed to fully understand this relationship.

Limitations

Several limitations in the current study should be noted. Participants were from one independent school district in north Texas, which likely limits the generalizability of the findings. The study design was cross-sectional, and therefore the direction of causality cannot be

discerned. A major limitation of the current study was the measure of SES. Socioeconomic status was measured categorically with a non-traditional indicator. Regardless of whether subsidized school lunches are an adequate indicator of SES, dichotomizing variables restricts the range of spread. This approach also does not consider instability in parent's income nor does it account for monies from informal income and assets (i.e., homeownership, car ownership, inherited wealth). Another limitation is reading comprehension differences among adolescents on the self-report depressive symptom questionnaire (CES-DC), which is at a 6th grade reading level. Additionally, body composition was measured by BMI which does not differentiate between fat mass and lean body mass. Thus individuals with increased muscle mass may also have elevated BMI (Daniels, 2009). Finally, questionnaires were distributed in a mass-testing format giving students the opportunity to discuss and share responses.

<div align="center">Implications and Future Directions</div>

The health problems of today's adolescent can be largely attributed to engaging in risky health behaviors, which thus facilitates the emergence of new health concerns including obesity, diabetes, and cardiovascular disease. The current study highlights the importance of understanding adolescent health through a variety of perspectives (i.e., biopsychosocial model).

More research is needed to understand the relationship between cardiorespiratory fitness and BMI. Future researchers should consider measuring body composition using waist circumference instead of BMI given that the former measurement more accurately reflects adiposity than the latter as well as a better predictor of cardiovascular disease and type 2 diabetes in adults (Leitzmann et al., 2011). Given that adolescents are acquiring the same health problems (i.e., obesity, diabetes, and hypertension) as adults, it is necessary to use measurements that

predict health problems into adulthood. Recent research showed that obese children's' (ages 6 to 11) waist circumference were related to a variety of health markers, which put them at a greater risk for diabetes and cardiovascular disease (Bassali, Waller, Gower, Allison, & Davis, 2010). On the other hand, if cardiorespiratory fitness does indeed have an inverse relationship to BMI among non-Hispanic black females, then weight management interventions should focus on targeting groups that are more susceptible to obesity (i.e., Hispanic males and non-Hispanics females) to engage in sport activities that promote better cardiorespiratory fitness. Weight management interventions should also be targeted to low SES adolescents who may also be more susceptible to poorer cardiorespiratory fitness, which then leads to a higher BMI.

Additionally, given that Hispanic adolescents endorsed more depressive symptoms than any other racial/ethnic group, interventions should target this group. Future researchers should investigate acculturation effects among Hispanics, since this variable was not taken into account in the current study. Findings on depressive symptoms suggest that psychotherapy interventions should focus on adding cardiorespiratory fitness as a therapy for decreasing depressive symptoms among adolescents, especially those that are most vulnerable (i.e., low SES females).

Finally, findings indicated that BMI and depressive symptoms equally predicted school absences in that adolescents who had a higher BMI and endorsed more depressive symptoms had more school absences. There is little research on the relationship between depressive symptoms and school absences. Nevertheless, school administrators, health professionals, and parents should be aware that depressive symptoms in adolescents may very well carry over to educational problems, specifically school absences. Findings showed that higher BMI was associated with more absences, which indicates that weight status can impede adolescent's ability to attend school. As there is little research on BMI and school absences, future research is

needed to understand this relationship as well as other possible health outcomes that may be

associated with adolescents' ability to attend school.

Table 1

Summary of Intercorrelations

Measure	1	2	3	4	5	6	7	8	9
1. Sex	-	-.05*	-.01	-.05	-.03	.05	.01	-.21**	.17**
2.Race/ethnicity		-	-.54**	-.04	-.00	.03	-.12**	.05	-.10**
3. SES			-	-.03	-.03	-.03	-.12**	.09**	-.14**
4. Age				-	.81**	.12**	.14**	.21**	.10**
5. Grade level					-	.18**	.12**	.21**	.09**
6 Absences						-	.07*	.01	.08**
7. BMI							-	-.36**	.12**
8. PACER								-	-.15**
9. Depressive symptoms									-

Note. *p <.05. **p <.01. (2-tailed).

