SCHOOL RACIAL CLIMATE AND RACIAL DISPARITIES IN YOUTH SEDENTARY BEHAVIORS

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Abstract

STEPHANIE LYNNETTE BAKER: School Racial Climate and Racial Disparities in Youth Sedentary Behaviors
(Under the direction of Susan T. Ennett)

Racial disparities in adolescent sedentary behavior have been documented yet little is known about the influence of contexts such as schools. My study addressed this gap by focusing on three aims: (1) to develop a school-level measure of racial climate and determine whether students in schools with more negative racial climates engage in more sedentary behavior, (2) to determine whether individual perceptions of prejudice among students and unfair treatment among teachers towards students predict sedentariness, and (3) to assess whether the relationship between school racial climate and adolescent sedentary behavior is mediated by prejudice and unfair treatment. My conceptual model was based on a stress-coping behavior paradigm and informed by ecological theory, the integrative model of child development, contact theory, and the social network literature. To address the study aims, I used data from Waves 1 and 2 of the National Longitudinal Study of Adolescent Health to perform Confirmatory Factor Analysis and Multilevel Structural Equation Modeling. School racial climate was measured by using school-level structural indicators of cross-race interaction based on contact theory.

Results indicated that the school racial climate can be reliably measured using structural indicators; however, the measure lacked invariance across race-gender subgroups. Therefore, a separate model was analyzed per group. For black males, as hypothesized, a
more negative school racial climate was associated with increased sedentary behavior when prejudice was included as a mediator. Significant mediation was not found for any other race-gender subgroup.

Results suggest that, except for black males, sedentary behavior may not be a coping strategy used by adolescents in response to a negative racial school climate, or that a negative school racial climate may not be a stressful context among all youth. Further, the findings suggest that the school racial climate may not be experienced similarly for black and white youth, and that the construct should be measured separately for each race, and possibly gender, subgroup. Additional research is needed to further clarify whether the school racial climate leads to other negative coping behaviors among black males, as well as to improve measurement of school racial climate among other race-gender subgroups.
Dedicated to my maternal and paternal grandmothers, Gladys Bailey McGee and Annie Gooden Baker. Their feisty, independent, driven, and full of faith personalities not only set my Mom and Dad on a trajectory of success, but their personalities trickled down to me as well, and allowed me to complete this dissertation. I stand on their shoulders.

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“For I know the plans I have for you,’ declares the Lord, ‘plans to prosper you and to not harm you, plans to give you a hope and a future.’”

Jeremiah 29:11

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critically about sedentary behavior and how schools operate to shape health behaviors, and to Cathy Zimmer who joined forces with me in the battle of structural equation modeling and MPLUS. We prevailed in the end! Her positive attitude, expressed confidence in my own abilities, and genuine care and concern for my well being were just what I needed to get through the complicated analyses.

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Chapter 1: Introduction

1.1 Purpose and Introduction to the Study

The purpose of this dissertation is to understand whether and, if so, how the school racial climate impacts adolescent sedentary behavior differentially by race in the United States. School racial climate is conceptualized to reside in the patterns of relationships among non-Hispanic black (black) and non-Hispanic white (white) students, in teacher diversity, and in other structural indicators of racial climate. The proposed mechanism of school racial climate’s effect on sedentary behavior is through experiences of prejudice and unfair treatment. The health disparities literature documents racial disparities across a broad array of health behaviors and outcomes (Braveman, Cubbin, Egerter, Williams, & Pamuk, 2010; Williams & Collins, 2001), including sedentary behavior (Gordon-Larsen, McMurray, & Popkin, 1999; Whitt-Glover et al., 2009). A developing body of research indicates that a stressful racial climate and experiences and/or perceptions of prejudice and unfair treatment, as well as their cumulative effects, are important factors across the lifespan in these disparities (Krieger, 2003; Williams, Neighbors, & Jackson, 2008).

The stress-coping behavior path is well established in psychology, has been tested empirically, and is a strong explanatory model for predicting coping behaviors (Glanz, Rimer, & Viswanath, 2008). While conceptualizations of “stress” vary widely across disciplines and fields of study, the fact that coping behaviors typically follow exposure to stress is well validated across a variety of populations and settings (Dietz, 1996; Glanz,
Rimer, & Viswanath, 2008). In more recent studies, stress has been conceptualized at both the environmental (e.g., characterizations of environments such as schools as either stress-inducing or stress-reducing) (Rew & Horner, 2003) and individual levels (e.g., an individual’s perceptions and assessment of a stressor) (Pearlin, 1993). For this study, I consider both aspects of stress with a school-level contextual measure (i.e., school racial climate) and individual-level measures (i.e., prejudice and unfair treatment). It should be noted that while I make attempts to approximate stress, I am not measuring stress with a validated scale or a biological assay of stress hormones such as cortisol. Despite the importance of such measures, it is also valuable to determine whether contexts and experiences that are understood to be “stressful” perform as predicted by stress-coping behavior theory.

The school environment is a context that influences adolescent health behaviors. A specific characteristic of the school context that is relevant for racial disparities in a variety of outcomes, and potentially health behaviors, is the school racial climate. A negative school racial climate is assumed to be a stressful context for students that could lead to coping behavior engagement. I conceptualize school racial climate not by the percent composition of students by race, but rather as a more detailed and nuanced description based on multiple structural indicators. These indicators include how students transact across race through friendship groups, the extent to which students have same-race friendship preferences, the relative status or popularity of white students compared to black students, the relative participation in extracurricular activities of white compared to black students, the extent of teacher diversity, and the presence of school-level racial busing practices. I expect a negative school racial climate to be associated with more segregated friendship networks, stronger
race-based friendship preferences, larger racial differences in centrality to the network and in extracurricular activity participation, fewer black teachers, and racial busing policies. This conceptualization of the school racial climate provides an opportunity to better understand how a stressful context can influence behaviors differently by race because it moves beyond counting numbers of adolescents by race who may or may not interact with one another and towards understanding how adolescents of different racial backgrounds interact, thereby potentially contributing to health disparities.

Beyond the development of a school racial climate variable and determining its relationship with sedentary behavior, potential pathways between the school racial climate and sedentary behavior will be explored. The link between stress and health behaviors has been established (Umberson, Liu, & Reczek, 2008). There is also evidence that contextual characteristics can impact stressful experiences related to discrimination (G. Gee & Walsemann, 2009; G. C. Gee, 2002; K. M. Walsemann, Gee, & Geronimus, 2009) and that discrimination research should specify domains in which discrimination occurs (Krieger, Smith, Naishadham, Hartman, & Barbeau, 2005). Adolescents experience prejudice and unfair treatment within schools and it has been demonstrated that black adolescents disproportionately experience prejudice and unfair treatment in school, particularly those that have negative racial climates (Rosenberg, 1979). In addition to the school racial climate being stressful and contributing to engagement in coping behaviors, experiences of prejudice and unfair treatment are stressful experiences often accompanied by both positive and negative coping strategies (Seaton & Yip, 2009). There are some findings and hypotheses that suggest that experiencing discrimination is associated with engagement in negative health behaviors, and can partially explain racial health disparities (Brodish et al., 2011;
Jackson et al., 2010). Since experiences of prejudice and unfair treatment are closely tied with discrimination, they can also be conceptualized as stressors that are likely associated with negative health behavior coping (Krieger, 1999; Sellers, Caldwell, Schmeelk-Cone, & Zimmerman, 2003; Williams, Neighbors, & Jackson, 2008); for example, engagement in sedentary behaviors (Williams, Neighbors, & Jackson, 2008).

I apply the stress-coping paradigm to examine whether a more negative racial climate within schools—the primary social context in which black and white youth interact (Crosnoe, 2000; Kubitschek & Hallinan, 1998)—influences racial disparities in sedentary behaviors. I hypothesize that a more stressful racial climate will result in increased negative coping behavior (sedentary behaviors in this case) for black versus white adolescents because the racial climate of schools may be more stressful for black adolescents than for white adolescents (Munsch & Wampler, 1993). I focus on sedentary behaviors as an exemplar coping behavior because of its significant implications for health and well-being (Utter, Neumark-Sztainer, Jeffery, & Story, 2003) and the demonstrated disparity in sedentary behavior between black and white youth (Eaton, 2010). In addition, sedentary behaviors have been identified as coping mechanisms for stress and emotional problems (Arnett, 1995; Chapman & Mullis, 2000; Shelton et al., 2009), which other research shows are linked with experiences of discrimination (Jackson et al., 2010). Additionally, I hypothesize that the relationship between the school racial climate and sedentary behavior is mediated by perceptions of prejudice and unfair treatment. I measure prejudice and unfair treatment using adolescent self-reports.
1.2 Study Purpose, Objectives, and Specific Aims

The first purpose of this study is to develop a multi-measure, latent, school contextual variable – racial climate – and to examine its effects on sedentary behavior among black and white youth. Most studies use measures of racial segregation to approximate racial climates, for example, by measuring racial composition. Racial composition, however, does not adequately capture the dynamics within schools, such as, within-school segregation, that lead to the racial climate. My dissertation addresses this gap by focusing on social relationships within schools using social network variables that are indicators of the racial climate including: a school-level segregation index based on the extent of cross-race friendships; black-white differences in race-based friendship preference; and status differences between black and white youth. I also include black-white differences in participation in extracurricular activities, the racial composition of teachers and racial busing practices as structural causal indicators of the racial climate.

Pathways by which racial climate in schools affect adolescent health behaviors have not been identified; this research intends to fill that gap. Accordingly, the second study purpose is to investigate mechanisms connecting school racial climate and sedentary behavior. Based on scientific evidence and theories of stress and health behavior (Coll et al., 1996; Umberson, Liu, & Reczek, 2008) detailed in Chapter 2, I expect that prejudice and unfair treatment, measured by self-report, will result from more negative school racial climates, and will negatively affect adolescent sedentary behavior. This second purpose addresses a critical need to understand adolescent behavior in context and the pathways from context to behavior. It aims to determine how the school racial context differentially affects
Aim 1: To develop a measure of the school racial climate and determine its relationship with sedentary behavior.

RQ 1a. To what degree and in what direction do the following variables: the amount of cross-race friendship segregation, same-race-based friendship preferences, status differences between black and white students, differences in participation in extracurricular activities between black and white students, racial diversity of teachers, and racial school busing practices, serve as indicators of the underlying concept of school racial climate?

Hypothesis 1a-1: All of the above-mentioned indicators will have significant loadings on the one factor latent variable school racial climate.

Hypothesis 1a-2: A more segregated friendship network will be associated with a more negative school racial climate.

Hypothesis 1a-3: Stronger preference for same-race friends will be associated with a more negative school racial climate.

Hypothesis 1a-4: Larger status differences between black and white students will be associated with a more negative school racial climate.
Hypothesis 1a-5: Larger differences in participation in extracurricular activities between black and white students will be associated with a more negative school racial climate.

Hypothesis 1a-6: Less racial diversity of teachers will be associated with a more negative school racial climate.

Hypothesis 1a-7: School busing policies will be associated with a more negative school racial climate.

**RQ 1b. To what degree does school racial climate demonstrate strong factorial measurement invariance across black males, black females, white males, and white females?**

Hypothesis 1c-1: The school racial climate will demonstrate strong factorial measurement invariance as evidenced by no significant differences among factor loadings, item intercepts and residual variances of indicators across all race-gender subgroups.

**RQ 1c. What is the variability across schools in racial climate?**

No hypothesis is presented based on the descriptive nature of the research question.

**RQ 1d. What is the relationship between the school racial climate and adolescent sedentary behavior, and does this relationship differ by race and gender?**

Hypothesis 1d-1: Adolescents attending schools with more negative racial climates will report more sedentary behavior compared to adolescents attending schools with less negative racial climates.

Hypothesis 1d-2: The relationship between school racial climate and adolescent sedentary behavior will vary by race such that more negative racial climates will be
more strongly related to sedentary behavior for black adolescents than for white adolescents.

Hypothesis 1d-3: The relationship between school racial climate and sedentary behavior among adolescents will vary by race and gender such that more negative racial climates will be more strongly related to sedentary behavior for black males than for black females, white males, or white females.

**Aim 2: To determine how prejudice and unfair treatment vary across adolescents and with sedentary behavior.**

**RQ 2a. What is the relationship between prejudice and adolescent race/ethnicity and gender?**

Hypothesis 2a-1: Black adolescents will more strongly agree that students in their school are prejudiced compared to white adolescents.

Hypothesis 2a-2: Male adolescents will more strongly agree that students in their school are prejudiced compared to female adolescents.

Hypothesis 2a-3: Black male adolescents will more strongly agree that students in their school are prejudiced compared to black female, white male, or white female adolescents.

**RQ 2b. What is the relationship between unfair treatment and adolescent race/ethnicity and gender?**

Hypothesis 2b-1: Black adolescents will more strongly agree that teachers in their schools treat students unfairly compared to white adolescents.

Hypothesis 2b-2: Male adolescents will more strongly agree that teachers in their schools treat students unfairly compared to female adolescents.
Hypothesis 2b-3: Black male adolescents will more strongly agree that teachers in their schools treat students unfairly compared to black female, white male, or white female adolescents.

**RQ 2c. What is the relationship between (a) prejudice, (b) unfair treatment and sedentary behavior?**

Hypothesis 2c-1: Adolescents who more strongly agree that students in their school are prejudiced will engage in more sedentary behavior than adolescents who more strongly disagree that students in their school are prejudiced.

Hypothesis 2c-2: Adolescents who more strongly agree that teachers in their schools treat students unfairly will engage in more sedentary behavior than adolescents who more strongly disagree that teachers in their school treat students unfairly.

**Aim 3: To determine if the relationship between school racial climate and adolescent sedentary behavior is mediated by prejudice and unfair treatment for all adolescents, and for race/gender subgroups.**

**RQ 3a. Does (a) prejudice and/or (b) unfair treatment mediate the relationship between school racial segregation climate and adolescent sedentary behavior?**

Hypothesis 3a-1: Adolescents attending schools with more negative racial climates will more strongly agree that students in their school are prejudiced and, in turn, report more sedentary behavior, compared with adolescents in schools with climates characterized by less negative racial climates.

Hypothesis 3a-2: Adolescents attending schools with more negative racial climates will more strongly agree that teachers in their school treat students unfairly and, in
turn, report more sedentary behavior, compared with adolescents in schools with less negative racial climates.

Hypothesis 3a-3: Black male adolescents attending schools with more negative racial climates will more strongly agree that students in their school are prejudiced, and in turn report more sedentary behavior, compared with black female, white male, or white female adolescents attending schools with more negative racial climates.

Hypothesis 3a-4: Black male adolescents attending schools with more negative racial climates will more strongly agree that teachers in their school treat students unfairly, and in turn report more sedentary behavior, compared with black female, white male, or white female adolescents attending schools with climates characterized by more racial segregation.

1.3 Overview of Approach

To answer these research questions, a secondary analysis of the National Longitudinal Study of Adolescent Health (Add Health) will be conducted. Add Health is a longitudinal research study that began in 1994 with adolescents in the 7th-12th grades. At present, five waves of data collection have occurred. This study uses data from the in-school survey, the Wave I and Wave II in-home interviews with adolescents and parents, and school administrator questionnaire. Additionally, previously calculated social network variables of the school-level friendship network segregation, preferences for same-race friends, and status/popularity of black students compared to white students, will be utilized. Only adolescents who identified as black and white non-Hispanic will be included in this analysis. While data for Hispanic, Asian, American Indian and Pacific Islander students were collected, there are not enough cases within schools to include these racial groups in the
present study. To establish the significance of the proposed relationships, a multiple group, multi-level structural equation modeling analytical strategy is used. This technique allows for the simultaneous testing of multiple relationships across groups, including mediation, while approximating latent variables using measured indicators.

1.4 Significance of the Study

The proposed research is significant because while racial disparities in adolescent health have been documented, there are research gaps in understanding the pathways by which school-level factors affect racial disparities in adolescent health behaviors. While there is an established literature of how the school context affects health behaviors, generally, only a handful of studies published in the past few years has looked more specifically at how racialized characteristics of the school context affects health behavior disparities (K. M. Walsemann & Bell, 2010). My study will contribute findings to address this gap because it focuses on the effect of school racial climate on racial disparities in adolescent sedentary behavior.

There is also a gap in the literature with respect to understanding the health behavioral consequences of experiences of prejudice and unfair treatment during adolescence. Much of the discrimination and health outcomes literature sits within the adult population but we know that experiences of discrimination start earlier in the life course. The inclusion of prejudice and unfair treatment in my model as mediators of the relationship between the school racial climate and sedentary behavior will provide an opportunity to explore whether and how discrimination is associated with negative health behaviors; sedentary behavior in this study.
Additionally, there is a lack of theoretical guidance on the structural measurement of racial climate in the published literature. I use Contact Theory to inform my conceptualization of the school racial climate because it highlights not simply the amount of diversity within a setting, but the need to capture the underlying racial climate of a setting based on the interactions and desires of people to interact across racial/ethnic backgrounds. Principles of Contact Theory informed the inclusion of social network measures of cross-race relationships and preferences of students as well as additional indicators of the school racial climate that are not network variables, but could be affected by the overall racial climate, including racial differences in extra-curricular participation, racial diversity of teachers, and racial busing policies. This measure of school racial climate includes a segregation measure that is conceptually and operationally different from segregation based on percent composition of students in schools and it moves beyond measuring individual-level perceptions of the racial climate towards identifying structural indicators and school-level trends of preferences that are indicative of the racial climate.

Finally, to address the Healthy People 2020 goals of reducing health inequalities, we must find evidence of fundamental causes that can contribute to intervention and policy development that encourage fundamental change. By moving towards understanding an upstream level of influence of racial disparities in adolescent sedentary behavior, my dissertation aims to do this.
Chapter 2: Background and Significance

2.1 Sedentary Behavior Background

2.1.1 Definition of Sedentary Behavior

In health research, sedentary behavior typically refers to activities that do not require significant energy expenditure, such as watching television, playing video games, and spending time on the computer (DeMattia, Lemont, & Meurer, 2007; Koezuka et al., 2006; Must & Tybor, 2005; Pate, O'Neill, & Lobelo, 2008; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). The amount of time adolescents spend in sedentary behavior has been of increasing interest in the literature, leading to recommendations by Healthy People 2020 to increase “the proportion of children who view television 2 or fewer hours per day to 75%” (Healthy People, 2011). This goal is in concert with the American Academy of Pediatrics recommendations to limit television viewing to 2 hours per day or less in adolescents (Baron et al., 2001).

Sedentary behavior is often mistakenly considered the opposite of physical activity. However, physical activity and sedentary behaviors are not simply opposites but instead, have their own unique determinants and consequences (S. J. Biddle, Marshall, Gorely, Cameron, & Murdey, 2003; S. J. H. Biddle, Gorely, Marshall, Murdey, & Cameron, 2004; Hamilton, Healy, Dunstan, Zderic, & Owen, 2008; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). Additionally, sedentary behavior and physical activity are not necessarily
correlated with one another (Brodersen, Steptoe, Boniface, & Wardle, 2007). In fact, sedentary behavior may predict obesity and cardiovascular disease to a greater degree than physical activity (Dietz, 1996; F. B. Hu, Li, Colditz, Willett, & Manson, 2003) and at the very least operates biologically very differently from physical activity (Hamilton, Healy, Dunstan, Zderic, & Owen, 2008). Even among those who are physically active, sedentary lifestyles are associated with poor health outcomes (Owen, Healy, Matthews, & Dunstan, 2010) indicating that there is time for both sedentary behavior and physical activity in a typical day. Watching more television is associated with increased overweight and obesity regardless of physical activity level (F. B. Hu, Li, Colditz, Willett, & Manson, 2003). Further, randomized controlled trial results have reported that a reduction in targeted sedentary behaviors is related to energy intake but not to changes in physical activity (Epstein et al., 2008). While physical activity disparities are present for adolescents, sedentary behavior disparities are far greater (Gordon-Larsen, McMurray, & Popkin, 1999) and, as elaborated below, more likely to be linked with stress for black than white youth (Airhihenbuwa, Kumanyika, Agurs, & Lowe, 1995). Adolescent sedentary behavior is therefore the outcome of interest for this study.

2.1.2 Prevalence of Sedentary Behavior

According to the Youth Risk Behavior Surveillance System, 25% and 33% of high school students used computers and watched television for more than 3 hours daily, respectively (Eaton et al., 2010). Gorely and colleagues estimate that adolescents spend 2.5 hours per day watching television, 30 minutes per day playing video games, and 45 minutes per day using the computer (Gorley, 2003). From a cohort perspective, adolescents in the late 1990’s were spending the same approximate total number of hours engaged in screen time
sedentary behaviors as adolescents in the 1950’s, even though the types of media use have changed (S. J. H. Biddle, Gorely, Marshall, Murdey, & Cameron, 2004). Other studies have found that while television time among adolescents has decreased over time, increased time spent playing video games and using computers may lead to overall increases in time spent in sedentary pursuits (P. M. Anderson & Butcher, 2006). With sedentary behavior being one of the top causes of preventable death in the United States, these alarming statistics for adolescents have significant implications for health and well-being across the life course (K. M. Harris, Gordon-Larsen, Chantala, & Udry, 2006). Inactive adolescents are more likely to suffer from obesity, diabetes, cardiovascular disease, hypertension, and mental and emotional problems in adolescence (Koplan, Liverman, & Kraak, 2005), and from cancer, heart disease and stroke as adults (U.S. Department of Health and Human Services & Office of Disease Prevention and Health Promotion, 2008).

In addition to overall high levels of adolescent sedentary behavior, racial disparities in adolescent sedentary behavior are well established, with black youth demonstrating greater levels of sedentary behavior compared with white youth (Eaton et al., 2010). Thirty percent of black youth versus 22% of white youth report using computers more than 3 hours a day and 55% of black adolescents report watching more than 3 hours of television a day compared to 25% of white adolescents (Eaton et al., 2010). Early racial disparities in sedentary behavior set the stage for racial disparities in related health outcomes, notably cardiovascular disease and obesity, which are also disproportionately experienced by black versus white people. The racial disparities gap widens in young adulthood, highlighting the importance of addressing this disparity early in adolescence (Gordon-Larsen, Nelson, & Popkin, 2004).
2.1.3 Determinants of Sedentary Behavior

Despite the volume of literature documenting racial disparities in adolescent sedentary behaviors, few studies have sought to explain underlying causes of this socially patterned disparity. One theoretical explanation is based on the “rest ethic” of African American culture and may provide some insight into the racial disparity in adolescent sedentary behavior. The “rest ethic” suggests that black people participate in more sedentary behavior because it is culturally appropriate to rest after a full day (Airhihenbuwa, Kumanyika, Agurs, & Lowe, 1995; S. Wilcox, 2002). This theory is based on the historic fact that black workers were more likely to have hard-labor jobs and thus engaged in large amounts of physical activity through employment. While the causes of the racial disparity are sparse in the peer-reviewed literature, there are data about the causes of the behavior itself. In addition to black race/ethnicity (Schmitz et al., 2002; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007), empirical findings report that increased sedentary behavior is associated with being male (Van Der Horst, Paw, Twisk, & Van Mechelen, 2007), having lower socioeconomic status (Must & Tybor, 2005; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007), lower perceived academic rank and expectations, depressive symptomatology and potentially overall psychological well-being and outlook (Schmitz et al., 2002), and parents with lower levels of education (Must & Tybor, 2005; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007).

Males and females share some correlates of sedentary behavior, but some factors are specific to gender. Increasing age and lower self-efficacy are associated with sedentary behavior for both adolescent boys and girls (Patrick et al., 2004). Ethnicity and body mass index (BMI) have been positively associated with sedentary behavior for boys only, whereas
family support, television and video rules (Patrick et al., 2004), and authoritative parenting (Schmitz et al., 2002) were some of the correlates of significance only for adolescent girls. Additionally, black adolescent boys report more sedentary behaviors than black adolescent girls (Eaton et al., 2010). Sedentary behavior has shown positive associations with obesity for children under 10 years of age (Must & Tybor, 2005) but have null associations for older children (S. J. Biddle, Marshall, Gorely, Cameron, & Murdey, 2003; Must & Tybor, 2005).

2.1.4 Measurement of Sedentary Behavior

As with other health behaviors, measurement of sedentary behavior is a debated topic in the literature and practice, particularly regarding its similarity and differences from physical inactivity. Physical inactivity is typically measured based on an individual’s lack of activity or when individuals do not meet certain physical activity guidelines (Dietz, 1996). Sedentary behavior, however, is not considered to be simply the absence of physical activity but to include a class of behaviors that require low energy expenditure and are chosen by individuals (S. J. H. Biddle, Gorely, Marshall, Murdey, & Cameron, 2004; Must & Tybor, 2005). Objective measures of sedentary behavior include observations of television viewing and in-home videotaping. Subjective measures include self-reports of the amount of time spent in typical sedentary behaviors such as television viewing, video games, sitting in a classroom, homework, listening to music and computer use (Must & Tybor, 2005). Screen time behaviors, including television viewing, video games and computer use, represent a significant amount of an adolescent’s sedentary time (Must & Tybor, 2005). Sedentary pursuits also do not occur in isolation, creating a challenge with pure measurement; for example, and adolescents could watch television and play video games on mobile devices at the same time, or they could play video games while walking (Must & Tybor, 2005).
There is support for both self-reported and objective measures of sedentary behavior with both having limitations and biases (Reilly et al., 2008). While self-report measures have limitations such as recall bias, objective measures can be biased as well due to Hawthorne effects associated with observations (Adair, 1984). In addition, the decisions researchers make for data cut-points in terms of what defines low, medium, and high levels of sedentary behavior can lead to different results and conclusions (Reilly et al., 2008). Although sedentary behavior measurement continues to develop, current measures are sufficient for empirical data analyses with the acknowledgement of limitations. For this dissertation, measurement of sedentary behavior is in line with it being conceptually different from physical inactivity and measured by self-report.

**2.1.5 Sedentary Behavior as a Coping Behavior**

While not tested explicitly as a coping behavior, sedentary behavior has often been linked with other maladaptive health behaviors associated with coping, including alcohol and tobacco use, drug use, and unhealthy eating (Glanz, Rimer, & Viswanath, 2008). Studies suggest that when individuals lack other positive coping skills, engagement in negative health behaviors provides a way to cope with stressful life experiences (Marcus et al., 2000). Further, it is far more likely for individuals who are coping with stress to engage in more sedentary behaviors because in the short term, sedentary behaviors, like alcohol use and smoking, are more pleasurable than more positive coping strategies, like exercise (Krueger, 2008). While not empirically tested, there is some theoretical support for the relationship between stress and negative health behaviors (Umberson, Liu, & Reczek, 2008), and it seems plausible to extend this association to include sedentary behavior as one of these negative health coping behaviors. In fact, adolescents report engaging in one type of sedentary pursuit,
watching television, when attempting to cope with school-related stress (Hutchinson et al., 2006).

### 2.1.6 Gaps in Contextual Factors Affecting Sedentary Behavior

Few studies have examined higher-level structural factors that shape sedentary behaviors and could explain these disparities. The sedentary behavior research calls for more inquiry into how environments shape sedentary behaviors, as well as the use of sub group analysis to understand differences (S. J. H. Biddle, Gorely, Marshall, Murdey, & Cameron, 2004; Schmitz et al., 2002). Although the school context has been identified as an important source of structural influences on racial disparities in youth academic achievement, it has not been studied extensively for racial disparities in adolescent health behaviors, including sedentary behavior (Barrett, Pearson, Muller, & Frank, 2007; McNeely, Nonnemaker, & Blum, 2002; Orfield, Lee, & Civil Rights, 2006). This gap in our knowledge calls for research, such as this dissertation, which aims to determine the differential effects of the school racial climate on adolescent sedentary behavior by race, and the mechanisms through which these relationships operate.

### 2.2 Introduction to Relevant Theories

Coping behaviors, whether maladaptive or positive, are one strategy people use to deal with stress. The theoretical and empirical literatures have found consistent support for the relationship between stress and coping. In addition to a basic relationship between stress and coping, scholars such as Lazarus and Folkman have developed more detailed theories of stress and coping, for example, the transactional model of stress and coping (Lazarus & Folkman, 1987). This model includes appraisal as a mediating variable between a stressful event and the coping strategy (Lazarus & Folkman, 1987). While more detailed theories such
as this may be useful in understanding how coping may different among adolescents of different race/ethnicities, I will base my conceptual model on a more general stress-coping behavior relationship.

The complexity of human behavior and the contexts in which these behaviors develop provide an opportunity to conceptualize the stress-coping behavior relationship in a variety of different ways. For example, stress can be measured directly or indirectly, it can be measured at an individual or contextual level, and it can be observed or self-reported. As described in Chapter 1, my research is informed by a general stress-coping behavior paradigm. Specifically, I measure stress indirectly at the school contextual level (i.e., school racial climate), and hypothesize that this contextual measure of stress is associated with individual-level measures of stress (i.e., unfair treatment by teachers and prejudice by students), leading to a specific coping behavior—sedentary behavior. While seated within a more general stress-coping behavior paradigm, the proposed relationships and measurement of variables in the conceptual model were informed by (1) Bronfenbrenner’s Ecology of Human Development (Ecological Theory), (2) the Integrative Model of Development (Integrative Model), (3) Allport’s Intergroup Contact Theory (Contact Theory), and (4) Social Network perspectives.

2.2.1 Ecological Model Background

The Ecological Model informed my decision to include multi-level measures in my conceptual model. The Ecological Model suggests there are 4-levels of environments that impact behavior. Each preceding level is contained in the preceding level with all four levels interacting to impact behavior. These levels include, from smallest to largest, a microsystem, mesosystem, exosystem, and macrosystem. The macrosystem level of
Bronfenbrenner’s Ecological model consists of “overarching institutional patterns of the culture…such as the…educational system” (Bronfenbrenner & Crouter, 1983). While the educational system itself lies in the macrosystem level, schools, as the primary socialization context of adolescents, lie in the microsystem level of the Ecological Model. The racial climate of schools likely encompasses both of these levels because while each individual school is a relevant context for adolescents, the racial climate of these schools can certainly be associated with larger issues related to the education system—for example, how students are assigned to schools based on race, and laws and policies of our educational system that may impact the racial climate in schools. Bronfenbrenner and Crouter (1983) state, “social position factors are not simply additive in their contributions; rather, they have the potential to interact in ways that magnify or diminish the importance of the factors that follow (Bronfenbrenner & Crouter, 1983).” Therefore, in addition to informing the multi-level nature of my model, Ecological Model also impacts my decision to explore subgroup differences in the model, taking into account the interactions between individuals and their multiple environments, as well as interactions between the environments. Specifically, I hypothesize that the effect of the macrosystem and microsystem-level school racial climate on individual-level sedentary behavior varies by race-gender subgroups, through experiences of prejudice and unfair treatment discrimination. Both race and gender are social constructs that, while measured at an individual level, reflect more institutionalized societal ideas about one’s status (Simpson & Yinger, 1985). Allowing the relationship between school racial climate and sedentary behavior to vary by race-gender subgroup acknowledges that the overall school racial climate could be experienced differently by different students (Ueno, 2009). This decision situates my conceptual model and research questions in a disparities
framework because it provides information about how relationships vary by race and gender. An analysis of this nature has the potential to contribute important findings to understanding health disparities.

### 2.2.2 Integrative Model Background

The Integrative Model is a more recent extension of Ecological Model that includes constructs relevant to people of color (Coll et al., 1996). It is a model of child development that includes the contributions of constructs like discrimination, racism, prejudice, segregation, and oppression to the development of children of color (Coll et al., 1996). The model suggests that a person’s race, ethnicity, gender, and class lead to experiences of racism, prejudice, discrimination, and oppression that then result in segregated environments, including residential segregation. Segregated environments then lead to segregated schools, neighborhoods, and health care settings that are either promoting and encouraging environments, resulting in positive outcomes for children, or are inhibiting environments, resulting in negative outcomes.

The model was created to account for gaps in earlier child developmental theories that neglected to consider the unique experiences and environments of minority children and adolescents. While some theories and models of child development acknowledge the contributions of racism, discrimination, prejudice, segregation and oppression to child development, these constructs are not at the core of those theories (Coll et al., 1996).

In addition to the influence of Ecological Theory, the Integrative Model also has a basis in social stratification theory, which recognizes that social position variables such as race, ethnicity, gender, and class contribute to individual membership in different groups (Coll et al., 1996). These different groups typically have unequal status and access to
resources and opportunities based on how society values those social groups. The Integrative Model suggests that social position variables affect a variety of outcomes through experiences of racism, sexism, and classism. In other words, being black or poor or female does not directly lead to differential outcomes. Instead, societal norms, judgments and values associated with being black or poor or female (e.g., exposure to racism or classism or sexism) lead to differential outcomes (Coll et al., 1996).

The Integrative Model also highlights the importance of understanding the contributions of social position variables and racism, discrimination, prejudice and oppression on a variety of child and adolescent outcomes, including child health (Coll et al., 1996). Other literatures have established that health behaviors are closely associated with health outcomes. I therefore use some principles from the Integrative Model to better understand racial differences in sedentary behavior. The Integrative Model suggests that these constructs that are relevant for children of color should be less relevant or of no relevance for white children.

My dissertation research is informed by the Integrative Model in the following ways. First, it led to my decision to include constructs relevant to people of color in racial climate (a measure of segregation, cross-race friendship groups, is one hypothesized indicator of the school racial climate), unfair treatment and prejudice. In my conceptual model, as in the Integrative Model, these variables are the constructs of main interest rather than external factors to consider when interpreting data. Second, the Integrative Model establishes an association between discrimination and social segregation and suggests that discrimination leads to social segregation. It seems practical, however, that social segregation and discrimination could have reciprocal effects whereby more social segregation could also lead
to more discrimination, for example through increased group stereotyping (Moody, 2001; K. M. Walsemann & Bell, 2010). I chose to model the latter hypothesized relationship in my conceptual model where friendship segregation by race and relative differences in white vs. black participation in extracurricular activities are included as possible indicators of social segregation associated with the overall school racial climate.

The Integrative Model also supports my decision to look at the relationships among variables across race-gender subgroups because it emphasizes that experiences differ based on an individual’s social position, which is based on several category classifications, including race/ethnicity and gender.

Finally, because the Integrative Model was informed by Ecological Theory, it also supports the conceptualization of the racial climate at the school-level, as this represents both macrosystem and microsystem influence on adolescent behavior and justifies the use of race and gender as moderator variables to model the interactive nature of individuals within environments.

### 2.2.3 Contact Theory Background

While the Ecological and Integrative Models informed my overall conceptual model, Allport’s Intergroup Contact Theory (Contact Theory) (1954) informed how I conceptualized the independent variable, school racial climate (Allport, 1979). Contact Theory has been used extensively in the prejudice and discrimination literature as it was developed to predict the most optimal conditions in which people of different races can come together and prejudice could be reduced (Pettigrew, 1998). It proposes that in order for intergroup contact to be successful there must be (1) sincere interactions among members of different groups, (2) status equality among group members, (3) a need for group members to work together for a
united goal, and (4) demonstrated support for intergroup contact from authority figures (Chavous, 2005; Green, Adams, & Turner, 1988; Pettigrew, 1998; Rankin & Reason, 2005). According to Green and colleagues, “the presence or absence of the conditions specified by contact theory can be conceptualized as indicators of a school’s interracial climate” (Green, Adams, & Turner, 1988).

The first condition that must be present for positive intergroup contact to occur is equal status of groups within a particular situation (Pettigrew, 1998). The second condition necessary for positive intergroup interaction is common goals, or an active goal-oriented effort. Examples of common goals are extracurricular activities and sports where all participants are typically unified around a common purpose. It is important, though, that these activities and sports be racially integrated for this condition to be met. Racial differences in participation in extracurricular activities, things that unite students around a common theme or purpose, could be an indicator of a more negative racial climate within a school, suggesting that students are not interested in socializing with one another in a non-academic way and/or that the types of extracurricular activities offered do not meet the needs of both black and white students. The third requirement for intergroup interactions based on principles of Contact Theory is that there are sincere interactions and cooperation across groups. In other words, different groups must be working together and not competing with one another. The final condition that Allport specifies is the support of authorities for intergroup contact because authorities within an environment help to establish the norms and practices of those environments. The administrative practice of busing students to increase formal racial integration (Orfield, Lee, & Civil Rights, 2006) of schools can result in negative substantive integration (T. M. N. Eitle & Eitle, 2004), particularly in situations
where the components of Contact Theory, discussed above, are not met. Alternatively, actions and programs by school administrators that support diversity and encourage interactions among students with different race/ethnicities and other demographics can have positive effects on all students within a school (M. J. Chang, 2001). Therefore, whether a school attempts to improve integration by busing students to certain schools is an important indicator of the school racial climate. Another characteristic of school environments that may be associated with the school racial climate is the presence of minority teachers. “Studies suggest that a visible presence of faculty from traditionally underrepresented groups impacts positively the student outcomes and perceptions of climate (Rankin & Reason, 2005).

The four conditions of Contact Theory have relevance for understanding racial climate. While interpretation of the principles of Contact Theory might suggest that the presence of these four conditions lead to a better racial climate, it is also possible that a better racial climate could lead to the same conditions. For example, Cabrera and colleagues found that the racial climate of college campuses (specifically racial conflict) led to decreased levels of institutional commitment among black students but not among white students (Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999).

2.2.4 Social Network Concepts

The social network literature has built upon the conceptualization and measurement of segregation and highlights the importance of moving beyond “formal segregation” measures based on racial composition towards “substantive segregation” measures based on cross-race friendship networks (Echenique & Fryer Jr, 2007; Moody & Bearman, 2001). The impetus behind defining additional types of segregation measures is largely based on the fact that despite policy efforts to integrate schools, within-school or “second generation”
segregation is present in racially integrated schools. The implications of “second generation” segregation or substantive segregation are not well understood and operate alongside several other school-level characteristics related to cross-race mixing of students. While Echenique, Kaufman, and Fryer conclude that substantive segregation is unrelated to academic achievement or social behavior, they also acknowledge that measuring only substantive segregation based on cross-race student friendships may be an insufficient characterization of the social nature of within school segregation (Echenique & Fryer Jr, 2007). Choosing to use social network-informed indicators of the school racial climate adds depth not reflected in the typical racial composition measure and more accurately measures social interactions by race (i.e., a school-level segregation index based on cross-race friendships; race-based friendship preference; and status differences between black and white youth).

Social network concepts therefore support a broadening of the conceptualization of substantive segregation and its contribution to the overall school racial climate.

2.3 Empirical Support for Conceptual Model

2.3.1 Introduction to School Racial Climate

Study of the effects of racial climates on individuals is rooted in the study of the effects of racial segregation. The impact of segregation on adolescents in the United States has been studied quite extensively in the educational literature. The impetus behind this body of research lies in the groundbreaking Supreme Court decision in Brown vs. the Board of Education (1954) which ruled that segregated schooling was illegal (Warren, 1954). The resulting integrated environments contributed to the overall racial climate of schools and led to scientific inquiry about how racial climates could be negative or positive as well as questions about the effect of racial climates on individuals. Some researchers have argued
there is too much emphasis on particular aspects of school segregation, for example, student and parent attitudes towards schools, and socioeconomic differences of students and families, and too little emphasis on the structure of schools (McEvoy & Welker, 2000). Others emphasize that characteristics of school environments can shape behaviors (Kiecolt, 1988). My decision to study the school racial climate is based on the state of literature on the effects of segregation and the insufficiency of the construct, measured based on racial composition, to quantify social interactions among adolescents. Aspects of racial segregation are important to understanding the overall racial climate of schools, and therefore additional attention is directed at racial segregation in the next few sections.

### 2.3.3 Negative and Positive Consequences of Traditional Segregation

Post-Civil Rights literature reviews show that integration results in positive academic achievement outcomes, particularly for black students (R. L. Crain, 1981). Other reviews substantiate these findings demonstrating positive outcomes among black students for several educational outcomes including, as reported by Lee: “academic achievement (C. Bankston & Caldas, 1996; C. L. Bankston & Caldas, 1997; C. L. Bankston & Caldas, 1998; Coleman et al., 1966; Goldsmith, 2003; Hanushek, Kain, & Rivkin, 2002; Roscigno, 1998; Rumberger & Palardy, 2005), improved social relations and self-esteem (M. K. Johnson, Crosnoe, & H., 2001; Joyner & Kao, 2000; Moody, 2001; Quillian & Campbell, 2003) and greater ‘life prospects’ such as graduation from college and higher earnings (J. H. Braddock & Dawkins, 1984; J. H. I. I. Braddock & McPartland, 1988; Dawkins & li, 1994).” Increased grade point averages and likelihood of persistence to succeed are more likely to occur in a space where interactions among students of different races is encouraged (Rankin & Reason, 2005). On the other hand, Terenzini and colleagues report that more diversity can have a diminishing
effect on students’ learning gains such that a school with medium diversity has the most positive effect on learning, while no diversity, low diversity, and high diversity settings have less positive effects on learning (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). This may be due to power struggles that can develop when a typical minority group’s numerical representation in the school begins to exceed that of the typical majority group (Moody, 2001).

Diversity is considered to have overall positive results, but there is also support in the literature for positive effects of segregated environments. Findings have suggested that segregated schools, for black students, can reduce experiences of discrimination and create a more comfortable environment (M. K. Johnson, Crosnoe, & H., 2001; Moody, 2001; Rosenberg, 1979), promote pro-school attitudes (Goldsmith, 2004), and higher self-esteem (Rosenberg, 1979). Rosenberg explains that when black students are in school with white students, they will likely receive information about whites’ perceptions of black people. Oppositely, if black students are in school with mostly black students, they will not receive these messages but instead receive more positive messages about black people (Rosenberg, 1979). Positive results of segregated environments may be a consequence of the social comparison mechanism whereby adolescents are less likely to compare themselves against like-peers and therefore have better self-esteem. One assumption among proponents of segregated environments that has received very little empirical testing is that same-race friendships are more supportive than opposite-race friendships (Ueno, 2009). The assumption is supported by several arguments including the ideas that same-race friendships are more emotionally supportive (Hansell, 1984; Schneider, Dixon, & Udvari, 2007), are more stable over time (Hansell, 1984), and result in a place of belonging for students which leads to a
better social experience within schools (McFarland & Pals, 2005; Perry, 2001). However, some studies findings do not support this assumption and find weak evidence that same-race friendships are stronger than cross-race friendships (Aboud, Mendelson, & Purdy, 2003; Ueno, 2009).

In summary, the academic consequences of segregation can be both positive and negative. The literature has yet to substantiate whether segregation has more positive or negative effects.

**2.3.4 Segregated Schools, Classrooms and Health Behaviors**

Within the past decade, there has been an increase in literature about the effects of segregated schools on a broader range of outcomes including health and health behaviors. This literature typically uses school or classroom-level racial composition measures to approximate segregation (Kandel, Kiros, Schaffran, & Hu, 2004; K. M. Walsemann, Gee, & Geronimus, 2009; K. M. Walsemann & Bell, 2010). The racial composition of schools had no association with differences in physical activity among white, black, and Hispanic adolescents (Richmond, Hayward, Gahagan, Field, & Heisler, 2006) but all students attending schools with higher percentages of minorities were less likely to initiate smoking (R. A. Johnson & Hoffmann, 2000; Kandel, Kiros, Schaffran, & Hu, 2004) and less likely to drink alcohol (Hoffmann, 2006). This suggests that schools with larger percentages of minorities have a protective effect for smoking and alcohol use among all adolescents. On the other hand schools that are more integrated have increased crime compared to segregated school (T. M. N. Eitle & Eitle, 2004). It is important to note that alcohol use and smoking occur less among black versus white adolescents (K. M. Walsemann & Bell, 2010), and that documented crime is more prevalent among black versus white adolescents (T. M. N. Eitle &
Eitle, 2004). While in theory, integration is a “good thing” because it can provide disadvantaged groups access to physical and social resources, integration can also create animosity, hostility, and result in increased group segregation within schools that are formally integrated (T. M. N. Eitle & Eitle, 2004). Thus, segregation could have both positive and negative effects on health behaviors, just as it has both positive and negative effects on academic outcomes. The relative weight of positive effects of segregation versus negative effects of segregation on health behaviors is not known (Green, Adams, & Turner, 1988; S. M. Nettles, 1991). I expect that increased segregation will have a negative effect on school racial climate because of its propensity to increase stereotyping (Moody, 2001; K. M. Walsemann & Bell, 2010).

### 2.3.5 Segregation within Integrated Environments

Within-group racial segregation, also known as second generation segregation, can be the result of several factors, for example, schools’ preferential tracking processes whereby minority children are placed in lower-achieving classes (Orfield, Lee, & Civil Rights, 2006). An investigation of the relationship between segregated English classes, educational outcomes and health behaviors among adolescents found that while increased segregation was associated with less smoking and drinking among black females, it was also associated with reduced educational aspirations among black males (K. M. Walsemann & Bell, 2010). The Walsemann and Bell study was the first published manuscript, to my knowledge, that studied health behaviors, in addition to educational outcomes, of adolescents as they relate to within-school segregation. Aside from preferential tracking, within-school segregation could result from students preferring same-race friends or having more things in common with students of the same race.
Within-school and within-classroom segregation are both important concepts, but they do not give much information about what segregation means socially, on a day-to-day basis within a school. A more integrated environment based on percentages of students does not necessarily result in a more integrated social space. Much of the focus of post-Brown vs. Board of Education legislation has been on the effects of segregation and integration on a variety of outcomes with both positive and negative findings. However, as emphasized in Contact Theory, bringing groups together based simply on numbers is not sufficient to promote intergroup contact. This has led to a need for researchers to move beyond measures of segregation towards a better description of the racially-based social environment in schools. My research focuses on the school racial climate, filling in this gap.

**2.3.6 Growing Interest in School Racial Climate**

As mentioned previously, some scholars have focused on the relationship between segregation and a variety of outcomes, while others have emphasized the need to move beyond measuring segregation in and of itself towards understanding the subsequent racial climate of an environment (Pellebon, 2000). These scholars assert that the degree of segregation does not necessarily predict the amount of contact that occurs between groups, and in fact that contact is more representative of the overall racial climate (Bullock, 1978; Chavous, 2005; Davidson, Hofmann, & Brown, 1978; Pellebon, 2000). The following section provides an argument as to why it is important to measure the school racial climate in a comprehensive manner, and why the impact of the school racial climate might differ for adolescents of different race-gender subgroups.

Social climates in a variety of environments have been studied consistently, and as mentioned before, the social climate of school environments, particular the racial climate,
gained interest among researchers after the spike in segregation-related literature following Brown v. Board of Education (Green, Adams, & Turner, 1988). Pargament et al eloquently stated that the environmental climate, “has been used to refer to psychologically meaningful representations of an environment…[it is] a central cognitive construct which intervenes between the setting and the attitudes and behaviors of the individual (Pargament, Silverman, Johnson, Echemendia, & Snyder, 1983).” Essentially, the school racial climate simultaneously represents characteristics of the setting as well as the individuals who comprise that setting (Mattison & Aber, 2007; Moos, 1973) and can be described as being encouraging or non-encouraging, supportive or non-supportive, engaging or non-engaging, or positive or negative (Chavous, 2005).

### 2.3.2 Alternative Methods of Assessing School Racial Environments

There are three main ways that racial aspects of school environments have been conceptualized in the educational literature (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). The first way is basic assessment of segregation. Racial composition or proportions of students of different races is used to approximate a contextual characteristic of schools (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). A second way that the racial segregation environment of schools has been discussed is in terms of “institutionally structured and purposeful programmatic efforts to help students engage in racial/ethnic and/or gender “diversity” in the form of both ideas and people” (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). This conceptualization of the racial environment of schools focuses on the content of curriculum, the structure of classroom settings, and whether or not schools require diversity workshops or trainings for students and teachers. Somewhat related to segregation, this conceptualization excludes measures of student racial composition and
instead describes ways that schools are structured. Schools that structure themselves to be supportive of diversity generally have positive effects in terms of academic outcomes, such as higher minority student retention and greater cognitive development. A third way that school racial environments have been considered is based on the interpersonal interactions of students with fellow students of different race/ethnicities (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). This method is most consistent with a Contact Theory-informed conceptualization of the school racial climate. Clear explanation of how racial characterization of school environments are measured is important to set the context for analysis.

### 2.3.7 Consequences of Positive and Negative School Racial Climates

A positive racial climate, measured by students’ perceptions, is indicative of better overall student achievement and fewer disciplinary actions (Mattison & Aber, 2007), regardless of adolescent race. Positive and warmer school racial climates are associated with students’ willingness to socialize with each other and to have a greater humility for diversity (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). One assumption suggests that environments with greater appreciation for people of other races would be less likely to be stressful and that experiences of prejudice and unfair treatment would be minimized as well. In fact, research has shown that the school climate may be a stronger indicator of student outcomes and behaviors than individual student characteristics such as attitudes and beliefs (Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979; Reid, 1983; Wu, Pink, Crain, & Moles, 1982), and possibly an even stronger indicator of outcomes for black versus white students (Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979).
The effect of school racial climate can vary by adolescent race (Ancis, Sedlacek, & Mohr, 2000; Chavous, 2005). In a qualitative research study by Griffin and Allen (2006), black students discussed having challenges based on the positive or negative racial climate within well resourced schools where they were the minority (Griffin & Allen, 2006). Oppositely, black students who attended poorly resourced schools where they were the majority did not discuss the racial climate of the school as a factor in their daily experiences (Griffin & Allen, 2006), although they did acknowledge experiences of negative racial climates outside of the school environment. For both black and white high school students, stronger endorsement of a positive school racial climate (i.e., significant interaction of students from different groups, equality between these different groups, and group interaction supported by the school) was associated with higher quality of school life and academic self-efficacy scores (Green, Adams, & Turner, 1988). Green and colleagues used Contact Theory to inform the interracial climate scale that assessed students perceptions of the climate (Green, Adams, & Turner, 1988). For ethnic minority college students, a positive racial climate has been associated with better “performance and persistence (Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999; M. T. Nettles, 1988; Zea, Reisen, Beil, & Caplan, 1997); enhanced interaction with teachers and white peers (W. R. Allen, 1988; Davis, 1995; Fleming, 1984; M. T. Nettles, 1988); and college involvement (M. T. Nettles, 1988; S. M. Nettles, 1991; Tracey & Sherry, 1984).”

School racial climates also have gendered effects on outcomes. For example, negative school racial climates were strongly associated with higher suspension rates for white but not black students, with the strongest relationship being for white female students. Black female students were most likely to rate school climates as negative even though this was not
associated with school suspension rates (Bickel & Qualls, 1980). Race gender subgroup differences were also evident in a study by Kuperminc and colleagues that found that the relationship between school climate and self- and teacher-reported externalizing problems was strongest for black male students (Kuperminc, Leadbeater, Emmons, & Blatt, 1997). Further, prior research demonstrates that the school racial climate and its association with academic and behavior outcomes differ by race and gender (Mattison & Aber, 2007).

Overall, black students tend to report a more negative racial climate than white students and female students report a more negative racial climate than male students (Mattison & Aber, 2007; Rankin & Reason, 2005). Some findings suggest that black students are more likely to recognize the structural components of school’s racial climate – such as policies and practices that create a more negative climate—and white students are more likely to recognize the interpersonal interactions that result in a negative racial climate (Blauner, 1989).