Table 2

Sex Equivalence on Key Variables

	M (SD)		*t* (*df*)	*p*	eta^2
	Males (*n* = 766)	Females (*n* = 790)			
Age	12.39 (.99)	12.29 (.97)	1.84 (1551)	.07	.00
Grade level	6.87 (.80)	6.82 (.81)	1.08 (1528)	.28	.00
Absences	2.74 (2.50)	2.99 (2.95)	-1.57 (1062)	.12	.00
BMI	21.09 (4.62)	21.21 (4.57)	-.47 (1447)	.64	.00
PACER	37.87 (18.02)	30.91 (14.33)	8.09 (1335.75)	.001*	.06
Depressive symptoms	10.70 (8.83)	14.18 (10.99)	-6.89 (1502.35)	.001*	.03

Note. * = p < .001.

Table 3

Racial/Ethnic Equivalence on Key Variables

	M (*SD*)			*F* (*df*)	*p*	*eta²*
	White/ Caucasian (*n* = 1003)	Hispanic/ Latino (*n* = 380)	Black/ African American (*n* = 173)			
Age	12.32 (.97)	12.42 (1.02)	12.27 (.98)	2.03 (2, 1552)	.13	.00
Grade level	6.85 (.81)	6.86 (.80)	6.79 (.80)	.52 (2, 1529)	.60	.00
Absences	2.95 (2.71)	2.81 (2.95)	2.68 (2.46)	.63 (2, 1063)	.53	.00
BMI	20.65 (4.33)	21.81 (4.65)	22.66 (5.43)	18.19 (2, 1448)	.00*	.02
PACER	34.80 (16.67)	32.85 (15.50)	34.54 (18.43)	1.81 (2, 1441)	.16	.00
Depressive symptoms	11.70 (9.84)	14.12 (10.48)	13.25 (10.57)	8.53 (2, 1555)	.00*	.01

Note. * *p* < .0001.

Table 4

Summary of Standard Regression Analysis for Variables Predicting BMI (n = 1449)

Variable	Model 1			Model 2			Model 3		
	B	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Sex	.13	.29	.01	-.60	.27	-.07*	-.64	.27	-.07*
Race/Ethnicity	-.50	.19	-.10**	-.50	.18	-.10**	-.48	.18	-.09**
SES	.56	.36	-.06	-.25	.33	-.03	-.21	.33	-.02
PACER				-.11	.01	-.39***	-.11	.01	-.39***
Sex x PACER							-.03	.02	-.04
Race/Ethnicity x PACER							.01	.01	.03
R^2		.02			.16			.16	
F for change in R^2		6.56***			170.24***			1.64	

Note. All variables were centered at their means. *p < .05. **p < .01. ***p < .001

Table 5

Summary of Standard Regression Analysis for Variables Predicting Depressive Symptoms (n = 1556)

Variable	Model 1			Model 2			Model 3		
	B	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Sex	3.42	.64	.16***	3.45	.64	.17***	3.04	.65	.15***
Race/Ethnicity	-.51	.43	-.04	-.48	.43	-.04	-.48	.42	-.04
SES	-2.32	.79	.11**	-2.27	.79	.11**	-2.10	.79	-.10**
Sex x SES				-2.77	1.33	-.06*	-2.48	1.33	-.06
PACER							-.06	.02	-.10**
R^2		.05			.05			.06	
F for change in R^2		16.71***			4.33*			9.18**	

Note. All variables were centered at their means. *p < .05. **p < .01. ***p <.001

Table 6

*Summary of Standard Regression Analysis for Variables Predicting School Absences (*n = 1064)

	Model 1			Model 2			Model 3			Model 4		
	B	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Sex	.19	.17	.04	.22	.64	.17	.15	.17	.03	.18	.17	.03
R/E	.17	.11	-.06	.17	.43	.11	-.48	.42	-.04	.21	.11	.07
SES	-.32	.21	-.06	-.33	.79	.21	-.28	.21	-.05	-.27	.21	-.05
PAC				.00	.01	.02	.01	.01	.03	.01	.01	.07
DS							.02	.01	.09**	.02	.01	.09*
BMI										.05	.02	.09*
R^2		.00			.01		.01				.02	

Note. All variables were centered at their means. *p* < .05. **p* < .01. ***p* <.001