### 2.3.8 Gaps in Understanding School Racial Climate

Much of the research around school racial climate has been conducted on college campuses and there is a gap in literature on school racial climates in middle and high school settings (Bacon, 1991; Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999; Green, Adams, & Turner, 1988; Mattison & Aber, 2007). Further, the majority of empirical findings on school racial climate consider academic outcomes and not health behaviors. Since the educational literature shows that racial climate may be a partial explanation for the achievement and disciplinary disparities by race within schools it can be reasoned that school racial climate may also be an explanation for the health behavior disparities among adolescents (Mattison & Aber, 2007; Rankin & Reason, 2005).
2.3.9 Measurement of School Racial Climates

The School Interracial Climate Scale (SICS) based on Allport’s Contact Theory (Green, Adams, & Turner, 1988) and the Racial Climate Survey – High School Version (RCSHSV) (M. Aber, Todd, Rasmussen, Meinrath, & Mattison, unpublished) are two measures of youth perceptions of the school racial climate. The SICS contains four subscales which measure the degree with which students from different racial groups come to know each other, whether students are willing to work with others from different racial backgrounds, supportive norms and equal treatment by all race/ethnic groups within a setting (Green, Adams, & Turner, 1988; Pellebon, 2000). Green and colleagues suggest that the perceived school racial climate can be positive or negative depending on whether these factors exist. The RCSHSV is a multidimensional measure with six subscales, three of which include: Racial Fairness subscale, the Experiences of Racism subscale, and the Need for Change subscale.

Moody et al. constructed social network variables that provide insight into the substantive segregation environments of schools (Moody, 2001). School level cross-race friendship measures are contextual-level variables based on whether students in schools nominate friends from races other than their own (Moody, 2001). The presence of cross-race friendships is an important indicator of the school racial climate because while segregation of students might increase connectedness and cultural pride, it can also create an atmosphere that encourages stereotyping, conflict, and preferential treatment (T. M. N. Eitle & Eitle, 2004). White students tend to view same race friendships as an indicator of racial segregation whereas minority students view them as examples of cultural support (Loo & Rolison, 1986) and these differences in perception might create different understandings and experiences of
school racial climate for white versus black students. Race-based friendship preference is another indicator of racial segregation climate. Within-school segregation can result from student preferences for friends of the same race, but it can also result from preferential tracking processes in the classroom and in extracurricular activities. For example, students might prefer to interact with students of other races, but black students might be tracked into different types of classes and extracurricular activities than white students, thereby making it difficult to cultivate friendships across race.

### 2.3.10 Empirical Support for Social Network Concepts and Contact Theory

Contact Theory is seated within the broader context of the social network literature because it is based on how people of different races interact within the same network, which can be measured by social network analysis.

A review of the literature by Pettigrew et al. found empirical support for Contact Theory such that intergroup contact in the absence of the four necessary conditions (equal status among groups, common goals, sincere interactions and cooperation across groups, and authoritative support for contact) resulted in negative cross-race relationships, whereas intergroup contact in the presence of these four conditions resulted in less prejudice, although not all four conditions were required to be met for prejudice reduction (Pettigrew, 1998). Contact Theory has been applied in tests of intergroup relationships across a variety of fields, for several different racial and ethnic groups, and in several different settings including schools, housing, and work environments (Pettigrew, 1998). Much of the early research testing Contact Theory was done in places like the military, where laws required black and white soldiers to serve together. This research found that while black and white soldiers improved their opinions about one another, white soldiers still preferred that their services be
separated. Previous empirical research has shown that equality of group status is necessary for positive cross race interactions, as the theory suggests, including in high schools with students of different races (Patchen, 1982).

2.3.11 Prejudice and Unfair Treatment Among Adolescents

While the conceptualization of the school racial climate and the hypothesized relationship between the school racial climate and sedentary behavior are the primary focus of this dissertation, a secondary focus is on determining potential pathways by which these variables may be associated—prejudice and unfair treatment.

Prejudice, unfair treatment, and discrimination are concepts that have been used somewhat interchangeably in the literature to assess the effects of differential treatment based on the social construction of race on a variety of outcomes. Most of the literature reviewed in the adolescent population uses “discrimination,” which I assume contains aspects of both prejudice and unfair treatment. Therefore, these terms will be used interchangeably throughout the rest of my dissertation. Unfair treatment has previously been used as a measure of discrimination that does not force the respondent to initially attribute discrimination to race (Williams, Neighbors, & Jackson, 2008). Prejudice traditionally refers to preconceived ideas about groups based on sociodemographics (Coll et al., 1996). Prejudice is an ideology that justifies discrimination, and from which it cannot be easily disentangled (Krieger, 1999).

The literature around discrimination in the adolescent population suggests that all adolescents, regardless of race or ethnicity, report experiencing prejudice and unfair treatment; however, black adolescents are more likely to report these experiences than other race/ethnicities within the school setting (Fisher, Wallace, & Fenton, 2000). An
overwhelming majority of black youth surveyed report experiencing discrimination at least once in the past year (Prelow, Danoff-Burg, Swenson, & Pulgiano, 2004; Seaton, Caldwell, Sellers, & Jackson, 2008). Experiences of prejudice and unfair treatment are more likely to occur in environments where black students are a minority relative to the total school population (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). No study to my knowledge has assessed experiences of discrimination in a nationally representative sample of both white and black adolescents sampled in schools, with school-level contextual data and health behavior data.

Context affects whether individuals will experience or be exposed to discrimination (G. C. Gee, 2002) and more negative school climates are stressful for students (T. M. N. Eitle & Eitle, 2004), particularly minority students who might feel these negative climates in school are a reflection of a greater racialized society (Thomas, 2005). Racial climates of schools may impact adolescent experiences of prejudice and unfair treatment, more generally referred to as discrimination because of the social division of students by race (K. M. Walsemann & Bell, 2010). These divisions can establish social hierarchies by race where more power is distributed to white students.

Prejudice and unfair treatment are two plausible mediators between school racial climate and sedentary behavior. As stated previously, contextual characteristics contribute to the likelihood that an individual will experience prejudice and unfair treatment (G. C. Gee, 2002; G. C. Gee, 2008). Because of the associations of these constructs and stress, depressive symptoms, and lowered self-esteem (Fisher, Wallace, & Fenton, 2000; Wong, Eccles, & Sameroff, 2003), adolescents who report prejudice and unfair treatment are likely to engage in adverse health behaviors (Krieger et al., 2010; Umberson, Liu, & Reczek, 2008; Williams,
Neighbors, & Jackson, 2008) as coping strategies. Sedentary behavior may be a strategy used, among other coping behaviors, some which are positive and others which are negative. Further, it is established that adolescents experience prejudice and unfair treatment differentially by race and these stressful experiences are accompanied by coping strategies (Seaton & Yip, 2009). It follows, then, that experiences of prejudice and unfair treatment could be mediators on the pathway between the school racial climate (a contextual characteristic of schools operating in my model as the independent variable) and sedentary behavior (an individual coping behavior and here my dependent variable).

2.4 **Summary of Theoretical and Empirical Influences**

In conclusion, the conceptual model for this dissertation (see Figure 1) was guided by overall stress-coping behavior paradigm, and further identified based on four main theories and bodies of work. The stress-coping behavior paradigm influenced the predicted association between indirect measures of stress, both at the school-level (school racial climate) and individual level (prejudice and unfair treatment), and sedentary behavior, presumed to be a coping behavior. The conceptualization of the school racial climate was developed based on principles of Allport’s Interpersonal Contact Theory and the social network literature. The overall model including its multi-level nature, the hypothesized race gender interactions, as well as the inclusion of the constructs of racial climate, unfair treatment and prejudice, are based on both Bronfenbrenner’s Ecological Model and Garcia Coll’s Integrative Model of Development. The empirical literature supports the hypothesized direction of relationships of variables within the model, as well as the conceptualization of the variables. Combined, the resulting conceptual model offers a novel approach to understanding racial disparities in adolescent sedentary behavior.
Chapter 3: Methods

3.1 Data Source

3.1.1 Study Design

Data for this secondary analysis are from the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a longitudinal study that examines the health and health behaviors of a nationally representative sample of individuals beginning in the 7th through 12th grades. Researchers at the UNC Carolina Population Center (CPC) initiated this study in 1994 and have collected five waves of data since then. Add Health is an appropriate data source for the research because it includes information collected from multiple sources about individual adolescents, their families, social networks, and schools.

Details on the clustered, school-based sampling design can be found in the manuscript by Bearman and colleagues (P. Bearman, Jones, & Udry, 1997). In brief, 80 high schools were selected from all high schools in the United States with an 11th grade and at least 30 students enrolled. Stratification of sampling was based on region, urbanicity, school size, school type, percent of black and white students, grade span, and curriculum characteristics. Feeder schools were then selected into the sample, one feeder school per enrolled high school. A feeder school was a junior high school or middle school that provided at least 5 students into the high school. All students within these schools were
invited to participate in the in-school survey. A smaller sample of students from the in-school survey were invited to participate in the in-home portion of the study.

3.1.2 Data Used for Present Study

I used data from the in-school survey and Wave I in-home survey that were collected in 1994-1995, and Wave II in-home survey collected in 1996. The in-school survey provided individual-level data from adolescents. The Wave I and Wave II in-home surveys provided individual-level data from adolescents and their parents. The constructed social network dataset by Moody et. al. (Carolina Population Center, 2001b) provided school-level and individual-level social network variables based on in-school friendship data while the constructed contextual database provided variables describing characteristics of schools. Both Wave I and Wave II school administrator surveys were used for additional school characteristics. Individual level Waves III through V data were not used because my dissertation focuses on adolescent health and participants in those waves are classified in the phase of emerging, early, and young adulthood.

3.2 Sample

For this study the sample was drawn from adolescents who: participated in Waves I and II of the data collection, self-identified as non-Hispanic black or non-Hispanic white, and had measured school- and individual-level social network variables, which were necessary to calculate the latent independent variable racial climate. The sample was limited to non-Hispanic black and white adolescents because of the historical significance of segregated schooling for these groups (Orfield, 2001). Additionally, there was not a sufficient sample size of Hispanic youth or youth of other race/ethnicities across schools for inclusion in this analysis. Other exclusion criteria included severe disability and pregnancy, as sedentary
measures are not appropriate for these populations. Finally, adolescents had to have sampling weight data from the wave II in-home survey (Chantala, 2006). These criteria resulted in a total sample of 3449 adolescents in 55 schools. The minimum number of clusters necessary for an analysis of this nature is debated in the literature and ranges with the lowest minimum recommendation of 40 clusters (Meuleman & Billiet, 2009). Therefore the 55 schools included in my sample is sufficient for my analysis.

3.3 Variables Descriptions

All measured variables are from the Restricted-Use Add Health data, which includes Wave I and Wave II databases, Administrator Surveys, and the constructed Network and Contextual databases.

3.3.1 Outcome Variable

Sedentary behavior (SB). Adolescent sedentary behaviors surveyed in Add Health include television watching, video watching, and playing video or computer games, often collectively termed “screen time behaviors.” A standard 7-day recall questionnaire was used (Gordon-Larsen, McMurray, & Popkin, 1999) whereby respondents reported the number of hours per week spent engaging in each of the above mentioned sedentary behaviors. I summed the three items together for a total number of hours spent in sedentary behavior measured continuously. I transformed the variable by taking the natural log in order to make the distribution closer to normal.

3.3.2 Explanatory Variables

School racial climate. School racial climate is a latent variable measured with six hypothesized indicators of the school racial climate: a school-level segregation index
constructed using cross-race friendships, race-based friendship preference for black students and for white students, status differences between black and white youth, racial heterogeneity of participation in extracurricular activities, racial heterogeneity of teachers, and busing practices. The first three measures were derived through social network analysis of friendship nominations: each student participating in the Add Health in-school survey was asked to nominate their five closest male and five closest female friends. Because the large majority of nominated friends also participated in the survey (approximately 15% of nominations were to friends outside of participating schools (Carolina Population Center, 2001a), self-reported race can be assigned to individuals within friendship networks and network variables can be calculated. All indicators were selected to reflect conditions required for intergroup contact based on Contact Theory.

Indicators were assumed to be effect indicators of a scale because they are strongly associated with one another (which is more typical of a scale than an index). Also, there was an expectation that a change in the school racial climate would lead to a change in any of the indicators identified. Finally, conceptualizing the indicators as effect indicators acknowledges that there are structural characteristics of the larger educational system that might impact the school racial climate, and lead to changes in any one of the hypothesized indicators.

Non-network variables that are hypothesized to contribute to the school racial climate include black versus white students' non participation in extracurricular activities, percentage of black teachers within the school, and busing practices. Each of the indicators is described below.
Segregation index, also known as school-level cross-race friendships, is a continuous measure in the social network dataset calculated by Moody and based on students’ friendship nominations. The segregation index assessed “the overall level of inter-group segregation, relative to a null of random mixing across groups” (Moody, 2001) for each school. As described above, each adolescent nominated 10 friends, most of whom were also participants in the study. Therefore the self-reported race of adolescents could be used to determine whether students had within school friends of the same or different race. Youth of all race/ethnicities were used to calculate this and other network variables contained in the network dataset, not black and white youth only. School-level cross-race friendships was calculated by subtracting the observed number of cross-race friendships from the expected number of cross-race friendships divided by the expected number of cross-race friendships. A value of “1” indicates complete segregation and a value of “-1” indicates complete integration. I transformed the segregation index by taking the natural log to make the distribution closer to normal.

School-level cross-race friendship was in line with condition #3 of Contact Theory that specified the association between sincere interactions and cooperation across groups with a positive racial climate.

Race-based friendship preference or salience is a continuous social network variable also calculated by Moody that measures student preference for selecting same race students as friends (Moody, 2001). It ranges from 0 indicating no preference for same race friends, up to a theoretically infinite number that represents strong preference for same race friends. It indicates whether black or white students’ friendship preference is driving the observed
amount of segregation. Salience was calculated for the network dataset using the following formula (Carolina Population Center, 2001b; Rytina & Morgan, 1982):

\[
\text{SALIENCE}_k = \frac{t_{kk}}{T_k} \frac{g_k}{g}
\]

Where:
- \( k \) = relevant trait (race in the case of my study)
- \( t_{kk} \) = number of ties sent by those with trait \( k \) to those with trait \( k \)
- \( T_k \) = total number of ties sent by those with trait \( k \)
- \( g_k \) = number of nodes with trait \( k \)
- \( g \) = total number of nodes in the network

For this study, I used two indicators, (1) black youth’s friendship preference for other black youth, and (2) white youth for white youth. A larger positive value of the race-based friendship preference indicates a stronger preference for friends of the same race. I included both measures as indicators because they each independently provide information about the school racial climate and they are not necessarily direct opposites of one another. I transformed both black salience and white salience by taking the natural log to make the distribution closer to normal.

Both black and white salience were selected as suggested by condition #3 of Contact Theory, which emphasizes an association between sincere interactions and cooperation across groups with a positive racial climate within schools.

Status differences between black and white youth was a continuous measure calculated from the Bonacich centrality measure constructed by Moody and colleagues. The Bonacich centrality measure is an assessment of the centrality or power of an adolescent based on that adolescent’s own network status, as well as the network statuses of connected adolescents (Bonacich, 1987). Each adolescent in the network dataset has a Bonacich centrality measure. An average Bonacich centrality measure was calculated separately for all
black students within a school and for all white students within a school. A white to black ratio was used for analysis. A larger ratio would indicate that white students are more central to the network than black students. A smaller ratio indicates that black students are more central to the network than white students. The larger the magnitude of the difference, whether positive or negative, the more negative the racial climate because of distinctions in network centrality by race. Differences close to zero would indicate a more positive racial climate because black and white students are equally centrally to the network. The white/black proportion at the school-level ranged from 0.24 to 27.25. I transformed the Bonacich Centrality measure by taking the natural log to make the distribution closer to normal.

Status difference is an important social phenomenon that can serve as an additional indicator of school racial climate. Measurement of the Bonacich Centrality measure was in line with condition #1 of Contact Theory—equal status of groups.

Racial differences in participation in extracurricular activities is a continuous school-level variable that was calculated from individual adolescent reports of whether or not they participated in any type of extra-curricular activity. Individual data were aggregated at the school-level to calculate the proportion of white students who did not participate in any activity and the proportion of black students who did not participate in any activity. The exponentiated proportion of white students who did not participate in any activity was divided by the exponentiated proportion of black students who did not participate in any activity. Exponentiation was used to transform variables due to some schools having zero percentage of black students who did not participate in any activity, which was the denominator of the calculated variable. I then took the natural log of this number to make the
distribution closer to normal. A larger ratio indicates that white students are less likely to participate in any activity and a smaller ratio indicates that black students are less likely to participate in any activity. A more negative racial climate is expected to cause a larger magnitude of the difference, whether positive or negative, which corresponds to differences in non-participation in extracurricular activities by race. A less negative racial climate would lead to a difference close to zero, indicating that black and white students equally do not participate in extracurricular activities.

In addition to racial differences in not participating in extracurricular activities, racial differences in participating in specific types of extracurricular activities were calculated in the same way to account for the possibility that students of different races may be more or less likely to participate in certain extracurricular activities over others. Four categories of extracurricular activities were created: sports, academic, leadership, and other. Sports extracurricular activities included cheerleading, baseball/softball, basketball, field hockey, football, ice hockey, soccer, swimming, tennis, track, volleyball, wrestling, and other sport. Academic extracurricular activities included history, math, and science club, and Honor Society. The only leadership extracurricular activity was student council. Other extracurricular activities included language clubs, book and computer clubs, debate team, drama club, Future Farmers of America, band, chorus, orchestra, newspaper, yearbook and other clubs. Average participation in these clubs were calculated for black and white students within each school, and then the average exponentiated participation of white students was divided by the average exponentiated participation of black students to create relative difference measures.
Ultimately I used the four categories of extracurricular activities for my model because it performed better than the single overall measure of extracurricular activity in the confirmatory factor analysis, and the four measures provided detailed descriptors of what was taking place in the school.

The extracurricular measures were suggested by the common goals or active goal-oriented effort requirement (condition #2) of Contact Theory.

Percent of black teachers in the school was a continuous measure taken from the School Administrator Questionnaire where school administrators reported the racial composition of the teaching faculty. I transformed the percent of black teachers by taking the natural log to make the distribution closer to normal. The percent of black teachers in school may contribute positively to the racial climate for black students (Moody, 2001). A larger percent of black teachers would indicate a more positive racial climate.

Additionally, the percentage of black teachers divided by the percentage of black students in a school was calculated as a relative measure of teacher to student diversity. A proportion equal to or greater than 1 would indicate a positive racial climate, while a proportion less than 1 would indicate a more negative racial climate.

Ultimately I used the natural log of the percent of black teachers in the school measure because it performed better in the confirmatory factor analysis than the proportional measure with other indicators of the school racial climate. A more negative school racial climate could lead to decreased percentages of black teachers for several different reasons. In one respect, a negative school racial climate might discourage black teachers from applying for jobs at that school. In another respect, a negative racial climate might discourage administrators from hiring black teachers.
The percent of black teachers within schools was in line with the fourth condition required for intergroup contact based on Contact Theory— authority support for intergroup contact.

Racial busing was also taken from the School Administrator Questionnaire in response to the question “pupils are assigned from several geographic areas in order to achieve a desired racial or ethnic composition in the school” (Moody, 2001). Racial busing, or forced school-level integration, has been found to have a negative impact on the racial climate in schools because it results in more segregated friendships (Moody, 2001). Racial busing was measured dichotomously, 1=yes and 0=no. After deciding to consider the other indicators of racial climate as effect indicators, I did not anticipate that racial busing would perform well in the confirmatory factor analysis (CFA) because it is more likely a cause indicator. A more negative racial climate is not likely to cause racial busing, unless of course the climate is an impetus for school boards to attempt to further diversify student bodies.

Racial busing is in line with the fourth condition required for intergroup contact based on Contact Theory— authority support for intergroup contact.

3.3.3 Moderator Variables (individual level):

Race. This self-reported measure is from Wave I data and has two value levels, non-Hispanic black (1) and non-Hispanic white (0).

Gender. This self-reported measure is from Wave 1 data and has two value levels, male (1) and female (0)

3.3.4 Mediator Variables (individual level):

Prejudice. This self-reported measure was taken from Wave I data based on the survey question; students at your school are prejudiced. Answers were based on a 5-point Likert
scale and were reverse coded with the following options: strongly agree (5), agree, neutral, disagree, strongly disagree (1). Because the distribution was close to a normal distribution, prejudice was modeled as a continuous variable (G. Norman, 2010) and was grand mean centered for the analysis (Enders & Tofighi, 2007).

**Unfair treatment.** This self-reported measure was taken from Wave I data based on the survey question; *the teachers at your school treat students fairly*. Answers were based on a 5-point Likert scale with the following options: strongly agree (5), agree, neutral, disagree, strongly disagree (1). Because the distribution was close to a normal distribution, unfair treatment was modeled as a continuous variable (G. Norman, 2010) and was grand mean centered for the analysis (Enders & Tofighi, 2007).

### 3.3.5 Control Variables

**Contextual-level Control Variables.**

**School racial composition.** The percentage of black students was used as an indicator of the school racial composition. This measure was expected to be related to both the opportunity for cross-race friendship formation and to sedentary behavior, so was controlled for in the analysis. The racial disparities in sedentary behavior may indicate that schools with more black students would also report more sedentary behavior since black students are more likely than white students to engage in sedentary behavior. I categorized the percentage of black students in three groups. “1” <15% of black students, “2” 15-30% of black students, “3” >30% of black students. These categories were then dummy coded for analysis with <15% of black students as the reference category.

**School size.** Size of school was measured categorically with small schools comprised of 1-400 students, medium schools comprised of 401-1000 students, and large schools comprised
of greater than 1,000 students. Size of the school is relevant to the construction of social network variables and was controlled for to standardize effects. Additionally, school size may be related to the racial climate as studies in the college population have concluded that a larger size school may serve as a proxy for “attention to students, suggesting that the extent to which institutions are supportive of students helps maintain a conflict-free environment” (Hurtado, 1992). In other words, larger schools may provide less attention to individual-students, and having less support may result in a more negative perceived climate. This more negative perceived climate could be a stressor that is subsequently related to sedentary behavior. School size was coded as follows: 1=small, 2=medium, 3=large. School size variables were dummy coded with small size being referent category.

School urbanicity. Urbanicity was measured as a categorical variable (and defined as such in the MPLUS code) with three response options: urban=1, suburban=2, and rural=3. These categorizations were developed by the Quality Education Database and consider the physical size of the school catchment area as well as the population density. School urbanicity may be related to sedentary behavior as schools in different types of settings are seated in communities with different types of environments that may be supportive of more sedentary behavior. Since school urbanicity may also be related to the racial make up of a school, urbanicity may be associated with the school racial climate. Urbanicity was dummy coded with rural as the reference group.

School type. School type is a dichotomous variable with two levels, public school and other type of school. Private schools tend to be structured differently and segregated in different ways than public schools (Moody, 2001) and should be controlled for to account for structural differences not measured in the school racial climate variable. Additionally,
research in college campuses has demonstrated that private schools tend to have more positive racial climates than public schools (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001). School type may be related to sedentary behavior because of the association between school type and racial composition whereby black students are less likely than white students to attend private schools. Public schools were coded with “1” and private schools will be coded with “0.”

Individual-level Control Variables.

Age. Age was measured continuously. Research has shown that sedentary behaviors increase with increasing age during adolescence (Gordon-Larsen, Nelson, & Popkin, 2004).

Socioeconomic Status (SES). Add Health has several different variables that contribute to an adolescent family’s SES. It is important to include both income and education because some research has demonstrated that black students family income is significantly lower than white students family income even at similar levels of mother’s education (Chavous, 2005). The following two variables from the parent interview data were used separately as indicators of SES: family income, the natural log of income level, and mother’s education (categorically coded, less than high school as “1”, high school graduate as “2”, some college as “3”, college graduate and more as “4”). Mother’s education was dummy coded with less than high school as the reference group. Having more than one measure of SES is considered optimal in research (Braveman et al., 2005).

Individual racial heterogeneity of friendship network. This measure is available from the constructed network dataset and measures the amount of cross-race friendships within an individual adolescent’s friendship network. It includes both the friends that the adolescent nominated and the friends who nominated the adolescent. The individual racial heterogeneity
of friendship networks range from 0-1 with 0 representing completely homogenous friendship networks and 1 representing completely heterogeneous friendship networks. I categorized this variable where 1= 0, 2= 0.1-0.2, 3= >0.2-0.4, 4= >0.4-0.6, and 5= >0.6 because there was a large number of adolescents with completely homogenous friendship networks that resulted in a continuous distribution skewed to the right. For analytic purposes, I dummy coded the racial heterogeneity of friendship networks variable with 0 as the referent category.

**Individual Bonacich Centrality.** Individual Bonacich Centrality represents an individual adolescent’s centrality in overall network of friendships in schools based on nominated friends, and friends of friends. It is a continuous measure with a minimum of 0 which represents no centrality, and a maximum in my sample of 4.29. I categorized this variable into four groups based on natural separations in the data because it had a skewed distribution that did not improve with logarithmic transformations. 1= 0, 2= >0-1, 3= >1-2, and 4= >2. Bonacich Centrality was dummy coded with 0 as the reference category.

**Preliminary Analysis**

All data analysis was done controlling for the complex survey design of the Add Health survey when possible. Data management and preliminary analyses were done using version 11 of Stata (StataCorp, 2009). Prior to analysis to address the study research questions, univariate descriptive statistics were calculated for all variables included in this study to determine closeness to normality, to identify outliers and to make certain cell sizes for categorical variables were adequately distributed. As described for several variables, transformations were made as necessary, including taking the natural log of continuous variables to improve closeness to normal distributions. Based on recommendations by Enders
and Tofighi, both mediator variables were group mean centered because my substantive interest is the school-level effect (level-2) on sedentary behavior (level-1) (Enders & Tofighi, 2007). Enders and Tofighi also recommend centering the independent variable, however, my independent variable is a latent variable and MPLUS software does not provide an option for centering a latent variable.

Univariate statistics (means, distributions) were calculated for both individual and school-level data where appropriate. Chi-square tests of differences were conducted to determine if differences by race and gender groups existed among the overall distribution of categorical variables. Chi-square pairwise tests of proportional differences were conducted for each level of categorical variables to determine significant differences by race, gender, and race-gender subgroup. Analyses of variance (ANOVAs) were conducted to examine differences among categorical independent variables and continuous dependent variables. Posthoc Bonferroni tests were conducted for pairwise group comparisons. Finally, Pearson correlations were calculated to examine bivariate relationships among variables. Although there are no consistent cutoff points to determine the strength of correlations, I used the following convention:

- weak association (-0.09 to 0.0 or 0.0 to 0.09)
- small association (-0.3 to -0.1 and 0.1 to 0.3)
- medium association (-0.5 to -0.3 or 0.3 to 0.5), and
- strong association (-1.0 to -0.5 or 0.5 to 1.0) (Cohen, 1988).

3.4 Missing Data

Missing data were identified and are detailed in Table 1. The Full Information Maximum Likelihood (FIML) procedure in MPLUS 6.12 (L. K. Muthén & Muthén, 1998-
was used during analysis to account for missingness. FIML is a theory-based maximum likelihood function that uses relationships among all available data, including partially complete data, to estimate model parameters (Enders & Bandalos, 2001). FIML is able to account for data whether they are missing completely at random, or missing at random and the estimates are superior compared to other methods of dealing with missing data, including listwise deletion, pairwise deletion, and response pattern imputation (Enders & Bandalos, 2001).

### 3.6 Intraclass Correlation Calculation

To determine whether there was school-level variability in sedentary behavior, an Intraclass Correlation Coefficient (ICC) for sedentary behavior was calculated based on the following equation: $\text{ICC} = \frac{\tau_{oo}}{\tau_{oo} + \sigma^2}$, where $\tau_{oo}=$the amount of variance in sedentary behavior between schools and $\sigma^2=$the amount of variance in sedentary behavior within students. The ICC is a measure of the proportion of variance in sedentary behavior that can be attributed to differences between schools (Diez, 2002).

### 3.7 Analytic Approach

The methodological approach to testing the hypotheses is a mediated moderation analysis. As described by Muller and colleagues, mediated moderation is appropriate when several conditions exist (D. Muller, Judd, & Yzerbyt, 2005). First, the effect of the independent variable on the dependent variable is thought to vary by the moderator variable. And second, the hypothesized mediated pathway explains the moderated relationship. When the mediated process is controlled, the moderation of the relationship between the independent and dependent variable is reduced. I selected this method because I hypothesized that the relationship between school racial segregation climate and sedentary
behavior is different for black and white adolescents. I also hypothesized that the difference is due to a mediated pathway of more unfair treatment and prejudice for black adolescents compared to white adolescents. Mediated moderation analysis is underutilized in health disparities research. However, this methodology is appropriate for disparities research questions because it allows for examination of the pathways that might account for differences in the relationship between the independent and dependent variable by race and gender (D. Muller, Judd, & Yzerbyt, 2005).

I used a multilevel structural equation model (MSEM) to simultaneously test the working hypotheses of this project. A multilevel model was appropriate because students were nested in schools and this technique accounts for the dependency of measures for students in the same schools. The research was also cross-level because the hypotheses test the effects of a school-level variable (i.e., racial segregation climate) on an individual-level outcome (i.e., sedentary behavior). The proposed mediators (i.e., unfair treatment and prejudice) and moderators (i.e., adolescent race and gender) are also individual-level measures. Control variables include both school- and individual-level variables.

3.8 Multilevel Mediation Model Specification

While the overall approach of my analysis is mediated moderation, the approach for conducting this analysis was to perform multiple group analysis of the mediated relationships via Structural Equation Modeling. The multiple group analysis satisfies the moderation piece of the model for MSEM (B. Muthén & Asparouhov, 2003). The mediation portion of the model is described in more detail here.

To establish temporality in meditational analysis, the mediator is typically measured at a time period after the independent variable. In my study, the independent variable is a
school-level variable and the mediator is an individual-level variable. It is not conceptually plausible for an individual-level variable to “cause” a contextual variable, thereby reducing concerns that both variables come from the same wave of data collection. Additionally, measurement of the mediator variable at a time period before the measurement of the dependent variable provides a stronger argument for causality. Wave II sedentary behavior was used for the dependent variable while I controlled for Wave I sedentary behavior in the analysis to account for the dependency of repeated measures from the same individual adolescent. Using Wave II measurements of sedentary behavior assisted me in establishing the temporality of its relationship with school racial segregation and discrimination (both measured at Wave 1).

Because the independent variable is measured at the school-level and the mediator and dependent variables are measured at the individual-level, the mediation model is multi-level in nature. The relevant model specification equations for a multi-level mediation model where the independent variable is at level-2 and the mediators and dependent variables are at level-1 are as follows (D. MacKinnon & MacKinnon, 2008):

Equations for sedentary behavior predicted by racial climate:

Individual Level 1: \( Y_{ij} = \beta_{0j} + e_{ij} \)

Group Level 2: \( \beta_{0j} = \gamma_{00} + cX_j + u_{0j} \)

Equations for sedentary behavior predicted by prejudice and unfair treatment:

Individual Level 1: \( Y_{ij} = \beta_{0j} + bM1_{ij} + bM2_{ij} + e_{ij} \)

Group Level 2: \( \beta_{0j} = \gamma_{00} + c'X_j + u_{0j} \)

Equations for prejudice and unfair treatment predicted by racial climate:

Individual Level 1: \( M1_{ij} = \beta_{0j} + e_{ij} \)
\[ M_{2ij} = \beta_{0j} + e_{ij} \]

Group Level 2: \( \beta_{0j} = \gamma_{00} + a_1 X_j + a_2 X_j + u_{0j} \)

Where:

\( Y_{ij} = \) sedentary behavior for individual student (i) in school (j)

\( \beta_{0j} = \) school-level intercept

\( e_{ij} = \) individual-level random error associated with student (i) in school (j)

\( \gamma_{00} = \) school-level mean

\( c = \) parameter that represents the effect of racial climate on sedentary behavior

\( X_j = \) racial climate in jth school

\( u_{0j} = \) random deviation of predicted school-level mean from observed school-level mean

\( b = \) parameter associated with the effect of the mediator on sedentary behavior, fixed and not random in this model

\( c' = \) parameter associated with the effect of racial climate on sedentary behavior, controlling for the mediator

\( a = \) parameter associated with the effect of racial climate on both mediators

3.9 **Structural Equation Modeling Overview**

Structural Equation Modeling (SEM) is a statistical technique that estimates relationships among variables by comparing sample and predicted covariance matrices (K. A. Bollen & Long, 1993; K. A. Bollen, 1989). It is a more general estimation technique than regression and allows for an analysis of both a measurement and structural model (K. A. Bollen & Long, 1993; K. A. Bollen, 1989). I selected SEM as the specific analysis strategy for several different reasons. First, SEM allows for the simultaneous modeling of multiple
equations. This decreases the likelihood of a Type I error—rejecting the null hypothesis when it is true—that increases when analyzing multiple equations separately. Second, SEM allowed me to include a measurement model of the latent variable school racial climate—one that is not observed but measured by six indicator variables: a school-level segregation index based on cross-race friendships; race-based friendship preference; status differences between black and white youth; racial heterogeneity of participation in extracurricular activities; racial heterogeneity of teachers; and busing practices. And finally, SEM allows for measurement error to be modeled in these variables thereby not making the assumption of perfect measurement.

Multilevel SEM (MSEM) is a form of SEM that accounts for multilevel data. My data represent a “2-1-1” or upper-level mediation model because the independent variable is measured at level 2 and the mediator and dependent variables are measured at level 1 (Preacher, Zyphur, & Zhang, 2010). The implications of having a level-2 variable in the model with other level-1 variables is that any mediated effect must occur at the between-level (Preacher, Zyphur, & Zhang, 2010). Further, both between and within effects will occur for the 1-1 portion of a “2-1-1” model. Traditional Multilevel Modeling (MLM) does not separate these effects, but MSEM is capable of doing this. MSEM is also able to provide unbiased estimates of the between-level indirect effect hypothesized by the mediation portion of the model. Finally, MSEM can handle multiple mediators in a more clear-cut approach than MLM is capable of doing (Preacher, Zyphur, & Zhang, 2010).

I made the decision to run a fixed effects model with random intercepts because a random intercepts model would predict sedentary behavior based on the random intercept
that varies across schools (Garson, 2012). Additionally, the complexity of the analysis precluded running a random slopes model in MPLUS.

I used MPLUS 6.12 software (L. K. Muthén & Muthén, 1998-2011) to analyze the hypothesized multi-group MSEM for both the confirmatory factory analysis and for the full model. MPLUS was selected because of its ability to handle complex survey data, latent variables, multiple group analysis, and multilevel mediation.

3.10 Measurement Model

Latent variables can be operationalized with cause or effect indicators (K. A. Bollen, 1989). Cause indicators are observed variables that cause the latent variable. Effect indicators are observed variables that are affected by the latent variable (K. A. Bollen, 1989; Perreira, Deeb-Sossa, Harris, & Bollen, 2005). Most of the indicators described below could be conceptualized as either type. For example, a negative racial climate could lead to more segregated friendship networks in schools, and oppositely, a more segregated friendship network in school could cause a more negative racial climate. As indicated earlier, I made the decision to consider the indicators effect indicators for several reasons. One, I do not believe that the indicators I selected are an exhaustive list of variables that create a school racial climate. School racial climates are likely created not only by what is happening within schools, but what is happening in society as a whole and what has happened in history. For example, during desegregation efforts, integrated school racial climates were generally more negative because of what was happening in terms of civil rights. Current events with racialized undertones, for example, court cases about affirmative action, can also contribute to a school’s racial climate, causing a change in how students interact across race.
Establishing the validity of measured indicators is an essential step in defining a latent variable (K. A. Bollen, 1989). Bollen defines validity as “the strength of the direct structural relation between a measure and a latent variable,” asserting that this definition of validity is more meaningful and useful than traditional assessment of validity (e.g., content, criterion, construct, convergent, and discriminant). Bollen suggests that one method of establishing validity in structural models is to evaluate the direct link between a latent variable and an observed variable by assessing the unstandardized and standardized validity coefficients. I assessed validity by evaluating the factor loadings of hypothesized indicators (these are equivalent to the unstandardized and standardized validity coefficients) with the latent variables, which were provided by running a confirmatory factor analysis.

Cronbach’s Alpha was calculated to assess the reliability of the items. It is a common method for determining the reliability of parallel measures in social science research (K. A. Bollen, 1989) and is a measure of internal consistency among a group of items (Cronbach, 1951). Cronbach’s Alpha was calculated for the whole sample, and for each race-gender subgroup.

For all measurement models, I included the subpopulation command to account for the fact that my smaller sample came from a nationally-representative population. I also accounted for the stratified nature of the sampling design by including region of the country and school-level weights.

Prior to starting measurement invariance testing (detailed below), I conducted separate CFAs for each race-gender subgroup so that I could determine, preliminarily, which set of hypothesized indicators had significant factor loadings for all subgroups. CFA is an analytical technique that aims to explain how observed variables covary with one another to
predict an implied latent variable (K. A. Bollen, 1989). It allows researchers to verify that hypothesized indicators of a latent variable, a variable that cannot be measured directly, are valid. This step was necessary because the items that I hypothesized would be indicators of the racial climate latent variable could potentially differ across race-gender subgroups. Conducting a CFA before measurement invariance testing allowed me to eliminate indicators that were not significant across all four groups.

### 3.11 Model Fit Assessment

I evaluated the model fit for each race-gender subgroup by interpreting model fit indices including the Chi-Square fit index, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI). The Chi-Square fit index is an indication of the similarity between the sample population covariance matrix and the predicted covariance matrix. The associated *p value* can be used as an assessment of model fit, however, the Chi-Square statistic is very sensitive to sample size and will typically be significant (indicating significant differences between matrices) with larger sample sizes.

While the Chi-Square statistic is typically reported, it is not a sufficient determinant of model fit (K. A. Bollen & Long, 1993). The RMSEA, CFI, and TLI are fit indices that are either not sensitive to sample size or adjust for sample size in their calculation. RMSEA values range between 0-1 and acceptable values are considered to be less than .05 (Browne, Cudeck, Bollen, & Long, 1993; MacCallum, Browne, & Sugawara, 1996; Nevitt & Hancock, 2000) or .06 (L. Hu & Bentler, 1999). CFI and TLI values range between 0-1 and acceptable minimum values are .90 in some schools of thought (Marsh, 1995; Marsh & Hau, 1996) and .95 in others (L. Hu & Bentler, 1999). No consistent approach exists as to which cutoff points are preferred and there is support for both more conservative and less conservative
interpretations. I evaluated model fit based on RMSEA <.05 and CFI/TLI >.90 representing a good model fit.

3.12 Measurement Invariance Testing

In order to compare the latent variable, school racial climate, across race-gender subgroups, I first had to establish measurement invariance of this construct across the four subgroups: black males, black females, white males, and white females (Vandenberg & Lance, 2000). Measurement invariance or measurement equivalence testing determines whether the latent variable is equivalent across groups (Byrne, Shavelson, & Muthén, 1989). While there are differences in the procedures for measurement invariance testing, recommended practices for “strong” measurement invariance testing (Meredith, 1993) involves the following: (1) a test of configural variance (i.e., whether the groups have the same factor structure) (2) a test of metric invariance (i.e., whether the groups have the same factor loadings), (3) a test of scalar invariance (i.e., whether the groups have the same item intercepts), and (4) a test of residual variance (i.e., whether the groups had the same item residual variances) (Hoffmann, 2006; Meredith, 1993; Vandenberg & Lance, 2000).

Invariance among factor loadings across groups indicates that the magnitude of the contribution of each indicator to the latent variable is equivalent. Chen et al. suggests several implications for why factors loadings may not be invariant: noninvariant factor loadings across groups may indicate that the latent variable has a different conceptual meaning across groups or that certain items/indicators are more relevant for one group compared to others.

Invariance among item intercepts suggests that groups will respond similarly for each item when the latent variable is equal to zero. Explanations for noninvariant item intercepts include that certain groups may have felt a social desirability pressure to endorse certain
items, group characteristics may result in a greater propensity to respond to an item, or groups may have different reference points for the same items (Chen, 2008; Sass, 2011). Significant differences in item intercepts across groups creates an over or underestimation bias of the resulting latent variable mean (Sass, 2011), making subsequent group comparisons inaccurate.

Invariance among residual variances means that each item has the same “portion of item variance not attributable to the variance of the associated latent variable” (Cheung & Rensvold, 2002). Item residual variance may differ because certain items may contain more measurement error for different groups. This could occur if certain groups are less familiar with items on a survey and therefore have more variability in terms of response compared to other groups (Cheung & Rensvold, 2002; Mullen, 1995).

At each step of measurement invariance testing, I assessed the model fit indices as detailed above. I also conducted a likelihood ratio test to determine if nested models were significantly different from one another. The likelihood ratio test (Satorra & Bentler, 2010) was based on the following formula:

\[ TR_d = -2 \times (L_0 - L_1)/cd \]

\[ cd = (p0 \times c0 - p1 \times c1)/(p0 - p1) \]

\[ TR_d = \text{chi-square difference}; \ L_0 \ & \ L_1 = \text{loglikelihood values from the H0 and H1 models}; \ p0 \ & \ p1 = \text{parameters from the H0 and H1 models}; \ c0 \ & \ c1 = \text{scaling correction factors for the H0 and H1 models} \]

If the resulting \(-2\Delta LL\) was not significant (p>.05), then I continued moving forward in the sequence because there was not a significance decrease in fit. If the resulting \(-2\Delta LL\) was significant (p<.05), then I stopped testing because the newest model had a significantly
poorer fit than the previous model. Results indicated the racial climate latent variable was not measurement invariant (details are in the Results chapter of the dissertation) and thus could not be reliably compared across all four race-gender subgroups. I therefore proceeded with conducting measurement invariance testing for gender differences across race, and for race differences across gender. The results were the same (i.e., not invariant) and I concluded that the racial climate variable was not measurement invariant for these comparisons.

Because I was unable to statistically compare the racial climate variable across groups, I made the decision to run a separate structural equation model—both measurement and structural models—for each race-gender subgroup.

3.13 Race-Gender Subgroup Confirmatory Factor Analysis

I followed these steps for each race-gender subgroup. First I conducted a CFA, with all hypothesized factors, and made adjustments to the model as necessary to establish the strongest measurement model possible. Indicators with non-significant factor loadings were dropped and correlated relationships among factors were added if they were theoretically meaningful.

3.14 Race-Gender Subgroup Structural Model

For all structural models, I used the “useobservations” command and controlled for region when it had a significant relationship with the dependent variable. Because my analysis was a multi-level analysis, I used the “type=twolevel” option to model the between and within level relationships. The subpopulation command and the stratification options are not available for use with the type=twolevel option. Based on personal communication with the software developers, no differences were expected in estimates, and very small differences were expected in standard errors when using the subpopulations vs.
useobservations command. To test this, I ran two test models using “type=complex,” one with the subpopulation command and one with the useobservations command. No differences were noted in the parameter estimates or significance levels. Small variations existed in the standard errors but these did not have any effect on p-values. I thus made the decision to use the useobservations command so that the appropriate between and within level relationships could be modeled.

Once the strongest measurement model was developed for each race-gender subgroup, I added the dependent variable (sedentary behavior) and the mediator variables (unfair treatment and prejudice) to the model. Next, I added Wave 1 measures of sedentary behavior to control for prior level of sedentary behavior. Following this I added control variables in increments to avoid overloading the model in MPLUS. This was necessary because each additional control variable increased the number of parameters that needed to be estimated in the model, and when the number of parameters greatly exceeded the number of clusters (schools), the model estimation failed. I started with adding school-level controls, one at a time. If hypothesized control variables were not associated with the dependent or mediator variables, they were removed from that portion of the model. Then I added individual-level controls, one at a time. If they were not associated with the dependent or mediator variables, they were also removed from that portion of the model. Variables with significant correlations based on modification indices were added to each model if the relationships were supported by theory. A final model is reported for each race-gender subgroup in the Results.
Chapter 4: Results

Results of the analyses are described below starting with the descriptive analyses, measurement invariance models, and a report of the final measurement model for each race-gender subgroup. The remaining results are organized by research questions and hypotheses.

4.1 Results—Descriptive Statistics

Univariate descriptive statistics were calculated for the full sample using unweighted data at the individual-level (N=3449), by race, gender, and race-gender subgroup, and at the school-level (N=55). Means, standard errors, percents and sample sizes were determined and ANOVAs and Chi-Squares were calculated. P-values were evaluated to determine the significance of group differences for the same variable measure at the p<.05 significance level.

4.1.2 Characteristics of the sample—control variables

Table 2 provides univariate statistics on individual and school control variables calculated at the individual-level for the full sample, by race, and by gender. Overall, the average age of adolescents in this study was 16 years and the majority of adolescents were in the 10th-12th grades. The majority of adolescents had mother’s who graduated from high school, earned their GED, or had higher levels of education. Only 13% of mothers did not graduate from high school. Most adolescents attended public (90%), medium (43%) or large (45%) schools, that were located in suburban environments (53%). Busing to increase racial
mixing was not a common practice in this sample of students. Only 6% of students attended schools with racial busing policies.

The overall distribution of adolescent grade, school size, urbanicity, school type, and racial busing among black and white adolescents was significantly different from the predicted distribution with p-values of Chi-square tests of differences <.05. No significant differences were present in the distribution of age or mother’s education between black and white students compared to the predicted distribution.

Pairwise testing of the differences in proportions for each level of categorical variables resulted in the following significant findings. More white students (46%) than black students (37%) were enrolled in medium-sized schools and more black students (50%) than white students (42%) were enrolled in large-sized schools. A larger percent of black students attended urban schools (41%) and public schools (94%) compared to their white counterparts (34% and 88%, respectively). Black students were more likely to attend schools with racial busing practices (13% vs. 2%).

Significant differences across gender were noted for the actual distribution of adolescent age and grade versus the predicted distribution of age and grade. No significant differences in proportions for any level of the categorical variables were found.

Table 3 provides univariate statistics by race-gender subgroups. Results of ANOVA testing indicated that there were significant differences in the means of adolescent age across race-gender subgroups. Chi-square tests also showed race-gender subgroup differences of the actual versus predicted distributions for all variables, except mother’s education.
Tests of differences in pairwise comparisons of means of adolescent age were significant for the following pairs: black males and white females, black females and white males, and white males and white females.

The following significant results from pairwise testing of proportional differences were found. White females (47%) were more likely to be enrolled in medium-sized schools than black males (39%) or black females (36%), and white males (45%) were more likely to be enrolled in medium-sized schools than black females (36%). Black males (50%) and females (51%) were more likely to be enrolled in large-sized, public schools than white males (43%) or white females (40%). Black males (41%) and females (40%) were more likely to be enrolled in urban schools than white males (33%). Black males (15%) were more likely to attend schools with racial busing practices than white females (3%). Lastly, white males (98%) and white females (97%) were more likely to attend schools without racial busing practices than black males (85%) and black females (89%).

4.1.3 Sample demographic characteristics at the school-level

Table 4 also describes the demographic characteristics of schools in the sample. Overall there were a total of 55 schools. Of the 55 schools, 13% were small (1-400 students), 53% were medium (401-1000 students), and 35% were large (1001-4000 students). Forty percent of the schools were located in urban settings, 51 percent in suburban settings and 0.09% in rural settings. Ninety-one percent of schools were public while only 9% were private and schools enrollment was, on average 26% black students and 59% white students.

4.1.4 Racial climate indicator characteristics at the school-level

Table 4 describes the racial climate indicator characteristics of schools in the sample. Only 5 of the schools had racial busing policies. On average, the white to black proportion of
participating in different extracurriculars indicated that in most schools white students were approximately five times to nine times more likely than black students to participate in activities. Schools employed approximately 13% black teachers. White salience—white students preferences for other white students as friends—averaged 1.67 with a range of 1.01-4.32 with higher magnitudes indicating stronger preferences. Black salience—black students preferences for other black students as friends—averaged 4.38 across the schools with a range of 1.16-11.41 with higher magnitudes indicating stronger preferences. The average segregation index across schools was 0.37, a positive value that represents more segregated friendship networks. In fact, the range of segregation index was .05-.75 indicating that all schools in this sample had varying levels of segregated friendship networks, but no integrated friendship networks which would be represented by a negative value. The white to black student relative Bonacich centrality measure of student’s centrality to the network was 7.29, indicating that on average across schools, white students centrality in the school network was more than seven times that of black students.

**4.1.4 Characteristics Sedentary Behavior—Wave 2**

Wave 2 sedentary behavior was used as the outcome variable and is therefore the variable used for all associations and statistical analyses. Wave 1 sedentary was used as a control variable for the final models. Correlations between wave 1 and wave 2 sedentary behavior was 0.49 for the full sample, 0.37 for black males, 0.42 for black females, 0.53 for white males, and 0.50 for white females.

The Interclass Correlation Coefficients (ICC}s) for sedentary behavior for each race-gender subgroup were: black males 0.103, black females 0.120, white males 0.098, and white females 0.114.
Table 5 provides the average number of hours spent in sedentary behavior per week for the full sample, by race, and by gender. On average, adolescents in this sample spend 22 hours per week engaged in sedentary behavior. Black adolescents engage in significantly more sedentary behavior than white adolescents and males engage in significantly more sedentary behavior than females.

Table 6 provides the average number of hours spent in sedentary behavior per week for the full sample, and by race-gender subgroup. Black males engage in more sedentary behavior than any other race-gender subgroup followed by black females, white males, and white females, respectively.

4.1.5 Variable Correlations

Bivariate associations (Pearson correlations) were calculated for the variables of interest and reporting was limited to associations between the mediator and dependent variables, and dependent variable with individual and school-level control variables. Significance relationships (p<.05) are described below. Associations at the p<.10 marginal significance level are included. Individual-level weights were applied to analyses at the individual-level and school-level weights were applied to analyses at the school-level.

Table 7 shows the associations among mediator and dependent variables in the full sample and for race-gender subgroups. Prejudice was negatively associated with sedentary behavior for the total sample. Thus among all adolescents, an increase in prejudice was associated with a decrease in sedentary behavior. However, when looking at race-gender subgroups, the negative association was only marginally significant for black and white females, and significant for white males. For black males, the association between prejudice
and sedentary behavior was positive such that an increase in prejudice was associated with an increase in sedentary behavior. All coefficients were weak to small in magnitude.

Unfair treatment was not significantly correlated with sedentary behavior in the total sample or any subgroup. Though not significant, the direction of the relationship between unfair treatment and sedentary behavior was negative for the total sample, and for black and white females. The relationship was positive for black and white males.

Associations between prejudice and unfair treatment were significant for all groups. All correlation coefficients were positive indicating increased prejudice was associated with increased unfair treatment. Coefficients ranged from 0.19 to 0.25 indicative of relatively modest associations.

Table 8 provides correlation coefficients and related significance values for relationships between the dependent variable and individual-level control variables for the total sample and for race-gender subgroups. Significant findings are detailed below.

4.1.5.1 Sedentary Behavior with Individual-level Controls. For the total sample, sedentary behavior had significant associations with all individual-level control variables. As age increased, the amount of sedentary behavior decreased. Males were more likely to engage in sedentary behavior than females, and black students more than white students. As mother’s education, income, adolescents’ centrality in the social network (Bonacich centrality), and adolescent grade level increased, sedentary behavior decreased. As the racial heterogeneity of a student’s friendship network increased, sedentary behavior increased.

Race-gender subgroup relationships between sedentary behavior and individual-level control variables showed fewer instances of significant relationships than for the total sample. For black males, the only marginally significant relationship existed between age and
sedentary behavior such that increasing age was inversely associated with sedentary behavior. For black females, increases in the racial heterogeneity of friendship groups and in age both resulted in increases in sedentary behavior. For white males increases in age, grade, and family income were associated with decreases in sedentary behavior. For both white males and females, increases in the racial heterogeneity of friendship networks were associated with increases in sedentary behavior. Also for both white males and females, increases in age, mother’s education level, and income were all associated with decreases in sedentary behavior.

All significant correlations between sedentary behavior and individual-level control variables were weak to small in magnitude.

4.1.5.4 Sedentary behavior with school-level controls. Table 9 displays correlation coefficients and significance values of individual-level sedentary behavior with school-level controls. Significant associations are discussed below.

For the full sample, increases in the percentage of black students and a decrease in the percentage of white students were associated with increases in sedentary behavior. Enrollment in smaller schools and rural schools were associated with increases in sedentary behavior.