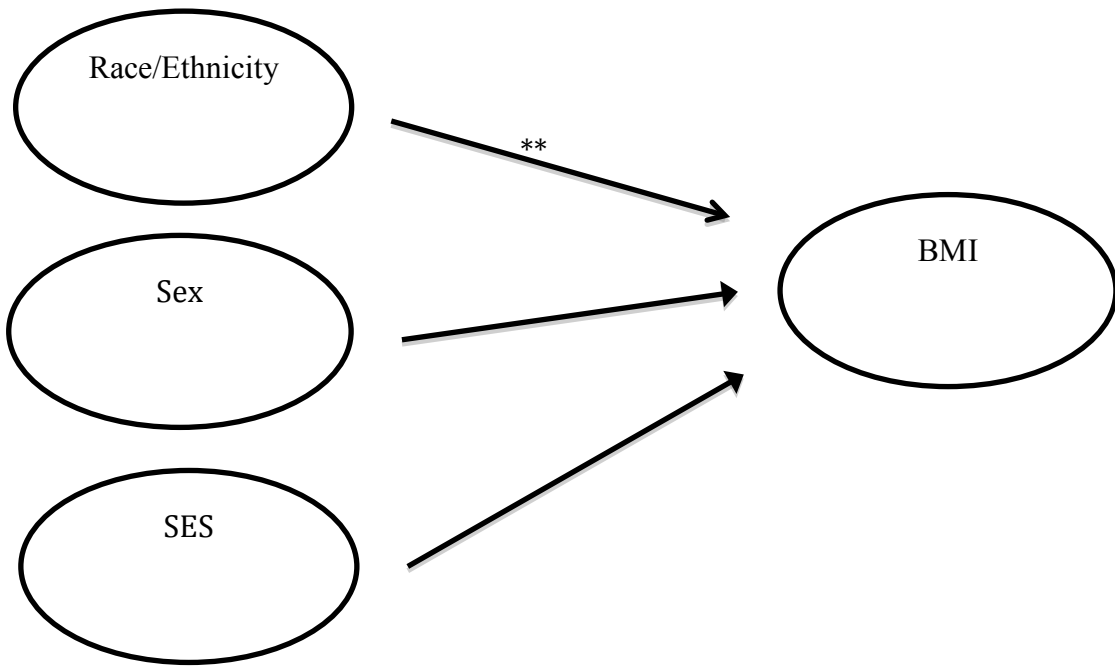*Figure 1*. The relationship between race/ethnicity, sex, and SES on BMI (Model 1). Only race/ethnicity significantly predicted BMI (***p < .01)*.
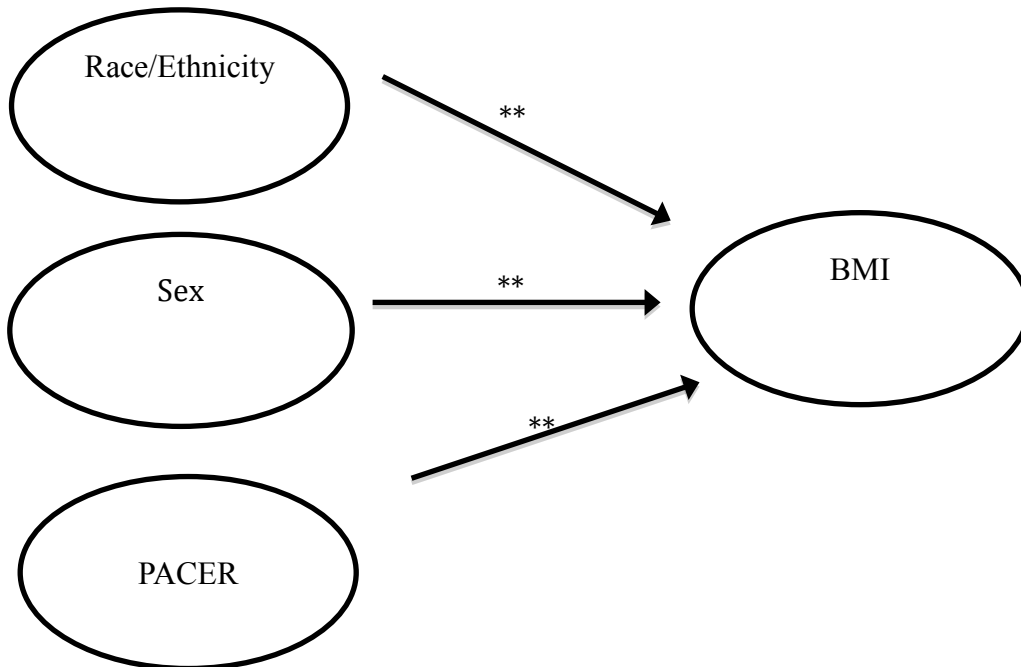