Correlations within race-gender subgroups mostly lacked significance, although a few were present. For black females, decreases in school size was associated with increases in sedentary behavior. For white males, attending private schools was associated with more sedentary behavior. For white females, increases in school size were associated with decreases in sedentary behavior and white females attending private schools were more likely to engage in sedentary behavior. All coefficients were weak to small in magnitude.
4.2 **Results from Measurement Research Questions**

Based on the results from the measurement model and measurement invariance testing, my original research questions were revised and reordered. As described more fully below, once I determined that the school racial climate was not measurement invariant across race-gender subgroups, a measurement model was developed separately for each race-gender subgroup. Therefore Research Questions 1a, 1c, and 1d were no longer appropriate. They were revised and renumbered as Research Questions 1e, 1f, and 1g respectively.

4.2.1 **School Racial Climate Descriptives**

4.2.1.1 **Item Correlations** *Table 10* shows correlations between the indicators of school racial climate: a school-level segregation index based on the extent of cross-race friendships; black-white differences in race-based friendship preferences; status differences between black and white youth; black-white differences in participation in extracurricular activities; the racial composition of teachers and racial busing practices. The segregation index was only marginally associated with the white to black relative participation in sports. All other indicators were significantly associated with one another, with values ranging from $r=0.42-0.96$. White salience was negatively associated with all racial climate indicators except for the percentage of black teachers and racial busing, where the relationships were positive. Increased black salience was associated with increased white to black relative variables and with decreased percentage of black teachers and racial busing. Increased white to black relative centrality (Bonacich) was associated with increased white to black relative participation in extracurricular activities and with decreased percentages of black teachers and racial busing. All white to black relative participation in extracurricular activity variables
were strongly associated with each other ($r = 0.88-0.98$), and an increase in black teachers was associated with racial busing.

4.2.1.2 Cronbach’s Alpha. I calculated a Cronbach’s alpha in STATA for the set of variables hypothesized to be indicators of the school racial climate for the full sample, and by race-gender subgroup, to determine the reliability of the measure. Results are presented in Table 11. Cronbach’s alpha measures were high across the full sample and all race-gender subgroups ranging from 0.92-0.93.

**Research Question 1b Results—To what degree does school racial climate demonstrate strong factorial measurement invariance across black males, black females, white males, and white females?**

Hypothesis 1b-1: The school racial climate will demonstrate measurement invariance as evidenced by no significant differences among factor loadings, item intercepts and residual variances of indicators across all race-gender subgroups.

Two hypothesized indicators, segregation index and racial busing, did not have significant factor loadings on the racial climate latent variables across all race-gender subgroups and were therefore eliminated from the measurement model for measurement invariance testing across four race-gender subgroups.

Table 12a shows the factor loadings, item intercepts, residual variances and their related standard errors when all parameters were free to vary across race-gender subgroups. All factor loadings showed positive associations with the school racial climate. It should be noted that both white salience and percent black teachers were reverse-coded. The magnitude of factor loadings were fairly consistent across race-gender subgroups while item intercepts differed. Black males and females had larger item intercepts for measures of white salience.
and percent black teachers. White males and females had larger item intercepts for all other indicators of school racial climate.

Table 12b shows the model fit indices and the results from measurement invariance testing across the four race-gender subgroups. Step 1, the configural invariance model, which determines whether factor structure is the same across groups, showed fairly good model fit across the four subgroups. Ideal model fit would be represented by a nonsignificant Chi-square, a CFI and TLI >0.90, and an RMSEA <.05. The CFI of this model was >.90 and the RMSEA was <.05. The TLI was close to 0.90 at a value of 0.87. The Chi-Square statistic was significant, which was not surprising based on the large sample size. (Subsequent Chi-Squares are reported in the tables but will not be discussed).

The results from Step 1 justified moving to Step 2. Step 2 involved testing the metric invariance model, which determines of the factor loadings are equivalent across groups. Model fit remained good based on fit indices (CFI=0.90, TLI=0.88, RMSEA=0.04). Likelihood ratio chi-square difference tests indicated no significant decrease in model fit between the configural (Step 1) and metric (Step 2) invariance models (p= 0.2721), therefore I moved to Step 3. Step 3 involved testing the scalar invariance model to determine if the groups had the same item intercepts. The CFI model index slightly declined while other indices remained similar (CFI=0.87, TLI=0.88, RMSEA=0.04), but the likelihood ratio chi-square difference test indicated that the scalar invariance model resulted in a significant decrease in model fit (p=0.0021). Therefore, the progression of measurement invariance steps stopped and I concluded that the measurement model of racial climate had weak, but not strong factorial invariance (Yoon & Millsap 2007).
I then tested for measurement invariance between black and white females (Tables 13a and 13b), black and white males (Tables 14a and 14b), black males and females (Tables 15a and 15b), and white males and females (Tables 16a and 16b). For all groups except black males and females, weak, not strong factorial invariance was present. For black males and females, model fit was poor and did not warrant interpretation of measurement invariance results.

Based on the results of measurement invariance testing across the four race-gender subgroups, I concluded that school racial climate did not demonstrate strong measurement invariance across race-gender subgroup. I proceeded by running a separate SEM (both measurement and structural model) for each race-gender subgroup. Running separate SEMs for each race gender subgroup precludes making statistical comparisons across groups for the hypothesized relationships because the measurement invariance tests indicated that the latent variable racial climate is experienced and measured differently for each group and it is therefore unwise to make such comparisons. While it is still appropriate to examine race and gender differences in variable correlations and prevalences (because these did not include a measurement of the school racial climate), it is only appropriate to look at results of the structural equation model separately for each race-gender subgroup. This required a revision of my hypotheses explicated in Chapter 1. The updated hypotheses are below.

**Research Question 1e Results—To what degree and in what direction do the following variables: the amount of cross-race friendship segregation, same-race-based friendship preferences, status differences between black and white students, differences in participation of extracurricular activities between black and white students, racial diversity**
of teachers, and racial school busing practices, serve as indicators of the underlying concept of school racial climate for each race-gender subgroup?

Hypothesis 1e-1: All of the above-mentioned indicators will have significant loadings on the one factor latent variable school racial climate.

Hypothesis 1e-2: A more segregated friendship network will be associated with a more negative school racial climate.

Hypothesis 1e-3: Stronger preference for same-race friends will be associated with a more negative school racial climate.

Hypothesis 1e-4: Larger status differences between black and white students will be associated with a more negative school racial climate.

Hypothesis 1e-5: Larger differences in participation in extracurricular activities between black and white students will be associated with a more negative school racial climate.

Hypothesis 1e-6: Less racial diversity of teachers will be associated with a more negative school racial climate.

Hypothesis 1a-7: School busing policies will be associated with a more negative school racial climate.

Final measurement model results are based on the final full structural model for each race-gender subgroup that includes mediator variables, dependent variable, and control variables. The fit of measurement models can change once other variables are introduced. This explains why the fit indices of the final measurement model are not identical with the fit indices from measurement invariance testing (which did not include mediator, dependent and control variables). I reverse-coded the segregation index, white salience and the percent black
teachers for consistency among factor indicator loadings. Lastly, modification indices suggested potential correlations among the measurement errors of indicator variables that should be modeled. If these correlations made theoretical sense, they were included in the model as well.

The final measurement model for black males is depicted on the left side of Figure 2. For black males, a more negative school was indicated by weaker preferences for same-race white friends, stronger preferences for same-race black friends, whites more central to the network, more participation in extracurricular activities by whites, and smaller percentages of black teachers. The directions of the relationships between indicator variables and school racial climate were as predicted except for preferences of same-race white friends. Wave 1 sedentary behavior and adolescent age were the only hypothesized control variables with significant association with both the school racial climate and sedentary behavior and were therefore retained in the full model. Additionally, correlations between the measurement errors of white salience and black salience, and white to black differences in academic extracurriculars and the percent of black teachers were modeled. Standardized factor loading coefficients for this set of indicators ranged from 0.59 to 0.99. Fit indices for black males indicated good model fit: Chi-Square=58.63 p=0.22, CFI=0.990, TLI=0.986, RMSEA=0.017.

The final measurement model for black females is depicted on the left side of Figure 3. Similar to black males, a more negative school was indicated by weaker preferences for same-race white friends, stronger preferences for same-race black friends, whites more central to the network, more participation in extracurricular activities by whites, and smaller percentages of black teachers. The directions of the relationship between the indicator
variables and school racial climate were as predicted except for preferences of same-race white friends. Correlations between white salience and black salience, and between white to black differences in sports and leadership extracurricular activities were modeled. The values of the standardized factor loading coefficients ranged from 0.59 to 0.99. Fit indices for black females indicated good model fit: Chi-Square=69.87, p=0.23, CFI=0.990, TLI=0.987, RMSEA=0.014.

The final measurement model for white males is depicted on the left side of Figure 4. This model included nine indicators of the school racial climate. A more negative racial climate was indicated by more integrated friendship networks, weaker preferences for same-race white friends, stronger preferences for same-race black friends, whites more central to the network, more participation in extracurricular activities by whites, and smaller percentages of black teachers. The directions of the relationships between the indicator variables and school racial climate were as predicted except for integrated friendship networks and preferences of same-race white friends. Correlations between white salience and black salience, and between white to black differences in academic extracurricular activities and percent black teachers were modeled. Factor loadings ranged from 0.31-0.99. Fit indices for white males indicated good model fit: Chi-Square=160.92, p=0.000, CFI=0.950, TLI=0.936, RMSEA=0.021.

The final measurement model for white females is depicted on the left side of Figure 5. A more negative racial climate for white females was similar to that for white males, and was indicated by more integrated friendship networks, weaker preferences for same-race white friends, stronger preferences for same-race black friends, whites more central to the network, more participation in extracurricular activities by whites, and smaller percentages of
black teachers. The direction of relationships between the indicator variables and school racial climate were as predicted except for integrated friendship networks and preferences for same-race white friends. Correlations between white salience and black salience were modeled as well. Standardized factor loading coefficients ranged from 0.32-0.99. Fit indices for white females indicated fairly good model fit: Chi-Square=159.24, p=0.000, CFI=0.926, TLI=0.903, RMSEA=0.032.

Research Question 1f. What is the variability across schools in racial climate for each race-gender subgroup? No hypothesis is presented based on the descriptive nature of the research question. The purpose of this research question was to determine whether there was sufficient variability across schools in the school racial climate to conduct the following analyses. To calculate the variability in the racial climate latent variable for each race-gender subgroup, I ran a multiple group CFA and set the racial climate variance free for each group. School racial climate variance was 0.093 for black males, 0.099 for black females, 0.067 for white males, and 0.072 for white females. I then ran a series of multiple group CFAs to determine whether the variances for each race-gender subgroup were statistically significantly different from one another. This was accomplished by setting the variance of racial climate to equality for two groups at a time and comparing the resulting model with the original model (all variances free) using the likelihood ratio chi-square difference test. Table 17 shows the results of the likelihood ratio chi-square difference testing, which indicates there were not significant differences in the racial climate variance among any of the race-gender subgroups.
4.3 Results from Analytic Research Questions

Research Question 1g—What is the relationship between the school racial climate and adolescent sedentary behavior for each race-gender subgroup?

Hypothesis 1g-1: A more negative racial climate will be related to increased sedentary behavior for black males.

Hypothesis 1g-2: A more negative racial climate will be related to increased sedentary behavior for black females.

Hypothesis 1g-3: A more negative racial climate will be related to increased sedentary behavior for white males.

Hypothesis 1g-4: A more negative racial climate will be related to increased sedentary behavior for white females.

The purpose of this research question was to determine whether the stress-coping paradigm predicts relationships between a stressor, school racial climate, and a coping behavior, sedentary behavior. For black males, contrary to my hypothesis, a significant relationship was found between school racial climate and sedentary behavior such that a one standard deviation unit increase in negative racial climate was associated with a 39% decrease in sedentary behavior. For white males, a marginally significant relationship existed such that a one standard deviation unit increase in negative racial climate was associated with a 21% decrease in sedentary behavior, also contrary to expectations. No significant associations were present for black females or white females.

Therefore, Hypotheses 1b-1 and 1b-4 are not supported because the relationships were in the opposite direction than I predicted. Hypotheses 1b-2 and 1b-3 are not supported because no significant results were found.
Research Question 2a—What is the relationship between prejudice and adolescent race/ethnicity and gender?

Hypothesis 2a-1: Black adolescents will more strongly agree that students in their school are prejudiced compared to white adolescents.

Hypothesis 2a-2: Male adolescents will more strongly agree that students in their school are prejudiced compared to female adolescents.

Hypothesis 2a-3: Black male adolescents will more strongly agree that students in their school are prejudiced compared to black female, white male, or white female adolescents.

The purpose of this research question was to determine how strongly students of different race-gender subgroups would agree that students in their school were prejudiced in the Add Health Survey since this information as not found in the published literature. The categories of disagree and strongly disagree, and agree and strongly agree are combined here for simplicity of interpretation. Overall, 45% of adolescents agreed that students in their schools were prejudiced, 29% disagreed and 26% were neutral (Table 18). There were significant differences between the actual and predicted distributions of prejudice in the race and race-gender subgroup comparisons, but not in the gender comparison. Tests of differences in proportions for each level of prejudice indicated significant differences in agreeing, disagreeing, strongly agreeing and strongly disagreeing for black and white adolescents, therefore these numbers are combined below for simplicity of interpretation. Contrary to expectation, white students were more likely than black students to agree that students in their schools were prejudiced (Table 18). Approximately 33% of black students agreed or strongly agreed that students in their schools were prejudiced compared to 51% of
white students. 41% of black students disagreed or strongly disagreed that students in their school were prejudiced compared to 23% of white students.

Comparing all four race-gender subgroups, Table 19 shows that there were significant differences in the actual and predicted distributions of prejudice. Tests of differences in proportions for race-gender subgroups for each level of prejudice indicated significant differences in agreeing, strongly agreeing, and disagreeing for black and white adolescents. 34% of black males, 31% of black females, 52% of white males, and 50% of white females agreed or strongly agreed that students in their school were prejudiced. Significant differences in proportions for “agree” were between black males (25%) and white males (33%), black females (25%) and white males (33%), and black females (25%) and white females (32%). Significant differences were also present between black females (9%) and white males (18%), and black females (9%) and white females (18%) for “strongly agree.” Significant differences in proportions for “disagree” were between black males (28%) and white males (17%) and black males (28%) and white females (18%). Again, black males and females were less likely to agree that students in their school were prejudiced compared with white males and females.

Analyzing prejudice as a continuous variable showed significant differences across racial groups, but none across gender (Table 18). The mean of prejudice among black students was 2.87 towards a general direction of disagreement while the mean for white students was 3.41, towards a general direction of agreement. Significant differences were also present across race-gender subgroups. Pairwise comparisons of means found significant differences in the following groups: black males (2.89) and white males (3.44), black males
(2.89) and white females (3.39), black females (2.85) and white males (3.44), and black females (2.85) and white females (3.39).

Measured categorically, hypothesis 2a-1 was not supported because more white than black students endorsed that students in their school were prejudiced which was opposite of what I predicted. Hypothesis 2a-2 was not supported because there were no significant differences in prejudice by gender. Hypothesis 2a-3 was not supported because the relationship between adolescent race-gender and prejudice was the opposite of what I predicted. More white males than black males or females agreed that students in their schools were prejudiced. No differences in conclusions were found when measuring prejudice continuously versus categorically.

**Research Question 2b— What is the relationship between unfair treatment and adolescent race/ethnicity and gender?**

Hypothesis 2b-1: Black adolescents will more strongly agree that teachers in their schools treat students unfairly compared to white adolescents.

Hypothesis 2b-2: Male adolescents will more strongly agree that teachers in their schools treat students unfairly compared to female adolescents.

Hypothesis 2b-3: Black male adolescents will more strongly agree that teachers in their schools treat students unfairly compared to black female, white male, or white female adolescents.

The purpose of this research question was to determine how strongly students of different race-gender subgroups would agree that teachers in their schools treated students unfairly. Agreement with the statement is indicative of fair treatment and disagreement with the statement represents unfair treatment. Overall, 57% of students agreed with the statement,
“teachers at your school treat students fairly,” 19% disagreed, and 24% were neutral (Table 20). There were significant differences in the actual versus predicted overall distribution of unfair treatment by race, and by race-gender subgroups, but not by gender. Approximately 52% of black students agreed that teachers in their school treat students fairly while 56% of white students agreed. 22% of black students disagreed that teachers in their school treat students fairly and 17% of white students disagreed. 26% and 24% of black and white students were neutral. While general trends indicate more black than white students report unfair treatment, no significant differences were present in pairwise comparisons of proportions for each level of unfair treatment.

Comparing all four race-gender subgroups, 21% of black males, 23% of black females, 18% of white males, and 17% of white females disagreed that teachers at their school treat students fairly. The majority of students within each race-gender subgroup felt that teachers were fair: 56% of black males, 49% of black females, 60% of white males, and 59% of white females. No significant differences were present for tests of proportional differences at each level of unfair treatment.

Measured continuously, the average value of unfair treatment was 2.51 for the full sample. Significant differences in the means for race were found: 2.62 for black adolescents and 2.45 for white adolescents (Table 20). Thus black adolescents were more likely to report unfair treatment. Marginally significant (p<.10) differences in means by gender were found: 2.48 for male and 2.54 for females, indicating that females were more likely to report unfair treatment than males.

Race-gender subgroup differences in the means of unfair treatment measured continuously indicated significant differences across groups. Bonferroni pairwise
comparisons were calculated and significant differences in means were present for black males (2.55) and white males (2.44), black females (2.67) and white males (2.44), black females (2.67) and white females (2.47), and white males (2.44) and white females (2.47). Higher numbers are indicative of more unfair treatment.

Measured continuously, Hypothesis 2b-1 was supported because black adolescents reported more unfair treatment than white adolescents. Hypothesis 2b-2 was not supported because I hypothesized that males would report more unfair treatment than females, but the opposite occurred. Hypothesis 2b-3 was also not supported because black females reported more unfair treatment on average than any other race-gender subgroup.

The hypotheses were not supported when measured categorically because there were not significant differences in proportions at the different levels of unfair treatment between black and white students, between male and female students, or among the four race-gender subgroups.

Research Question 2c\(^1\) — What is the relationship between (a) prejudice, (b) unfair treatment and sedentary behavior for (1) black males (2) black females (3) white males (4) white females?

Hypothesis 2c-1: Black males, black females, white males, and white females who more strongly agree that students in their school are prejudice will engage in more sedentary behavior than those adolescents who more strongly disagree that students in their school are prejudice.

Hypothesis 2c-2: Black males, black females, white males, and white females who more strongly agree that teachers in their school treat students unfairly will engage in

\(^1\) Research Question 2c was slightly revised from the original such that the relationship was investigated within each race-gender subgroup.
more sedentary behavior than who more strongly disagree that teachers in their school treat students unfairly.

The purpose of this research question was to determine if the stress-coping behavior paradigm applied to the relationship between prejudice, unfair treatment and sedentary behavior for each race-gender subgroup.

For black males, there was a significant positive relationship between prejudice and sedentary behavior such that a one-unit increase in prejudice was associated with a 65% increase in sedentary behavior (Figure 2). For white males, the relationship was marginally significant relationship but in the opposite direction such that a one-unit increase in prejudice was associated with a 24% decrease in sedentary behavior (Figure 4). No other race-gender subgroups demonstrated significant associations between prejudice and sedentary behavior.

The relationship between unfair treatment and sedentary behavior was not significant for any race-gender subgroup. Though lacking significance, positive relationships, as hypothesized, were present for black males and females, while negative relationships were present for white males and females.

Hypotheses 2c-1 concerning prejudice was supported for black males only. Hypothesis 2c-2 concerning unfair treatment was not supported by these data for any race-gender subgroup.

Research Question 3 — Does (a) prejudice or (b) unfair treatment mediate the relationship between school racial climate and adolescent sedentary behavior for each race-gender subgroup?

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2 Research Question 3 was revised from the original so that the relationship was investigated within each race-gender subgroup.
Hypothesis 3-1: Black male adolescents attending schools with more negative racial climates will (a) more strongly agree that students in their schools are prejudiced and (b) that teachers in their schools treat students unfairly, and in turn report more sedentary behavior, compared with black male adolescents attending schools with less negative racial climates.

Hypothesis 3a-2: Black female adolescents attending schools with more negative racial climates will (a) more strongly agree that students in their schools are prejudice and (b) that teachers in the schools treat students unfairly, and in turn report more sedentary behavior, compared with black female adolescents attending schools with less negative racial climates.

Hypothesis 3a-3: White male adolescents attending schools with more negative racial climates will (a) more strongly agree that students in their schools are prejudice and (b) that teachers in the schools treat students unfairly, and in turn report more sedentary behavior, compared with white male adolescents attending schools with less negative racial climates.

Hypothesis 3a-4: White female adolescents attending schools with more negative racial climates will (a) more strongly agree that students in their schools are prejudice and (b) that teachers in the schools treat students unfairly, and in turn report more sedentary behavior, compared with white female adolescents attending schools with less negative racial climates.

This research question contained my overall study hypothesis and was intended to test whether the theory-based relationships among variables in my conceptual model were obtained for each race-gender subgroup.
For black males, prejudice significantly mediated the relationship between school racial climate and sedentary behavior. There was a significant relationship, as hypothesized, between school racial climate and prejudice such that a one standard deviation unit increase in racial climate was associated with a 0.53 unit increase in prejudice ("a" pathway). There was also a significant relationship as hypothesized between prejudice and sedentary behavior such that a one unit increase in prejudice was associated with a 65% increase in sedentary behavior ("b" pathway). The direct effect of school racial climate on sedentary behavior was also significant, but in the opposite direction hypothesized; such that a one standard deviation unit increase in school racial climate was associated with a 39% decrease in sedentary behavior ("c prime" pathway). The indirect effect (a₁ x b₁ pathway) of sedentary behavior on racial climate, accounting for the mediated effect of prejudice resulted not only in an attenuation of the direct relationship, but a reversal in sign of the relationship. A one standard deviation unit increase in school racial climate was associated with a 34% increase in sedentary behavior, after accounting for the mediated effect of prejudice. This is called negative or suppression mediation, meaning that the relationship between school racial climate and sedentary behavior was suppressed by the absence of the mediator prejudice.

No significant mediation occurred through unfair treatment for black males. None of the hypothesized mediated effects of either prejudice or unfair treatment were present within any other race-gender subgroup. Direct relationships were then investigated for black females, white males, and white females between the independent variable, racial climate, and the mediators, prejudice and unfair treatment.

Significant relationships were found between school racial climate and prejudice for black females in the hypothesized direction. A one unit standard deviation increase in a
negative racial climate was associated with a 0.50 unit increase in prejudice. For white males and females, the regression coefficient was not significant and was negative, opposite to the hypothesized direction.

No significant relationships were found between school racial climate and unfair treatment for black females, white males, or white females.

Hypothesis 3-1 was partially supported. The relationship between school racial climate and sedentary behavior was mediated by reported school prejudice for black males, but not by unfair treatment.

Hypotheses 3-2 - 3-4 were not supported by these data. There was some indication of relationships between the school racial climate and prejudice for some race-gender subgroups, however, the relationship between school racial climate and sedentary behavior, and between the mediators—prejudice and unfair treatment—with sedentary behavior were very weak and in some cases, opposite to hypotheses. Explanations for these findings will be discussed in Chapter 5.
Chapter 5: Discussion and Conclusion

In my dissertation, I created a theoretically-driven latent variable, school racial climate, and I predicted that the positive relationship between a more negative school racial climate and sedentary behavior would be mediated by experiences of prejudice and unfair treatment. I further hypothesized that this relationship would vary by race-gender subgroups and that stronger relationships would exist among black males compared to other race-gender subgroups. Initial results required a revision of some of my hypotheses to account for the fact that the school racial climate was not measurement invariant across the race-gender subgroups. New hypotheses were written separately for each race-gender subgroup. My analyses showed that the structural indicators of the school racial climate variable performed quite well in the measurement model for each race-gender subgroup, but the results of the measurement invariance testing highlighted the importance of ensuring similar meaning and measurement of constructs across groups before making comparisons. As I hypothesized, I found a significant positive relationship between a more negative school racial climate and sedentary behavior for black males. It is important to note that the direction of this relationship was only as predicted with prejudice included as a mediator in the model.

Below I summarize and provide additional interpretation to the following main themes of my study: sedentary behavior as a coping strategy and outcome measure in my model, measurement development and non-invariance of school racial climate, performance
of the prejudice and unfair treatment variables, overall model fit for black males, and overall model fit for other race-gender subgroups.

5.1 Sedentary Behavior — Appropriateness as an Outcome Measure and Coping Behavior

As discussed in Chapters 2 and 3, I conceptualized and measured sedentary behavior not by low levels of physical activity, but as a behavior in its own right, not orthogonal to physical activity, that has its own determinants and characteristics. Sedentary behavior was measured based on the sum total of hours adolescents spent watching television, videos, and playing video games during a typical week. This conceptualization distinguishes sedentary behavior as a stand alone health behavior, and not simply as a lack of physical activity. The overall performance of sedentary behavior in my study was very similar to other studies and supports the use of this construct as measured by the Add Health Survey. In the full sample, increased sedentary behavior was associated with black race, male gender, less income and lower levels of mother’s education. These associations have been reported previously in the peer-reviewed literature (Must & Tybor, 2005; Van Der Horst, Paw, Twisk, & Van Mechelen, 2007). In my study, age and grade had negative relationships with sedentary behavior, consistent with some findings but contrary to others that report positive relationships between sedentary behavior and age (Nelson & Gordon-Larsen, 2006; Patrick et al., 2004). A review by Van der Horst and colleagues concluded that there are no conclusive trends in the direction of the relationship between age and sedentary behavior (Van Der Horst, Paw, Twisk, & Van Mechelen, 2007) although my findings suggest that adolescents become older, they engage in less sedentary behavior, perhaps because they may increase participation in active pursuits.
While the literature provides some theoretical support for sedentary behavior as a coping behavior (Jackson et al., 2010), no empirical studies have demonstrated this. Certainly, no studies have examined sedentary behavior as a coping behavior in response to the school racial climate or to prejudice or unfair treatment. By conceptualizing sedentary behavior as a coping strategy, I expected the measure to have a positive relationship with a more negative school racial climate. Despite this expectation, the only significant relationship between school racial climate and sedentary behavior was for black males, and in a negative direction. This initial finding does not support sedentary behavior as a coping behavior in response to a stressor, in this case, a more negative school racial climate. When mediation was assessed, the relationship between school racial climate and sedentary behavior became positive, as expected (see Section 5.4. for additional details). Overall, support for sedentary behavior as a coping strategy in response to school racial climate, unfair treatment and prejudice was thin.

Secondarily, I expected sedentary behavior to have a positive bivariate relationship with both unfair treatment and prejudice. Findings indicated no significant bivariate association between sedentary behavior and unfair treatment, and the significant associations between sedentary behavior and prejudice were negative for the full sample and for all race-gender subgroups, except for black males. This finding suggests that while sedentary behavior may be a coping strategy in response to prejudice for black males, it may operate in a direction opposite to what I predicted for other race-gender subgroups.

The Intraclass Correlation Coefficients (ICCs) for school-level variability in sedentary behavior across race-gender subgroups ranged from 0.098 to 0.114, meaning that approximately 10% of the variance in sedentary behavior could be accounted for by school-
level variables for each race-gender subgroup. These values are higher than those reported in studies of other school-level health behaviors (Ennett, Flewelling, Lindrooth, & Norton, 1997; McNeely, Nonnemaker, & Blum, 2002; Siddiqui, Hedeker, Flay, & Hu, 1996). The presence of between school variability in sedentary behavior indicates that school-level factors could influence sedentary behavior. I did not find, however, that the school-level characteristic of interest to this study—school racial climate—influenced sedentary behavior, except for black males. Other studies have found that affluent schools (Brodersen, Steptoe, Williamson, & Wardle, 2005) were associated with less sedentary behavior for adolescent girls but not boys, and schools that offered after-school programs (He, Harris, Piché, & Beynon, 2009) were associated with less sedentary behavior among all adolescents in the sample. Neither of these variables were measured in my study.

5.2 School Racial Climate—Measure Development and Invariance Findings

Developing a structural measure of school racial climate was imperative to test the validity of my conceptual model. I developed a theoretically-guided comprehensive measure of the school racial climate based largely on how students interact with one another across race as well as teacher diversity within schools. This measure was informed by Allport’s Contact Theory (Allport, 1979) and concepts from the social network literature and resulted in a strong, structural measure of the school racial climate.

I followed Contact Theory’s four required conditions for positive intergroup contact to identify school-level indicators of racial climate. Contact Theory suggests that to achieve a more positive climate, groups must have equal status, meaningful interactions, united goals, and support for cross-group interactions from authority figures. I defined a more negative school racial climate as the opposite of these conditions: a school environment indicated by
less equal status among black and white students, fewer meaningful interactions and united goals across black and white students, and less support for cross-group interactions from authority figures. Specifically, I expected a negative school racial climate to be indicated by the following: more segregated friendship networks, stronger preferences for same-race friends, larger white to black differences in extracurricular activity participation, larger white to black differences in centrality to the school network, smaller percentages of black teachers, and the presence of racial busing policies. I expected the indicators related to extracurricular activities to tap into united goals.

Because these indicators were measured at the school-level and therefore provided the exact same value for all students within the same school, I expected that the school racial climate would have the same conceptual meaning and measurement structure for black males, black females, white males and white females. However, I expected that the effect of the school racial climate on sedentary behavior and other covariates would differ across the race-gender subgroups. I expected these relationships would differ because I believed that black males and females would be more aware of and affected by a negative school racial climate, especially a climate indicated by white students being more central to the network, more likely to participate in extracurricular activities, and having stronger preferences for white friends.

Overall, there was strong reliability among the initial ten indicators used for the school racial climate latent variable: segregation index, white salience, black salience, relative white to black centrality, relative differences in white versus black students participation in sports, academic, leadership, and other extracurriculars, the percent of black teachers within a school, and racial busing. Cronbach’s alpha statistics were high for the full
group, as well as for each race-gender subgroup, ranging from .92 to .93. This suggests that my approximations of the basic tenets of Allport’s Contact Hypothesis provided a reliable measure of the school racial climate for use in my study.

Once these indicators were placed in a measurement model and confirmatory factor analysis (CFA) was conducted for an assessment of validity, I was not surprised that the racial busing variable did not make a substantial contribution to school racial climate because very low percentages of students in my sample actually attended schools with racial busing practices. Additionally, because I chose to consider the indicators as effect indicators, racial busing was not likely to operate in the direction predicted, whereby an increased negative racial climate would lead to increased busing policies. I was surprised, however, by the loadings for the segregation index. The segregation index is a measure of the degree of integration or segregation of student friendships at the school-level that is based on the number of cross-race friends students actually nominate. The measure also considers the number of students of different races within schools who are available for cross-race friendships to occur. The segregation index had non significant loadings for black youth, but significant loadings for white youth that were opposite to the direction predicted. For white students, a more negative school racial climate was indicated by more integrated friendship networks.

My initial hypothesis was that a more negative school racial climate would lead to more segregated friendship networks because some empirical findings indicate that segregation, while associated with some positive outcomes for black adolescents, could be a response of exposure to stereotyping, violence, and feelings of not belonging (T. M. N. Eitle & Eitle, 2004), things more likely to occur in a more negative school racial climate. Findings
like these from Eitle and Eitle are typically associated with segregation measures based on percentages of black and white students within schools, not measures of segregation based on the extent to which adolescent friendship groups share cross-race friendships, which is what I assessed in my study. This leads to a question of why segregation of school-level friendship groups is a valid indicator of the school racial climate for white adolescents in the opposite direction I predicted, but not for black adolescents at all.

Although it seems logical that for black youth, segregated friendship networks would contribute to a negative school racial climate, perhaps the fact that it did not is due to measurement error. It is possible that there is less variability in school-level cross race friendship networks for black students making it statistically challenging to detect associations with the school racial climate. It is also possible that black students are more likely to reside in schools with fewer opportunities for integrated friendship network development, thereby making the relationship between school racial climate and segregated friendship networks statistically non significant. An alternative explanation is that segregation of friendship networks is simply not an indicator of racial climate for black youth. Policies and procedures may be a more relevant indicator of school racial climate for black students (Blauner, 1989). While I did not include any measures of policies and procedures, for example disciplinary rules that may unfairly target minority youth, these might have shown stronger associations with the other indicators of school level racial climate for black students.

For white students, I found a more negative school racial climate is associated with more integrated friendship networks. While this finding was not expected, there are potential explanations for it. Other research indicates that for white students, interpersonal interactions
may be meaningful indicators of school racial climates (Blauner, 1989). Though I made the inherent assumption that cross-race friendship networks are positive for the school racial climate, it is possible that school-level integrated friendship networks are indicators of a negative school racial climate because they may uncover negative interracial relationships, stereotype exchanges, and prejudicial thoughts and expectations that would otherwise be hidden in the presence of segregated friendship networks (Hurtado, 1992).

It is important to note that since both the school racial climate and the segregation index are measured at the school-level, a non significant finding for black students and a significant finding for white students suggest that, despite the fact that schools in this study are integrated, there are still school racial climate differences in the types of schools black students and white students attend. Though I did not expect for the segregation index to differ as an indicator of the school racial climate for black and white youth, the findings suggest otherwise and the segregation index was not used for measurement invariance testing.

Both racial busing and the segregation index thus were eliminated from the measurement model because they were not valid indicators of the school racial climate for all race-gender subgroups. The remaining eight indicators that were relevant included the following: white salience, black salience, relative white to black centrality, relative differences in white versus black students participation in sports, academic, leadership, and other extracurriculars, and the percent of black teachers within a school. The direction of the relationship between the school racial climate and each indicator was the same for all race-gender subgroups, but for all groups the relationship between school racial climate and white salience was in the opposite direction than predicted. That is, the weaker the preference of white students for white friends, the more negative the racial climate.
The relationship between a negative school racial climate and white salience was puzzling. I hypothesized that a more negative school racial climate would be indicated by a stronger preference for same-race friendships among white adolescents because Contact Theory suggests that sincere interactions among groups is a necessary condition of positive intergroup contact. I posited that white salience would be a proxy for lack of sincerity in having integrated friendships but results showed the opposite. An explanation for this finding may reside in the conceptualization of the school racial climate variable. The performance of the indicators of the school racial climate seat a more negative climate in the context of a white-dominated school environment where white students are more central to the network and more active in extracurricular activities compared to black students. In a white-dominated negative school racial climate, weaker preferences for same-race friends among white students may be an indicator of a negative school racial climate because it interrupts the status quo of white dominance. Alternatively, it is possible that with the schools included in this study the magnitude of white salience was underestimated. White salience ranged from 1.01-4.32 (higher number indicating more salience) with an average of 1.67. Perhaps a larger sample of schools would have resulted in a higher average white salience that would have performed as predicted by Contact Theory because of more variability among schools. Despite the fact that white salience was not associated with school racial climate in the direction I predicted, I kept it in the measurement model because it was a valid indicator of the measure.

It should be noted that the findings for white salience are in concert with those for the segregation index because a weaker preference of white students for white friends would be associated with a more integrated friendship network.
Overall, the findings showed that a more negative school racial climate was indicated by a weaker preference among white students for white friends, a stronger preference among black students for black friends, white students being more central to the network, larger proportions of white students participating in extracurricular activities, and smaller percentages of black teachers. As noted earlier, this measure of a more negative school racial climate was largely reflective of white dominance within schools in terms of centrality to the network and participation in activities. Configural variance (the same factor structure) was obtained across race-gender subgroups because all indicators provided significant contribution to the underlying school racial climate latent variable. This measurement model provided the base model through which I initiated additional tests of measurement invariance.

Measurement invariance testing was necessary as a condition of testing the full structural equation model across multiple subgroups. Measurement invariance testing, “tests whether the equations used to create the latent factor scores are equal across groups (or across a continuous variable), thus ensuring that the constructs are operationalized similarly” (Sass, 2011). Strong factorial invariance testing requires invariant factor loadings, item intercepts and residual variances across groups means (Sass, 2011). When any one of these conditions is not met, measurement invariance is not achieved.

Prior to statistical assessment of factor loadings, item intercepts and residual variances, general measurement patterns were observed across subgroups. Patterns suggested that the direction of relationships between the school racial climate and each individual indicator were the same regardless of race-gender subgroup. Additionally, the pattern of factor loading magnitudes were similar. The largest significant contributions to the
calculation of the school racial climate came from white salience, white to black relative measures of Bonacich centrality and participation in extracurricular activities. The smallest significant contributions to the calculation of the school racial climate came from black salience and the percent of black teachers within a school. For all race-gender subgroups, the absolute strongest contribution to the school racial climate came from white to black differences in sports extracurricular activities (0.98-0.99) and the absolute smallest, but significant contribution came from black salience (0.47-0.53). There were no race-gender subgroup differences in the performance of the remaining indicators (same-race friendship preferences, white to black relative Bonacich centrality, white to black relative participation in extracurricular activities, and percent black teachers) in measurement models of the school racial climate.

These general patterns suggest some rationale for making comparisons in the school racial climate across groups because of the similarities in which indicators matter most and in the direction of relationships of indicators with the latent school racial climate variable. Statistical analysis of the similarity of factor loadings provided a test of metric invariance and statistical results matched those of overall pattern similarities. The factor loadings were not significantly different across race-gender subgroups and this means that each item’s contribution to the calculation of the school racial climate was similar for black males, black females, white males, and white females. Further, invariance of the factor loadings suggested that the school racial climate had the same conceptual meaning across groups and that none of the final indicators were more relevant for one group versus any other group. Metric invariance is also called “weak factorial invariance” because while it does indicate that the factor structure and factor loadings of school racial climate are similar across groups, it does
not determine whether the magnitude of each indicator’s contribution to the magnitude of school racial climate is similar across groups.

In order to compare group means of the school racial climate, all indicators have to contribute to the magnitude of the school racial climate mean in a similar way based on measurement scales. Patterns of item intercepts and subsequent statistical testing of item intercept magnitudes demonstrated significant differences across groups. The lack of invariance among item intercepts suggests that certain items contained an over or underestimation bias in the measurement of the school racial climate for different groups. An overestimation bias indicates that the item intercept is actually higher than what the model would predict when constraining intercepts to be equal to one another. An underestimation bias indicates that the item intercept is actually lower than what the model would predict under equality constraints. White males and females had item intercepts that were higher in magnitude compared to black males and females for measures of black salience, white to black relative Bonacich centrality, and white to black relative participation in extracurricular activities. In other words, white males and females with the exact same school racial climate score had higher item responses of black salience, white to black relative Bonacich centrality, and white to black relative participation in extracurricular activities, compared to black males and females. Intercept invariance requires that all of the intercepts be held equal to one another. If black males were the reference group, and item intercepts were constrained to be equal based on the item intercept for black males, then there would be underestimation bias contained in the item intercept for white males and females. This would result in an underestimation of the school racial climate for white males and females.
For black males and females, item intercepts for white salience and percent black teachers were higher than they were for white males and females. Thus, black males and females with the exact same school racial climate score had higher item responses for white salience and percent black teachers than white males and females. Again, intercept invariance requires that the item intercepts be held equally across groups. Using black males as the reference group, this means that a more negative school racial climate may be overestimated for white males and females because of the overestimation bias contained in the intercepts of white salience and percent black teachers when constrained to be equal to black males.

A basic goal of measurement invariance testing was that it would allow me to compare the mean or average of the school racial climate across race-gender subgroups. The invariance in the item intercepts, however, suggests that if the school racial climate means were not required to be equal across groups, then the magnitude of the school racial climate measure would be higher in white males and females due to these groups having higher item intercepts on six out of the eight indicators of the school racial climate. Thus, white males and females would be more likely to have more negative racial climates than black males and females, based on my measurement of the school racial climate.

Because I conceptualized the racial climate as a structural factor and used all school-level variables as indicators, I expected that it would be measured similarly for both black and white students. My findings suggested that the indicators of school racial climate contributed to the underlying concept in a similar conceptual way. However, the magnitude of differences of the item intercepts highlight race-gender subgroup differences in the measurement of the school racial climate. This may provide some indication that even though black and white students were integrated within the schools that I used in my study, the
amount of integration was not sufficient to characterize a general racial climate irrespective of race. For example, if all of the integrated schools were mostly white or black students versus more even distributions, then racial differences in the measurement of school racial climate may be expected when students are combined across schools. A review of campus racial climates concluded that most studies find that black and white students’ perceptions of the racial climate differ (Hurtado, 1992). While I would expect perceptions to differ, I expected structural measures to be similar across groups. Overall, based on the results of measurement invariance testing, reliable comparisons of the school racial climate across race-gender subgroups would not be reasonable suggesting the school racial climate is differentially experienced and measured for different race-gender subgroups.

Because I moved forward with analyzing separate models for race-gender subgroups, I added the segregation index back into the measurement of the school racial climate for white males and white females because it was a valid indicator for these groups.

5.3 **Relevance of Prejudice and Unfair Treatment in Study Population**

The two constructs of prejudice and unfair treatment were used as indicators of the broader construct of discrimination. All results with these two variables should be interpreted with caution because as single item measures, and not more nuanced scales, poor measurement is of concern. While scales measuring prejudice and unfair treatment are available, they were not included in the Add Health Survey. Measurement limitations are described in more detail in the Limitations section of this Discussion. Nonetheless, I expected that prejudice and unfair treatment would be positively associated with each other. The positive correlation between the two mediator variables was small, although statistically significant. The small magnitude of the correlation provides some indication that while...
prejudice and unfair treatment are similar constructs, they are likely measuring two different aspects of discrimination.

Intuitively, the term prejudice is associated with some type of racial or gender-related discrimination, while the term unfair treatment is more general and relevant to all people, regardless of racial-ethnic background (Guyll, Matthews, & Bromberger, 2001; Williams, Yu, Jackson, & Anderson, 1997; Williams, Neighbors, & Jackson, 2008). The finding that prejudice and unfair treatment had small positive associations supported my decision to keep them separate in my analysis, because adding them together would not necessarily represent an accurate characterization of each independent measure.

5.3.1 White Adolescents Report More Prejudice than Black Adolescents

In the literature on experiences of racial discrimination and its many correlates, including prejudice and unfair treatment, the large majority finds that minorities experience more discrimination than whites (Greene, Way, & Pahl, 2006; Krieger & Sidney, 1996; Seaton, Caldwell, Sellers, & Jackson, 2008).

While I expected more black students to report that students in their school were prejudiced, results showed the opposite, that white students were more likely to report that students in their school were prejudiced. I also expected that black male adolescents would be most likely to endorse that students in their school are prejudiced because of facts such as the negative portrayal of black men in our society through the media and through news reporting. Negative media portrayals represent just one example of the many reasons why black males might be especially vulnerable to perceiving prejudiced treatment. However, white males and females both reported perceiving more prejudice than black males and females, with no significant differences by gender within racial group. Although one
potential explanation for this finding is that black students in this sample did not experience as much prejudice compared to white students, this is unlikely, based on the volume of research that states the opposite. As another explanation, perhaps white students share and talk among themselves about prejudicial feelings towards black students, leaving black students unaware of the extent of white students’ prejudice. White students, thus, might be more likely than black students to agree that other students in their school were prejudiced. A third explanation may reside in the Minimization Hypothesis by Ruggiero and Taylor which suggests that black adolescents may be less likely to agree that students in their school are prejudice because minimizing discrimination can result in stronger feelings of control over one’s circumstances and social environments and a higher social self-esteem (Ruggiero & Taylor, 1997). Despite the psychological benefits of minimizing discrimination, at the societal level, those who minimize discrimination are also less likely to try to address and try to change discriminatory-related practices and injustices.

5.3.2 Black Adolescents Report More Unfair Treatment than White Adolescents

Similar to prejudice, I expected black students to report more unfair treatment than white students, and findings supported this expectation. Black males reported more unfair treatment than white males, but did not report more unfair treatment than any other race-gender subgroup. Black females reported more unfair treatment than both white males and females. This is consistent with some data that indicates that minorities are more likely to be sent to the office, disciplined or expelled (Wallace Jr, Goodkind, Wallace, & Bachman, 2008).

Despite the findings that black youth reported more unfair treatment than white youth, the single-item measure of unfair treatment available was likely inadequate in my
model because, as indicated above, unfair treatment is not necessarily related to race. The item did not qualify whether unfair treatment question was due to race, ethnicity, or any other individual attribute. In contrast to this single-item measure, in a discrimination survey developed by Williams et al., after asking about unfair treatment, subjects are asked whether or not they believe that the unfair treatment was based on their race, gender, body size, sexual orientation, or other types of identities (Williams, Yu, Jackson, & Anderson, 1997). The wording specifically allows for a more precise assessment of why people think they may be treated unfairly. Had such a measure been available, stronger endorsement of unfair treatment by black youth and white youth might have been obtained. Even so, I expected the measure would capture unfair treatment by race and gender because black males and females in general are more likely to be disciplined in school than white males and females and could attribute that to unfair treatment (Skiba, Michael, Nardo, & Peterson, 2002; Wallace Jr, Goodkind, Wallace, & Bachman, 2008). A more detailed measure of unfair treatment that includes multiple items and reference to race and gender would have been desirable.

5.4 Summary of findings for Black Males

Results from SEM testing for black males provided strong support for my hypothesized conceptual model. The significant mediated effect of prejudice on the relationship between school racial climate and sedentary behavior was supported and an interesting finding of inconsistent mediation was present.

5.4.1 Inconsistent Mediation for Black Males Only

The hypothesized relations between school racial climate, prejudice, and sedentary behavior were based on basic principles of stress coping theory that suggest that increased stress leads to increased coping, with the expectation that sedentary behavior is a coping
strategy. The empirical literature identifies sedentary behavior as a coping strategy in adults (Krueger & Chang, 2008; Ng & Jeffery, 2003; Steptoe, Wardle, Pollard, Canaan, & Davies, 1996) and there is some evidence that adolescents cope by engaging in sedentary pursuits such as watching television (Hutchinson et. al., 2006; Arnett, 1995; Kurdek, 1987). When the putative mediator, prejudice, was added to the model, however, a positive indirect effect of school racial climate on sedentary behavior became apparent indicating that inconsistent or suppression mediation occurred for black males (D. P. MacKinnon, Krull, & Lockwood, 2000). Inconsistent or suppression mediation is defined by a reversal in the sign of the direct versus mediated relationship between an independent and dependent variable (D. P. MacKinnon, Krull, & Lockwood, 2000).

Findings for black males suggest that sedentary behavior may not be a consistent coping behavior for this subgroup. Directly, sedentary behavior decreases with a more negative school racial climate. This direct relationship highlights an unexpected direction of influence of the school context on individual level behavior based on stress-coping behavior models. In the presence of prejudice, sedentary behavior increases with a more negative school racial climate. This indirect relationship emphasizes the power of individually-measured prejudice to affect the direction of the relationship between a stressful school context and an individual-level coping behavior. Without including the mediator in the model, sedentary behavior would not have been concluded to be a type of coping behavior because it did not respond to a stressful environment the way stress-coping behavior paradigms predict. The finding of inconsistent mediation for black males highlights the importance of considering pathways by which contextual variables influence individuals
because without the mediator of prejudice, the conclusions would have been contrary to my hypothesis.

Findings for black males demonstrated support for my conceptual model, but no other statistically significant mediation occurred for any of the other race-gender subgroups. While there were fairly consistent relationships between school racial climate and prejudice, and between school racial climate and unfair treatment for some subgroups, the lack of association between sedentary behavior and school racial climate, unfair treatment and prejudice contributed to many of the null findings in my dissertation for black females, white males, and white females.

5.5  **Summary of Findings for other Race-Gender Subgroups**

Despite the lack of significance of the overall model for black females, white males, and white females, direct relationships were assessed including the relationships of school racial climate with prejudice and unfair treatment, prejudice and unfair treatment with sedentary behavior, and school racial climate with sedentary behavior.

5.5.1. **Summary for Black Females**

For black females, the significant positive relationship between a more negative school racial climate and prejudice was as expected. This relationship was in part predicted by the Integrative Model of Development that highlights the relationships between school environments and prejudice (Coll et al., 1996). The hypothesized link between the school racial climate and prejudice was also expected based on empirical findings that characteristics of school contexts impact experiences of prejudice (Seaton & Yip, 2009). Beyond this significant relationship, however, no other significant relationships were found for black females.
Despite lacking significance, the direction of the relationship between school racial climate and sedentary behavior was in the predicted positive direction, but the negative relationship between prejudice and sedentary behavior was not as expected. These findings provide only marginal support for sedentary behavior as a coping behavior for black females.

5.5.2. Summary for White Females

For white females, the nonsignificant relationships between variables in the structural model indicate that while the data fit the model well, the school racial climate was not a meaningful predictor of prejudice, unfair treatment, or sedentary behavior.

The nonexistent relationships between school racial climate and the mediator and dependent variables for white females would be predicted by the Integrative Model because that model suggests the relationships only apply for adolescents of color.

Because neither school racial climate nor prejudice nor unfair treatment predicted sedentary behavior in white females, sedentary behavior is not a coping strategy, at least with regard to these stressors. The school racial climate may not represent a particularly stressful context for white females because its measurement reflects white students being more dominant in the school. In a similar way, prejudice and unfair treatment may not be relevant stressors for white females. The misidentification of valid measures of stress both at the contextual and individual levels may reduce the usefulness of the stress-coping behavior paradigm to guide study hypotheses for white females.

5.5.3. Summary for White Males

For white males, marginally significant relationships were present between school racial climate and sedentary behavior, and prejudice and sedentary behavior, but both were negative relationships, the opposite of what I predicted. Therefore, among white males,
sedentary behavior did not perform as I hypothesized it would based on my conceptualization of sedentary behavior as a negative coping behavior. This may be because what I call a more negative school racial climate is measured based on white students being dominant within a school, and therefore is not likely a source of stress for white males, as suggested for white females above. Without the stressful context, coping would not be required. The stress-coping behavior model, in this case, would not apply. The negative relationship between school racial climate and sedentary behavior suggests that a white-dominant negative school racial climate offers positive effects by reducing sedentary behavior for white males. Similar relationships are found between prejudice and sedentary behavior. It is likely that prejudice is not an individual-level stressor for white males and therefore has positive rather than negative associations with sedentary behavior.

Finally, no significant relationships were present for white males between the school racial climate and prejudice or unfair treatment, which suggests that the Integrative Model of Development that was developed for children of color and may be relevant for white females, is not relevant for white males. Additionally, the indicators of Contact Theory that I selected to inform the school racial climate measure may not be meaningful in terms of relationships with prejudice for white males, even if they do combine to form a strong reliable measure of the school racial climate. It is possible that other indicators of the school racial climate might be more meaningful in terms of prejudice for white males. It is also possible that for white males, prejudice is not affected by a negative school racial climate in the case that climate is white dominated. An alternative explanation is that because white males are not considered to be a minority in the United States in terms of race or gender, experiences of prejudice are
less affected by what is happening within schools and more affected by other factors that I did not measure in my study.

5.6 Summary of Empirical Findings

In summary, I found support for the following hypothesized relationships: a mediated effect of prejudice on the relationship between school racial climate and sedentary behavior for black males, a positive relationship between a negative school racial climate and prejudice for black females, and a modest negative relationship between a negative school racial climate and sedentary behavior for white males. These modest findings may be an indication that with better measures and conceptualization of a school racial climate that would be stressful for all adolescents, the data would better fit the hypothesized model across all subgroups. On the other hand, these findings strongly suggest that the best measure of school racial climate for black and white youth would be separate and unique to each group, comprised of indicators most meaningful and relevant for each subgroup.