Figure 2. The relationship between race/ethnicity, sex, and the PACER on BMI (Model 2). The PACER became the most significant predictor of BMI. Race/ethnicity remained a significant predictor of BMI. Although sex was not a significant predictor of BMI in the first model, the addition of the PACER produced a significant relationship between sex and BMI (***p < .01)*.
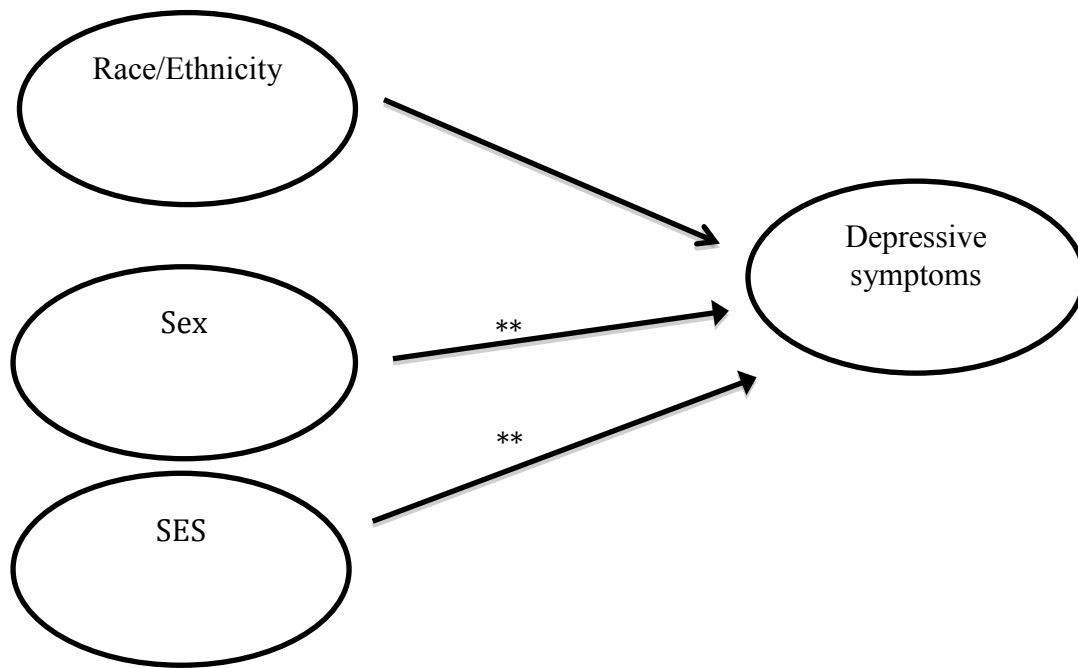
Figure 3. The relationship between race/ethnicity, sex, and SES on depressive symptoms (Model 1). There was a significant relationship between sex and depressive symptoms and SES and depressive symptoms *(**p < .01).*
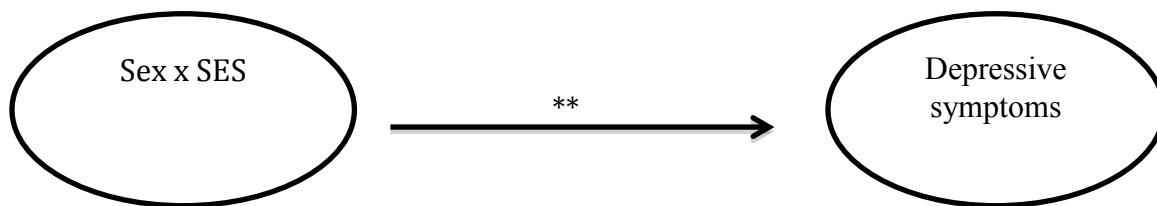

Figure 4. The interactional relationship of sex X SES on depressive symptoms (Model 2). The interaction between sex and SES significantly predicted depressive symptoms *(**p < .01).*
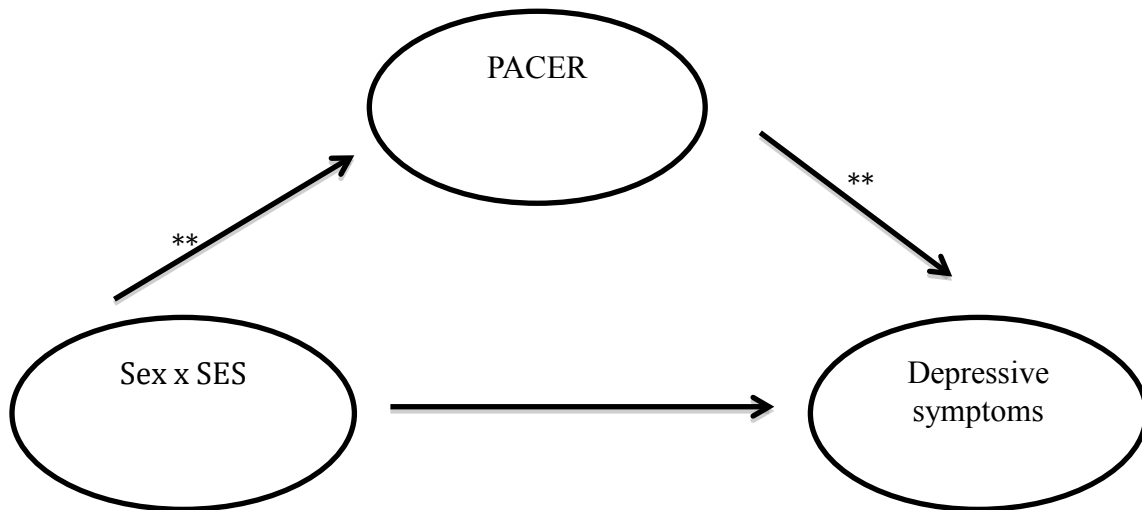
Figure 5. The interactional relationship between sex and SES on the PACER. There was also a significant relationship between the PACER and depressive symptoms. When the PACER was added to model 3, however, the previous significant relationship between the interaction of sex and SES on depressive symptoms became non-significant (**p < .01).
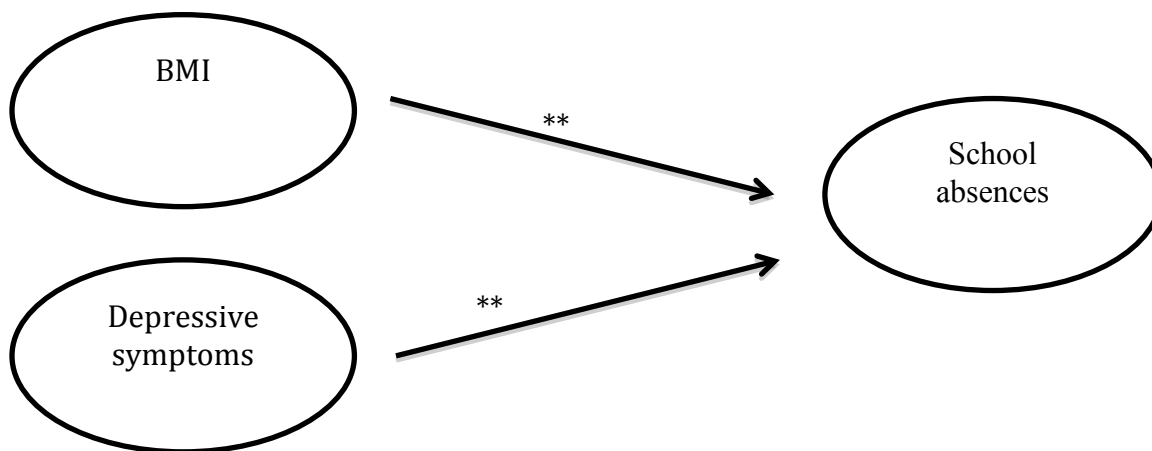

Figure 6. The relationship between BMI and depressive symptoms on school absence (Model 4). Both BMI and depressive symptoms significantly predicted school absences (**p < .01).

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