5.7 Limitations

5.7.1 Measurement Related Limitations

The study has several measurement related limitations. First, there is the question of whether self-reports of sedentary behavior were reliable and valid. Self-report measures are limited because individuals may be unable or choose not to report correct information. Additionally, reporting errors may be present due to the time frame for the questions. The Add Health survey asked students to recall the number of hours they spent watching television, watching videos, or playing video games during the past week. A week is a long span of time to recall any type of behavior when consistent journaling or record keeping is
not taking place. It is possible that adolescents had a challenging time answering the questions leading to inaccurate data. An additional possible limitation is that summing the total number of hours engaged in sedentary behavior over- or underestimated the time that adolescents truly spent in sedentary behavior. An overestimation may have occurred if adolescents were simultaneously engaging in activity and sedentary behavior. For example, watching videos while dancing, or playing video games that involved active movement. An underestimation may have occurred if adolescents had difficult recalling the number of hours spent in sedentary pursuits across the week. Even so, the measure of sedentary behavior was associated with demographic variables in a similar manner to other studies suggesting that it may have been a valid measure of sedentary behavior.

There were also limitations to the measurement of prejudice and unfair treatment. Both constructs were measured with single-items. Ideally, the two items could have been combined to form a measure of discrimination, but the items were not highly correlated suggesting that they were tapping into two different concepts. For example, the unfair treatment measure may have been more relevant to individual experiences and the prejudice measure may have been more relevant to school culture. I decided to keep the measures separate in the analysis to determine if the effect of school racial climate differed for individual experiences of discrimination versus school culture around discrimination. Although the single-item measures were not ideal, they have been used and published in peer-reviewed journals (Goosby & Walsemann, 2011). Further, the use of them did not negate potential contributions to the health disparities literature, and results find some support for an association between the school racial climate and prejudice that should be further investigated with better measures.
The limitations of self-reported measures apply to some of the individual-level covariates based on either the adolescent or parent report. Family income data could have been inaccurate if it was difficult for parents to recall and estimate income totals correctly. Additionally, many individuals are not comfortable with reporting income and may choose not to answer those questions. Family income and parent education could have been overestimated if embarrassment or an individual’s desire to please the interviewer with a favorable response led to higher income and education reporting. These potential challenges were not of significant concern because my study looked at racial disparities and there is no reason to believe that overestimation of income or parent education would occur disproportionately among parents of black students compared to parents of white students.

As control variables, family education and parent income were likely sufficiently measured via self-report. Additionally, many peer-reviewed articles from Add Health using self-reported family income and parent education have been published.

In summary, while there were measurement-related limitations that should be considered in data interpretation, none of the limitations were severe enough to completely impede data interpretation.

5.7.2 Survey and Sample Related Limitations

Sample sizes in Add Health did not allow for the inclusion of any minority groups other than black adolescents, although the school-level measures of cross-race friendships did include other minorities. The sample limits the generalizability of results to only black and white adolescents. Given that different minorities have very different histories and experiences in the United States, the application of the conceptual model to other race/ethnic groups than black and white youth may not be justified. Black adolescents are termed
“involuntary immigrants” because the majority of their ancestors came to the United States by way of the slave trade (Coll et al., 1996). Not all families of black adolescents in the Add Health study came to the United States via the slave trade, however. Some were of Caribbean decent or more recent immigrants who more voluntarily arrived to the United States. While it was not possible to include adolescents of other race/ethnicities in my study due to sample size, studies of the effect of discrimination and socially constructed-race may not operate the same across all race/ethnicity groups, even if the data were available.

In addition to adolescent-level sample size limitations, school-level sample size limitations were present. Sample inclusion and exclusion requirements for my study limited the number of schools to fifty five. This was a sufficient number of schools to perform my analyses. However, in order to make sure that the number of parameters that the model estimated did not exceed the number of units of schools (K. A. Bollen, 1989), I had to enter hypothesized control variables into the model one at a time, and permanently remove any control variables that lacked significant relationships with either school racial climate or sedentary behavior. It would have been optimal to have larger numbers of schools so that all control variables could be entered into the model simultaneously and retained. Eliminating nonsignificant controls, however, is a reasonable strategy to limit the number of parameters estimated by a model. If the hypothesized control variable does not have significant associations with school racial climate or sedentary behavior then it lacks the empirical evidence to be called a control variable.

A final limitation related to survey and sample is that the Add Health Survey collected Wave 1 data in 1994-1995, which predates some of the technological advances of MP3 players, iPads, and smartphones, and may underestimate the amount of sedentary
behavior among youth. The data are several years old, but there is some indication that while the types of sedentary pursuits differ, the average amount of time spent in sedentary pursuits had not changed between 1950 and the 1990’s (Biddle, 2004). If the amount of sedentary pursuits has increased, as other authors suggest, my study results would potentially underestimate the number and the strength of significant relationships between sedentary behavior and other variables of interest.

5.7.3 Analytical Related Limitations

Analytically, the results may have been strengthened by assessing relationships among variables over a longer period of time than the one to two year time span between Waves 1 and 2. It is possible that exposures to a negative racial climate, prejudice, or unfair treatment during adolescence could have an effect on individuals later in their lives. Analyses of this nature are possible to conduct using later waves of Add Health. More studies are looking at exposures in adolescence as they relate to health outcomes in young adulthood. For example, a study by Goosby and Walsemann found that black adolescents reported poorer health during adulthood if they attended majority white schools (Goosby & Walsemann, 2011). In another recent study, Nicholson and Browning found an effect of neighborhood disadvantage in adolescence on young adult obesity among females (Nicholson & Browning, 2012). There is certainly room in the literature to contribute findings about long term effects of adolescent experiences of negative racial school climates, prejudice, and unfair treatment.

Additional limitations were present due to the analytical complexity of my model and the Add Health data structure. Complex survey data is typically analyzed using the “type = complex” specification in MPLUS as this allows the researcher to input stratification
variables, cluster variables, survey weights, and to specify subpopulations. Subpopulation specification is necessary so that appropriate survey weights are applied during analysis. While “type=complex” could account for the multi-level structure of Add Health, it did not allow me to specify separate models for both the individual and school levels, which was necessary to answer my research questions. “type=twolevel” was an alternative approach that did allow me to specify separate individual and school-level models, but required a different approach in order to take into account the complex nature of the survey. I was able to specify subpopulations using the “useobservations” command. I tested my assumption that parameter estimates and standard errors would not be significantly different when using the “useobservations” versus “subpopulation” commands and confirmed that this was the case. Additionally, I was not able to name the stratification variable, but I was able to include it as a control variable in the full models. Even though MPLUS was limited in its ability to handle my analysis in a straightforward manner, the software package did allow alternative approaches to be certain that the sampling design and analytical specifications were included appropriately.

5.8 Strengths

This dissertation has a number of strengths. The major strength of my dissertation was the development of a theoretically-informed, structural, school racial climate variable. The fact that the measure and indicator selection were informed and guided by Contact Theory gives the resulting school racial climate variable strong theoretical support, which is absent for other measures of the school racial climate. The use of structural indicators that reflected cross-race interactions among black and white students, and the percent of black teachers, reflected a novel approach to measuring the school racial climate. It expanded on
previous measures of cross-race interactions that simply relied on racial composition by including more detailed and nuanced estimations of how black and white students interact with one another through friendships and participation in extracurricular activities, as well as race-based friendship preferences, centrality to the network, and the percentages of black teachers. Also, measuring the school racial climate through these school-level indicators is vastly different from asking students about their perceptions of the racial climate which is how climates are typically assessed. Rather than measuring the school racial climate as a psychosocial construct, as has been done in previous research, I measured the school racial climate as a structural construct (Green, Adams, & Turner, 1988). Even when school racial climates are assessed with more structural variables like school size, the selection of those structural variables tend to lack theoretical significance (Hurtado, 1992).

My study was also strong because it assessed whether the school racial climate was measurement invariant across comparison groups. Although it was not measurement invariant, school racial climate did have metric invariance suggesting that the indicators contributed similarly to the meaning of the underlying construct for black males, black females, white males, and white females. Measurement invariance testing is a step often overlooked by sociobehavioral researchers, and yet my results revealed important information that led me to conclude it was unwise to look at race-gender differences in the effects of the school racial climate (Sass, 2011). If I neglected to test for measurement invariance, I would have misinterpreted study findings of group differences between school racial climate and sedentary behavior. Other studies have also highlighted the importance of testing measures across populations before making comparisons across group. Perriera and colleagues, for example, examined the CES-D across a variety of different racial, ethnic, and
immigrant status adolescents and found that the CES-D in its entirety was not measurement invariant across groups (Perreira, Deeb-Sossa, Harris, & Bollen, 2005). The results of my study provide additional support for the implications of that study: that measures should be tested within groups before comparisons of relationships between that measure and outcomes can be made across groups.

In addition to having a theoretically-grounded measure of the school racial climate, my overall conceptual model has a strong grounding in theoretical perspectives and the empirical literature that provided strong rationales for the hypothesized relationships. Without the use of theory, it would have been difficult for me to understand and interpret the relationships I found in my study (Dean, 1996). Using theory as a guide, for example, I was able to note that Contact Theory was a useful way to conceptualize the school racial climate measure. I was also able to explain that the school racial climate might be more relevant to students of color based on ideas from the Integrative Model, which suggests that non-encouraging environments like negative school racial climates would be more relevant to children of color. Lastly, rather than rejecting the usefulness of stress-coping paradigms that are widely used in public health research, I was able to determine that stress-coping paradigms were not applicable to white males and females because the school racial climate was not a likely stressful context for these groups. Theory helped me to organize information to draw conclusions about the predictive nature of the variables in my conceptual model and to learn new knowledge about the meaning of a school racial climate measured from structural indicators.

Another strength of my work is that the dissertation moves beyond the establishment of disparities in sedentary behavior and towards investigating reasons why the disparities
exist in the first place. Even though I was not able to make direct statistical comparisons by race-gender subgroups, findings suggest that differences do reside in the ways that school contexts affect health behaviors across adolescents of different race-gender subgroups.

Further, my study was strong because it was multilevel in design allowing me to contribute to understanding how the school context may shape health behaviors differently for adolescents of different race-gender subgroups. Multilevel studies move beyond identifying individual factors that lead to health behaviors by directly measuring characteristics of context that may influence health behaviors. Rather than simply suggesting that factors external to adolescents impact sedentary behavior, I chose to model one factor, the school racial climate. The ability to use a multilevel model resided in the strength of the data used in my study. Add Health is a rich data source because the sample is nationally-representative and includes information on individuals, friends, families, schools, neighborhoods, and census tracts. Using Add Health allowed me to look at the interactions of students across race and within schools.

Finally, my study investigated an understudied health behavior, sedentary behavior, that has gained additional interest in recent times due to its significant effect on the health and well being of people, independent of physical activity. This is a strength of my study because it is a health behavior that shows significant disparities, but has yet to be explored extensively in the published literature. The reality of our world today, and the propensity with which technology encourages sedentary behavior, calls for more investigation into how we can decrease the amount of sedentary behavior in which people engage.
5.9 Future work

Both the significant and nonsignificant findings in my dissertation will inform future work related to understanding racial disparities in adolescent sedentary and other health behaviors. First, I would reconceptualize the school racial climate measure. While Contact Theory was useful in selecting indicators of the school racial climate, there may be other indicators that are more consistently associated with the conditions of Contact Theory, and that do a better job as indicators of the school racial climate in a way that is measured similarly for both black and white students. For example, a better proxy for equal status of black and white students may be a measure of racial differences in earning school-related awards and honors. A better proxy of administrator support of cross-race interactions may be the existence and quality of diversity and cultural humility programs and workshops within schools. Measures like these are not available in the Add Health Survey so I would need to determine whether an existing dataset contains such measures, or whether to do primary data collection in order to have access to desired variables.

Finding indicators of school racial climate that are meaningful for both black and white students may not be practical. Studies of perceived racial climate and my study of structural racial climate both indicate that racial climates differ across racial groups, and sometimes across gender groups as well. In this case, it would be prudent for future work to investigate how the school racial climate differs by race-gender subgroup and to determine which indicators of school racial climate are most relevant for different subgroups. Understanding similarities and differences in the measurement of school racial climate would certainly add to the discourse of its relevance to health behavior and other disparities.
Reconsideration of the data used to examine relationships is also important so that better measures of prejudice and unfair treatment are used. Add Health contains only single-item measures, but multiple-item measures do exist in other surveys and would provide a better understanding of whether prejudice and unfair treatment are stressors adolescents experience that lead to increased coping behavior engagement. The use of a different dataset may improve the quality of some measures, while adding new limitations to a study of this nature. For example, The National Survey of American Life is a survey of 1,170 adolescents with detailed measures of discrimination and sedentary behavior, but it only contains data for black youth and there is less information on the school context (ICPSR). This dataset would be useful, though, to look at similarities and differences in the school racial climate and its association with other variables between black males and black females, and possibly also between recent immigrants and nonimmigrants.

Additionally, future work should include an explicit assessment of whether the assumption that sedentary behavior is a coping behavior is supported. To do this, I would identify more typical stressors and determine if they are significantly associated with sedentary behavior in the predicted direction. I would test these associations across different race-gender subgroups because coping behaviors can differ by race and gender. In the event that sedentary behavior is not a consistent coping behavior among adolescents, I would consult the published literature and re-conceptualize what type of coping health behavior may be more relevant for my conceptual model. The literature suggests that violence may be a relevant health behavior to consider as a way of coping in response to school-level interracial conflict (T. M. N. Eitle & Eitle, 2004).
In addition to reorganizing my conceptual model by improving the measurement of the school racial climate, prejudice, unfair treatment, and sedentary behavior, future work related to this study would also include modeling the long-term health behavior effects of negative school racial climates, prejudice and unfair treatment experienced in adolescence. My conceptual model was limited to variables collected during adolescence and did not extend into young adulthood. However, several surveys have additional waves of data available beyond what I used and therefore additional inquiry can be made as to longitudinal effects on coping behaviors into young adulthood. There is some reason to believe that exposure to discrimination and other hardships during youth can translate to engagement in health behaviors in the future, however this has not be readily studied specific to health behaviors (Goosby & Walsemann, 2011).

Finally, it may be useful to reconceptualize the relationship between school racial climate and negative coping behaviors through the lens of a more detailed theory, such as Lazarus and Folkman’s transactional theory of stress and coping (Lazarus & Folkman, 1987). This theory specifies additional pathways and mechanisms that may contribute to understanding adolescent racial health disparities in response to stressful contexts.

5.10 Implications for Policy and Practice

5.10.1 Study Specific Implications for Policy and Practice

The main findings from my dissertation, that for black males, prejudice mediated the relationship between school racial climate and sedentary behavior, and that there is an association between the school racial climate and prejudice for black and white females suggests that there would be value in considering how the school context can contribute to racial disparities among adolescents. Whether the racial disparities exist at the level of
prejudice, or at the level of the health behavior, the school context can indeed be impactful on the day to day experiences of students. These findings suggest a need for additional studies to provide more knowledge in this area because we know that school contexts can be changed. For example, if additional research confirms the importance of diverse faculty in decreasing health behavior disparities, then schools administrators could make greater efforts to diversify their faculty. Having the opportunity to see teachers with different racial and ethnic background can serve as a visual sign that schools support diversity at the level of instruction and role modeling. Additionally, a diverse faculty can create a more diverse educational experience and awareness for all students within a school. School administrators can also improve racial climate by encouraging and supporting students from all backgrounds to become involved in extracurricular activities where united goals may encourage cross race friendships if additional research suggests that the racial climate is indeed impactful.

The assumption of multi-level studies is that the contextual level affects everybody in the exposed population, but my results suggest that the conceptualization and effects of the contextual level can differ greatly for different subgroups of the population, across different outcomes, if effects exist at all. This certainly has implications for a structural approach to public health problems. We traditionally think that a structural approach intervention is preferred because it affects everybody in the population and thus benefits the population as a whole (Rose, Khaw, & Marmot, 2008). One of the critiques of Rose’s approach is that a population or structural approach does not necessarily address the problem of health disparities (Frohlich & Potvin, 2008). In the case of my study, where adolescents within schools are the defined population, a structural approach of encouraging a more positive racial climate, something presumed to affect everyone within a school, might decrease only
black males’ participation in sedentary behavior. This would decrease health disparities because black males would be engaging in sedentary behaviors at a more similar frequency to white males. Findings from my study suggest that certain structural factors may not necessarily affect all people within the same population, at least to a degree that can be statistically detected, and that addressing certain structural factors may address health disparities, particularly when structural factors are more relevant for one group compared to another.

Lastly, the findings of my study suggest that policies created to promote integration of students within schools are insufficient strategies to improve outcomes. The composition of students within schools can create either a positive or negative racial climate depending on other structural characteristics of the schools, for example, as examined in this dissertation, the percentages of black teachers, the interactions among students of different races, and the relative popularity and participation of black and white students in extracurricular activities. To understand when integration leads to positive outcomes, but it is critical to investigate and understand how integration impacts the school racial climate.

5.10.2 Global Implications for Policy and Practice

The substantive interest of my dissertation was health disparities and while I hoped to be able to compare differences across race and gender, it was necessary to make these comparisons without sound evidence that the latent variable I created operated similarly across all groups. If the measure does not operate similarly across, which it did not in this case, then any results comparing groups lack interpretable quality (Perreira, Deeb-Sossa, Harris, & Bollen, 2005). While I chose to conduct measurement invariance testing for my study, it is not a common practice among researchers and perhaps may be a source of
inaccurate findings (Meredith, 1993; Perreira, Deeb-Sossa, Harris, & Bollen, 2005). It is more common to assume that constructs and measures mean the same thing for all people, when in fact most measures were not developed in diverse populations and therefore have not been validated and tested among diverse subgroups. For health disparities research, it is imperative that we improve measurement as we seek to find solutions to narrow disparities gaps. Drawing conclusions about factors that cause health disparities, without knowledge of whether these factors can truly be compared across the disparate groups, can incorrectly inform intervention development that targets potentially irrelevant constructs. Putting a stronger emphasis on measurement could move the health disparities literature from documentation of disparities towards having a better understanding of what factors truly matter for disparities, and for which group these factors matter.

Findings from my dissertation also have implications for public health because they move past the demonstration of racial health disparities and move towards understanding why they exist and persist, for example, how the school racial climate may be an important factor in adolescent health behavior disparities. The problem with continually documenting racial disparities in health without providing explanation for their existence is that it puts racial minorities in an undesirable light with respect to health, further opening the door for victim-blaming and stereotyping (Blum et al., 2000; Coll et al., 1996). My attempt to model contextual factors that may influence health disparities reflected a fundamental causes approach. A fundamental causes approach has the potential to explicate the underlying factors responsible for a variety of different health behaviors because it addresses constructs that underlie fundamental inequalities in access and opportunity (Link & Phelan, 1995).
5.11 Conclusion

Despite stated goals to reduce health disparities by the Healthy People Reports, little progress has been made. To reduce health disparities, understanding how and why they develop is needed. Much of the health disparities research to date has been conducted with a focus on individual-level determinants of health. Similarly, interventions designed to reduce health disparities often focus at the individual and sometimes at the interpersonal levels of the Socio-ecological Framework. Because we have seen little sustained success by focusing at these levels, we must consider alternative explanations for both the causes and the solutions of health disparities. My work moves beyond understanding individual and interpersonal-level factors that impact sedentary behavior and towards understanding how the context and environments in which those behaviors are shaped, impact the disparities that we see. Disparities research must continue in this direction to determine how best to narrow health disparities gaps.

My study found that for black males, a more negative school racial climate leads to increased prejudice, which leads to increased sedentary behavior. While trends were not significant for any other race-gender subgroups, evaluation of direct relationships among study variables suggest there is a need to continue to investigate how the school context, and the school racial climate specifically, impact racial disparities in adolescent health behavior. More investigation needs to be done to understand if adolescents engage in health behaviors to cope with discrimination-related stress and how the school context could affect engagement in those behaviors through plausible mediators such as prejudice and unfair treatment.
### Appendix: Tables and Figures

**Table 1. Missing Data***

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*notes. *only variables with missing data included
Table 2. Characteristics of the Sample: Demographic and School Characteristics, Total and by Race and Gender

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Racial
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Notes: 
³significant test of proportion in medium school size between black and white adolescents
³significant test of proportions (p<.05) in large school size between black and white adolescents
³significant test of proportions (p<.05) in urban schools between black and white adolescents
³significant test of proportions (p<.05) in public schools between black and white adolescents
³significant test of proportions (p<.05) in racial busing between black and white adolescents
Table 3. Characteristics of the Sample: Demographic and School Characteristics, Total and by Race-Gender Subgroups

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<td>14.80 (98)</td>
<td>15.96 (176)</td>
<td>17.59 (200)</td>
<td>11.98 (129)</td>
<td>14.29 (160)</td>
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<tr>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
<td>14.79 (510)</td>
<td>15.54 (85)</td>
<td>12.69 (84)</td>
<td>14.23 (157)</td>
<td>16.18 (184)</td>
<td>28.88 (311)</td>
<td>31.43 (352)</td>
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<td>10&lt;sup&gt;th&lt;/sup&gt;</td>
<td>19.19 (662)</td>
<td>16.09 (88)</td>
<td>21.90 (145)</td>
<td>18.22 (201)</td>
<td>20.05 (228)</td>
<td>25.41 (139)</td>
<td>26.34 (295)</td>
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<tr>
<td>11&lt;sup&gt;th&lt;/sup&gt;</td>
<td>22.82 (787)</td>
<td>25.41 (139)</td>
<td>25.23 (167)</td>
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<td>20.67 (235)</td>
<td>21.02 (115)</td>
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<td>other</td>
<td>7.91 (273)</td>
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<td>9.07 (100)</td>
<td>7.74 (88)</td>
<td>29.40 (992)</td>
<td>30.18 (325)</td>
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<td>12.08 (64)</td>
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<td>14.29 (160)</td>
<td>11.70 (129)</td>
<td>13.02 (148)</td>
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<td>HS grad/GED</td>
<td>28.75 (970)</td>
<td>25.66 (136)</td>
<td>26.43 (171)</td>
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<td>31.43 (352)</td>
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<tr>
<td>Some college</td>
<td>28.72 (969)</td>
<td>31.51 (167)</td>
<td>30.14 (195)</td>
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<td>26.34 (295)</td>
<td>29.52 (191)</td>
<td>30.18 (325)</td>
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<tr>
<td>College grad+</td>
<td>29.40 (992)</td>
<td>30.75 (163)</td>
<td>29.52 (191)</td>
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<td>27.95 (313)</td>
<td>29.40 (992)</td>
<td>30.75 (163)</td>
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<tr>
<td>School Size</td>
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<tr>
<td>Small</td>
<td>12.32 (425)</td>
<td>10.97 (60)</td>
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<td>13.02 (148)</td>
<td>11.00 (160)</td>
<td>11.00 (160)</td>
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<tr>
<td>Medium</td>
<td>42.91 (1,480)</td>
<td>39.12 (214)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>35.80 (237)&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td>45.33 (500)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>46.53 (529)&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td>42.97 (474)&lt;sup&gt;g&lt;/sup&gt;</td>
<td>40.46 (460)&lt;sup&gt;j,g&lt;/sup&gt;</td>
</tr>
<tr>
<td>Large</td>
<td>44.77 (1,544)</td>
<td>49.91 (273)&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td>50.91 (337)&lt;sup&gt;d,g&lt;/sup&gt;</td>
<td>42.97 (474)&lt;sup&gt;h,f&lt;/sup&gt;</td>
<td>40.46 (460)&lt;sup&gt;j,g&lt;/sup&gt;</td>
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<tr>
<td>Urbanicity</td>
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<tr>
<td>Urban</td>
<td>36.16 (1,247)</td>
<td>40.95 (224)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>40.18 (266)&lt;sup&gt;j&lt;/sup&gt;</td>
<td>32.64 (360)&lt;sup&gt;b,i&lt;/sup&gt;</td>
<td>34.92 (397)</td>
<td>36.16 (1,247)</td>
<td>32.64 (360)&lt;sup&gt;b,i&lt;/sup&gt;</td>
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<tr>
<td>Suburban</td>
<td>53.03 (1,829)</td>
<td>49.54 (271)</td>
<td>51.21 (339)</td>
<td>55.30 (610)</td>
<td>53.56 (609)</td>
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<td>55.30 (610)</td>
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<td>11.52 (131)</td>
<td>10.81 (373)</td>
<td>12.06 (133)</td>
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<tr>
<td>Public</td>
<td>90.23 (3,112)</td>
<td>93.97 (514)&lt;sup&gt;j,k&lt;/sup&gt;</td>
<td>93.66 (620)&lt;sup&gt;j,m&lt;/sup&gt;</td>
<td>89.21 (984)&lt;sup&gt;j,l&lt;/sup&gt;</td>
<td>87.42 (994)&lt;sup&gt;j,m&lt;/sup&gt;</td>
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<tr>
<td>Private</td>
<td>9.77 (337)</td>
<td>6.03 (33)</td>
<td>6.34 (42)</td>
<td>10.79 (119)</td>
<td>12.58 (143)</td>
<td>9.77 (337)</td>
<td>10.79 (119)</td>
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<tr>
<td>Racial</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Busing</td>
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</tr>
<tr>
<td>Yes</td>
<td>6.06 (209)</td>
<td>14.63 (80)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.33 (75)</td>
<td>1.99 (22)</td>
<td>2.81 (32)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.06 (209)</td>
<td>11.33 (75)</td>
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<tr>
<td>No</td>
<td>93.94 (3,240)</td>
<td>85.37 (467)&lt;sup&gt;k,p&lt;/sup&gt;</td>
<td>88.67 (587)&lt;sup&gt;j,r&lt;/sup&gt;</td>
<td>98.01 (1,081)&lt;sup&gt;j,d&lt;/sup&gt;</td>
<td>97.19 (1,105)&lt;sup&gt;j,r&lt;/sup&gt;</td>
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<td></td>
</tr>
</tbody>
</table>
Notes. 1. significant test of differences in means (p<.05) between black males and white females  
2. significant test of differences in means (p<.05) between black females and white males  
3. significant test of differences in means (p<.05) between white males and white females  
4. significant test of proportions (p<.10) in medium school size between black males and white females  
5. significant test of proportions (p<.05) in medium school size between black females and white males  
6. significant test of proportions (p<.05) in medium school size between black females and white females  
7. significant test of proportions (p<.05) in large school size between black males and white males  
8. significant test of proportions (p<.05) in large school size between black males and white females  
9. significant test of proportions (p<.05) in large school size between black females and white males  
10. significant test of proportions (p<.05) in large school size between black females and white females  
11. significant test of proportions (p<.05) in urban schools between black males and white males  
12. significant test of proportions (p<.05) in urban schools between black males and white males  
13. significant test of proportions (p<.05) in public schools between black males and white males  
14. significant test of proportions (p<.05) in public schools between black males and white males  
15. significant test of proportions (p<.05) in public schools between black females and white females  
16. significant test of proportions (p<.05) in public schools between black females and white females  
17. significant test of proportions (p<.10) in racial busing=yes between black males and white females  
18. significant test of proportions (p<.05) in racial busing=yes between black males and white females  
19. significant test of proportions (p<.05) in racial busing=no between black males and white males  
20. significant test of proportions (p<.05) in racial busing=no between black males and white males  
21. significant test of proportions (p<.05) in racial busing=no between black females and white males  
22. significant test of proportions (p<.05) in racial busing=no between black females and white males  
23. significant test of proportions (p<.05) in racial busing=no between black females and white females
<table>
<thead>
<tr>
<th>Variables</th>
<th>Range/Values</th>
<th>% (N) or Mean ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Size</td>
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<tr>
<td>Small (1-400)</td>
<td>n/a</td>
<td>12.73 (7)</td>
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<tr>
<td>Medium (401-1000)</td>
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<td>52.73 (29)</td>
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<tr>
<td>Large (1001-4000)</td>
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<td>34.55 (19)</td>
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<tr>
<td>Urbanicity</td>
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<tr>
<td>Urban</td>
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<td>40.00 (22)</td>
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<td>50.91 (28)</td>
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<td>School Type</td>
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<td>Public</td>
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<td>90.91 (50)</td>
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<tr>
<td>Private</td>
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<td>9.09 (5)</td>
</tr>
<tr>
<td>Racial Busing</td>
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<tr>
<td>Yes</td>
<td>n/a</td>
<td>9.09 (5)</td>
</tr>
<tr>
<td>No</td>
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<td>90.91 (50)</td>
</tr>
<tr>
<td>Relative white to black student participation in:</td>
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<td></td>
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<tr>
<td>Academic Extracurriculars</td>
<td>0.09-54.00</td>
<td>8.57 ± 10.29</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.23-23.11</td>
<td>4.73 ± 5.24</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.08-40.00</td>
<td>5.44 ± 7.39</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.30-27.96</td>
<td>5.84 ± 6.51</td>
</tr>
<tr>
<td>No Extracurriculars</td>
<td>0.32-30.40</td>
<td>5.48 ± 5.87</td>
</tr>
<tr>
<td>Percent black teachers</td>
<td>0.00-64.00</td>
<td>12.76 ± 15.20</td>
</tr>
<tr>
<td>White Salience</td>
<td>1.01-4.32</td>
<td>1.67 ± 0.73</td>
</tr>
<tr>
<td>Black Salience</td>
<td>1.16-11.41</td>
<td>4.38 ± 2.80</td>
</tr>
<tr>
<td>Segregation Index</td>
<td>.05-.75</td>
<td>0.37 ± 0.17</td>
</tr>
<tr>
<td>White/Black Bonacich centrality</td>
<td>0.24-27.25</td>
<td>7.29 ± 7.58</td>
</tr>
<tr>
<td>Percent black students</td>
<td>5.00-80.00</td>
<td>25.95 ± 19.88</td>
</tr>
<tr>
<td>Percent white students</td>
<td>5.00-95.00</td>
<td>59.12 ± 23.93</td>
</tr>
</tbody>
</table>
Table 5. Characteristics of the Sample: Sedentary Behavior, Total and by Race, Gender, and Race-Gender Subgroup

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Total (N=3449) Mean±SE</th>
<th>Black (N=1209) Mean±SE</th>
<th>White (N=2240) Mean±SE</th>
<th>p value</th>
<th>Male (N=1650) Mean±SE</th>
<th>Female (N=1799) Mean±SE</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wave 2 Sedentary Behavior</td>
<td>0-194 21.87±20.24</td>
<td>26.91±24.03</td>
<td>19.16±17.26</td>
<td>0.000</td>
<td>24.26±21.88</td>
<td>19.68±18.34</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Wave 1 Sedentary Behavior</td>
<td>0-200 24.43±21.82</td>
<td>28.76±23.76</td>
<td>22.09±20.3</td>
<td>0.000</td>
<td>26.93±22.93</td>
<td>22.14±20.49</td>
<td>0.000</td>
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</table>
Table 6. Characteristics of the Sample: Sedentary Behavior, Total and by Race-Gender Subgroups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range</th>
<th>Total (N=3449) Mean±SE</th>
<th>Black Male (N=547) Mean±SE</th>
<th>Black Female (N=662) Mean±SE</th>
<th>White Male (N=1,103) Mean±SE</th>
<th>White Female (N=1,137) Mean±SE</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave 2 Sedentary</td>
<td>0-194</td>
<td>21.87 ± 20.24</td>
<td>29.63 ± 25.90&lt;sup&gt;a,b,c&lt;/sup&gt;</td>
<td>24.67 ± 22.14&lt;sup&gt;a,d,e&lt;/sup&gt;</td>
<td>21.60 ± 19.05&lt;sup&gt;b,c,d,f&lt;/sup&gt;</td>
<td>16.78 ± 14.96&lt;sup&gt;c,e,f&lt;/sup&gt;</td>
<td>0.000</td>
</tr>
<tr>
<td>Wave 1 Sedentary</td>
<td>0-200</td>
<td>24.43 ± 21.82</td>
<td>30.44 ± 24.02&lt;sup&gt;b,h,i&lt;/sup&gt;</td>
<td>27.37 ± 23.47&lt;sup&gt;f,i&lt;/sup&gt;</td>
<td>25.19 ± 22.19&lt;sup&gt;h,k&lt;/sup&gt;</td>
<td>19.08 ± 17.82&lt;sup&gt;i,j,k&lt;/sup&gt;</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Notes: <sup>a</sup>significant test of differences in means (p<.05) between black males and black females  
<sup>b</sup>significant test of differences in means (p<.05) between black males and white males  
<sup>c</sup>significant test of differences in means (p<.05) between black males and white females  
<sup>d</sup>significant test of differences in means (p<.05) between black females and white males  
<sup>e</sup>significant test of differences in means (p<.05) between black females and white females  
<sup>f</sup>significant test of differences in means (p<.05) between white males and white females  
<sup>g</sup>significant test of differences in means (p<.05) between black males and black females  
<sup>h</sup>significant test of differences in means (p<.05) between black males and white males  
<sup>i</sup>significant test of differences in means (p<.05) between black males and white females  
<sup>j</sup>significant test of differences in means (p<.05) between black females and white females  
<sup>k</sup>significant test of differences in means (p<.05) between white males and white females
Table 7. Correlations between Individual-Level Dependent and Mediator Variables: Total and by Race-Gender Subgroups (N=3449)

<table>
<thead>
<tr>
<th></th>
<th>Sedentary Behavior (SB)</th>
<th>Prejudice (Prej)</th>
<th>Unfair Treatment (UT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total BM BF WM WF</td>
<td>Total BM BF WM WF</td>
<td>Total BM BF WM WF</td>
</tr>
<tr>
<td>SB</td>
<td>1.00 1.00 1.00 1.00</td>
<td>1.00 1.00 1.00 1.00</td>
<td>1.00 1.00 1.00 1.00</td>
</tr>
<tr>
<td>Prej</td>
<td>-0.09* 0.12* -0.12^ -0.07* -0.08^</td>
<td>1.00 0.19* 0.21* 0.25* 0.18* 0.22*</td>
<td>1.00 1.00 1.00 1.00 1.00</td>
</tr>
<tr>
<td>UT</td>
<td>-0.01 0.02 -0.06 0.02 -0.02</td>
<td>0.19* 0.21* 0.25* 0.18* 0.22*</td>
<td>1.00 1.00 1.00 1.00 1.00</td>
</tr>
</tbody>
</table>

Notes. * p<.05, ^p<.10, BM=Black Male, BF=Black Female, WM=White Male, WF=White Female
Table 8. Correlations between Sedentary Behavior and Individual-Level Controls, Total and by Race-Gender Subgroups (N=3449)

<table>
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<tr>
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<th>Sedentary Behavior</th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>BM</td>
<td>BF</td>
<td>WM</td>
<td>WF</td>
</tr>
<tr>
<td>Bon(^a)</td>
<td>-0.05(^\wedge)</td>
<td>0.00</td>
<td>0.07</td>
<td>-0.06</td>
<td>-0.00</td>
</tr>
<tr>
<td>Race(^b)</td>
<td>0.06(^*)</td>
<td>0.04</td>
<td>-0.11(^*)</td>
<td>0.11(^\wedge)</td>
<td>0.07(^\wedge)</td>
</tr>
<tr>
<td>Hetero</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age(^c)</td>
<td>-0.09(^*)</td>
<td>-0.01(^\wedge)</td>
<td>-0.18(^*)</td>
<td>-0.08(^*)</td>
<td>-0.15(^*)</td>
</tr>
<tr>
<td>Gender(^d)</td>
<td>0.14(^*)</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Race(^e)</td>
<td>0.14(^*)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Mother(^f)</td>
<td>-0.11(^*)</td>
<td>0.00</td>
<td>-0.08</td>
<td>-0.10</td>
<td>-0.19(^*)</td>
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<tr>
<td>Educ</td>
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<td></td>
</tr>
<tr>
<td>Income(^g)</td>
<td>-0.12(^*)</td>
<td>-0.08</td>
<td>-0.01</td>
<td>-0.10(^*)</td>
<td>-0.15(^*)</td>
</tr>
<tr>
<td>Grade(^h)</td>
<td>-0.01(^\wedge)</td>
<td>0.00</td>
<td>-0.10</td>
<td>-0.02(^\wedge)</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Notes. * denotes p<.05, ^p denotes <.10
\(^a\)individual Bonacich centrality \(^b\)individual racial heterogeneity \(^c\)adolescent age \(^d\)adolescent gender (male=1) \(^e\)adolescent race (black=1) \(^f\)mother’s education \(^g\)family income \(^h\)adolescent grade
Table 9. Correlations between Individual-Level Dependent and Mediator Variables and School-Level Controls, Total and by Race-Gender Subgroup (N=3449)

<table>
<thead>
<tr>
<th></th>
<th>Sedentary Behavior</th>
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<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>% Black(^a)</td>
<td>0.10(^*)</td>
</tr>
<tr>
<td>% White(^b)</td>
<td>-0.06(^\wedge)</td>
</tr>
<tr>
<td>Size(^c)</td>
<td>-0.07(^*)</td>
</tr>
<tr>
<td>Urban(^d)</td>
<td>-0.01</td>
</tr>
<tr>
<td>Type(^e)</td>
<td>-0.12(^\wedge)</td>
</tr>
</tbody>
</table>

Notes. \(^*\) denotes p<.05, \(^\wedge\) denotes <.10

\(^a\)percent black students \(^b\)percent white students \(^c\)school size
\(^d\)urbanicity \(^e\)school type
<table>
<thead>
<tr>
<th>(1) Seg Index</th>
<th>(2) White Sali</th>
<th>(3) Black Sali</th>
<th>(4) Bon Cen</th>
<th>(5) Sports</th>
<th>(6) Other</th>
<th>(7) Academic</th>
<th>(8) Leadership</th>
<th>(9) % Black Teach</th>
<th>(10) Racial Busing</th>
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</thead>
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<tr>
<td>1.00</td>
<td>0.20</td>
<td>-0.01</td>
<td>-0.17</td>
<td>-0.31^</td>
<td>-0.27</td>
<td>-0.29</td>
<td>-0.16</td>
<td>0.23</td>
<td>-0.20</td>
</tr>
<tr>
<td></td>
<td>1.00</td>
<td>-0.51*</td>
<td>0.71*</td>
<td>0.69*</td>
<td>0.67*</td>
<td>0.57*</td>
<td>0.90*</td>
<td>0.62*</td>
<td>0.42*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.00</td>
<td>0.71*</td>
<td>0.96*</td>
<td>0.96*</td>
<td>0.92*</td>
<td>0.93*</td>
<td>0.93*</td>
<td>0.93*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td>0.96*</td>
<td>0.98*</td>
<td>0.93*</td>
<td>0.90*</td>
<td>0.90*</td>
<td>0.88*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.96*</td>
<td>1.00</td>
<td>0.93*</td>
<td>0.90*</td>
<td>0.89*</td>
<td>0.88*</td>
</tr>
<tr>
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</tr>
</tbody>
</table>

Notes. * denotes p<.05, ^p denotes <.10

1 segregation index, 2 white salience, 3 black salience, 4 bonacich centrality white/black, 5 sports extracurriculars white/black, 6 other extracurricular white/black, 7 academic extracurricular white/black, 8 leadership extracurricular white/black, 9 percent black teachers, 10 racial busing policies
<table>
<thead>
<tr>
<th>Table 11. Cronbach’s Alpha Results, Total and by Race-Gender Subgroup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items (n=10)</td>
</tr>
<tr>
<td>segregation index, white salience, black salience, bonacich centrality, sport, other, academic, leadership, percent black teachers, busing</td>
</tr>
</tbody>
</table>
Table 12a. Multiple Group Measurement Model: Factor Loadings, Item Intercepts, and Residual Variances of School Racial Climate Indicators (all freely estimated)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>Factor Loadings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.88 (0.03)</td>
<td>0.88 (0.03)</td>
<td>0.87 (0.03)</td>
<td>0.87 (0.03)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>0.47 (0.22)</td>
<td>0.53 (0.25)</td>
<td>0.49 (0.17)</td>
<td>0.41 (0.18)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.96 (0.02)</td>
<td>0.96 (0.03)</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.02)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.99 (0.00)</td>
<td>0.98 (0.00)</td>
<td>0.99 (0.01)</td>
<td>0.99 (0.01)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.99 (0.00)</td>
<td>0.98 (0.00)</td>
<td>0.98 (0.01)</td>
<td>0.98 (0.01)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.01)</td>
<td>0.94 (0.01)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.91 (0.02)</td>
<td>0.91 (0.03)</td>
<td>0.86 (0.04)</td>
<td>0.87 (0.04)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.63 (0.08)</td>
<td>0.63 (0.08)</td>
<td>0.51 (0.09)</td>
<td>0.54 (0.09)</td>
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<tr>
<td><strong>Item Intercepts</strong></td>
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<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>1.66 (0.21)</td>
<td>1.69 (0.20)</td>
<td>1.08 (0.16)</td>
<td>1.05 (0.18)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>1.36 (0.32)</td>
<td>1.28 (0.35)</td>
<td>1.58 (0.43)</td>
<td>1.44 (0.43)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>4.67 (0.48)</td>
<td>4.56 (0.55)</td>
<td>5.82 (0.50)</td>
<td>5.81 (0.53)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>4.38 (0.41)</td>
<td>4.40 (0.42)</td>
<td>5.40 (0.44)</td>
<td>5.34 (0.48)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>4.72 (0.41)</td>
<td>4.72 (0.45)</td>
<td>5.95 (0.60)</td>
<td>5.92 (0.62)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>4.05 (0.54)</td>
<td>4.03 (0.60)</td>
<td>5.02 (0.54)</td>
<td>4.95 (0.53)</td>
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<tr>
<td>Leadership Extracurriculars</td>
<td>3.88 (0.43)</td>
<td>3.52 (0.46)</td>
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<td>5.31 (0.55)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>2.11 (0.32)</td>
<td>2.23 (0.28)</td>
<td>1.81 (0.25)</td>
<td>1.94 (0.28)</td>
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<tr>
<td><strong>Residual Variances</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.22 (0.06)</td>
<td>0.21 (0.06)</td>
<td>0.25 (0.05)</td>
<td>0.24 (0.05)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>0.78 (0.21)</td>
<td>0.72 (0.27)</td>
<td>0.77 (0.17)</td>
<td>0.83 (0.15)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.07 (0.04)</td>
<td>0.08 (0.05)</td>
<td>0.11 (0.04)</td>
<td>0.12 (0.04)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
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<td>Other Extracurriculars</td>
<td>0.02 (0.01)</td>
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<td>0.03 (0.01)</td>
<td>0.03 (0.02)</td>
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<tr>
<td>Academic Extracurriculars</td>
<td>0.13 (0.04)</td>
<td>0.13 (0.05)</td>
<td>0.12 (0.03)</td>
<td>0.12 (0.03)</td>
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<tr>
<td>Leadership Extracurriculars</td>
<td>0.17 (0.04)</td>
<td>0.17 (0.05)</td>
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<td>0.24 (0.07)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.60 (0.10)</td>
<td>0.60 (0.10)</td>
<td>0.74 (0.09)</td>
<td>0.71 (0.10)</td>
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Notes. Standardized estimates reported.
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<tr>
<th></th>
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<th>Chi-Square Value</th>
<th>Chi-square p-value</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA Estimate</th>
<th>H0/H1 value</th>
<th>H0/H1 scaling correction factor</th>
<th>-2ΔLL</th>
<th>DF Diff</th>
<th>-2ΔLL p-value</th>
</tr>
</thead>
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<td>96</td>
<td>223.972</td>
<td>0.000</td>
<td>0.906</td>
<td>0.868</td>
<td>0.045</td>
<td>-17921.690</td>
<td>30.022</td>
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<td>2. Metric Model</td>
<td>75</td>
<td>261.271</td>
<td>0.000</td>
<td>0.895</td>
<td>0.884</td>
<td>0.042</td>
<td>-18046.134</td>
<td>35.577</td>
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Notes. Good model fit considered Chi-square p-value > 0.05, CFI and TLI > 0.90, RMSEA < 0.05
Table 13a. Multiple Group Measurement Model: Factor Loadings, Item Intercepts, and Residual Variances of School Racial Climate Indicators (all freely estimated)

<table>
<thead>
<tr>
<th>Factor Loadings</th>
<th>Black Females</th>
<th>White Females</th>
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<tbody>
<tr>
<td></td>
<td>Estimate (SE)</td>
<td>Estimate (SE)</td>
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<tr>
<td>White Salience</td>
<td>0.89 (0.03)</td>
<td>0.87 (0.03)</td>
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<tr>
<td>Black Salience</td>
<td>0.53 (0.25)</td>
<td>0.41 (0.18)</td>
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<tr>
<td>Bonacich Centrality</td>
<td>0.96 (0.03)</td>
<td>0.94 (0.02)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.98 (0.00)</td>
<td>0.99 (0.01)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.99 (0.00)</td>
<td>0.98 (0.01)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.01)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.91 (0.03)</td>
<td>0.87 (0.04)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.63 (0.08)</td>
<td>0.54 (0.09)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item Intercepts</th>
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<tr>
<td>White Salience</td>
<td>1.69 (0.20)</td>
<td>1.05 (0.18)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>1.28 (0.35)</td>
<td>1.44 (0.43)</td>
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<tr>
<td>Bonacich Centrality</td>
<td>4.56 (0.55)</td>
<td>5.81 (0.53)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>4.40 (0.42)</td>
<td>5.34 (0.48)</td>
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<tr>
<td>Other Extracurriculars</td>
<td>4.72 (0.45)</td>
<td>5.92 (0.62)</td>
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<tr>
<td>Academic Extracurriculars</td>
<td>4.03 (0.60)</td>
<td>4.95 (0.53)</td>
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<tr>
<td>Leadership Extracurriculars</td>
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<td>5.31 (0.55)</td>
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<tr>
<td>Percent Black Teachers</td>
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<td>1.94 (0.28)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Residual Variances</th>
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</thead>
<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.21 (0.06)</td>
<td>0.24 (0.05)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>0.72 (0.27)</td>
<td>0.83 (0.15)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.08 (0.05)</td>
<td>0.12 (0.04)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
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<td>0.03 (0.02)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.13 (0.05)</td>
<td>0.12 (0.03)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.17 (0.05)</td>
<td>0.24 (0.07)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.60 (0.10)</td>
<td>0.71 (0.10)</td>
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Table 13b. Model Fit Statistics and Chi-Square Likelihood Ratio Resting for Invariance Tests of Multiple Group Measurement: Black Females, White Females

<table>
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<th></th>
<th># Free</th>
<th>Chi-Square Value</th>
<th>Chi-square p-value</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA Estimate</th>
<th>H0/H1 value</th>
<th>H0/H1 scaling correction factor</th>
<th>-2 ΔLL</th>
<th>DF</th>
<th>-2 ΔLL p-value</th>
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</thead>
<tbody>
<tr>
<td>1. Configural Model</td>
<td>48</td>
<td>115.424</td>
<td>0.000</td>
<td>0.899</td>
<td>0.859</td>
<td>0.045</td>
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<td>32.772</td>
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<td>2. Metric Model</td>
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<td>0.897</td>
<td>0.878</td>
<td>0.042</td>
<td>-9482.735</td>
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<td>35.136</td>
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<td>3. Scalar Model</td>
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<td>-9670.270</td>
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<td>43.285</td>
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Notes. Good model fit considered Chi-square p-value > .05, CFI and TLI > .90, RMSEA < .05
<table>
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<th></th>
<th>Black Males Estimate (SE)</th>
<th>White Males Estimate (SE)</th>
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</thead>
<tbody>
<tr>
<td><strong>Factor Loadings</strong></td>
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<tr>
<td>White Salience</td>
<td>0.88 (0.03)</td>
<td>0.87 (0.03)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>0.47 (0.22)</td>
<td>0.49 (0.17)</td>
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<tr>
<td>Bonacich Centrality</td>
<td>0.96 (0.02)</td>
<td>0.94 (0.02)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.99 (0.00)</td>
<td>0.99 (0.01)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.99 (0.00)</td>
<td>0.98 (0.01)</td>
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<tr>
<td>Academic Extracurriculars</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.02)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.91 (0.02)</td>
<td>0.86 (0.04)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.63 (0.08)</td>
<td>0.51 (0.09)</td>
</tr>
<tr>
<td><strong>Item Intercepts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>1.66 (0.21)</td>
<td>1.08 (0.16)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>1.36 (0.32)</td>
<td>1.58 (0.43)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>4.67 (0.48)</td>
<td>5.82 (0.50)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>4.38 (0.41)</td>
<td>5.40 (0.44)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>4.72 (0.41)</td>
<td>5.95 (0.60)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>4.05 (0.54)</td>
<td>5.02 (0.54)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>3.88 (0.43)</td>
<td>5.17 (0.54)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>2.11 (0.32)</td>
<td>1.81 (0.25)</td>
</tr>
<tr>
<td><strong>Residual Variances</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.22 (0.06)</td>
<td>0.25 (0.03)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>0.78 (0.21)</td>
<td>0.77 (0.17)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.07 (0.04)</td>
<td>0.11 (0.04)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.02 (0.01)</td>
<td>0.03 (0.01)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.13 (0.04)</td>
<td>0.12 (0.03)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.17 (0.04)</td>
<td>0.26 (0.07)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.60 (0.10)</td>
<td>0.74 (0.09)</td>
</tr>
</tbody>
</table>
Table 14b. Model Fit Statistics and Chi-Square Likelihood Ratio Resting for Invariance Tests of Multiple Group Measurement: Black Males, White Males

<table>
<thead>
<tr>
<th># FreeParms</th>
<th>Chi-Square Value</th>
<th>Chi-square p-value</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA Estimate</th>
<th>H0/H1 value</th>
<th>H0/H1 scaling correction factor</th>
<th>-2ΔLL</th>
<th>DF Diff</th>
<th>-2ΔLL p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Configural Model</td>
<td>48</td>
<td>108.242</td>
<td>0.000</td>
<td>0.913</td>
<td>0.878</td>
<td>0.045</td>
<td>-8520.034</td>
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<tr>
<td>2. Metric Model</td>
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<td>0.906</td>
<td>0.889</td>
<td>0.043</td>
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<td>0.864</td>
<td>0.861</td>
<td>0.048</td>
<td>-8722.412</td>
<td>37.117</td>
<td>16</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Notes. Good model fit considered Chi-square p-value >.05, CFI and TLI >.90, RMSEA <.05
<table>
<thead>
<tr>
<th></th>
<th>Black Males Estimate (SE)</th>
<th>Black Females Estimate (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor Loadings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.88 (0.03)</td>
<td>0.89 (0.03)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>0.47 (0.22)</td>
<td>0.53 (0.25)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.96 (0.02)</td>
<td>0.96 (0.03)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.99 (0.00)</td>
<td>0.98 (0.00)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.99 (0.00)</td>
<td>0.98 (0.00)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.02)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.91 (0.02)</td>
<td>0.91 (0.03)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.63 (0.08)</td>
<td>0.63 (0.08)</td>
</tr>
<tr>
<td><strong>Item Intercepts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>1.66 (0.21)</td>
<td>1.69 (0.20)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>1.36 (0.32)</td>
<td>1.28 (0.35)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>4.67 (0.48)</td>
<td>4.56 (0.55)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>4.38 (0.41)</td>
<td>4.40 (0.42)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>4.72 (0.41)</td>
<td>4.72 (0.45)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>4.05 (0.54)</td>
<td>4.03 (0.60)</td>
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<td>Leadership Extracurriculars</td>
<td>3.89 (0.43)</td>
<td>3.52 (0.46)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>2.11 (0.32)</td>
<td>2.23 (0.28)</td>
</tr>
<tr>
<td><strong>Residual Variances</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.22 (0.06)</td>
<td>0.21 (0.06)</td>
</tr>
<tr>
<td>Black Salience</td>
<td>0.78 (0.21)</td>
<td>0.72 (0.27)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.07 (0.04)</td>
<td>0.08 (0.05)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.02 (0.01)</td>
<td>0.03 (0.01)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.13 (0.04)</td>
<td>0.13 (0.05)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.17 (0.04)</td>
<td>0.17 (0.05)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.60 (0.10)</td>
<td>0.60 (0.10)</td>
</tr>
</tbody>
</table>
Table 15b. Model Fit Statistics and Chi-Square Likelihood Ratio Resting for Invariance Tests of Multiple Group Measurement: Black Males, Black Females

<table>
<thead>
<tr>
<th># Free Parms</th>
<th>Chi-square Value</th>
<th>Chi-square p-value</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA Estimate</th>
<th>H0/H1 value</th>
<th>H0/H1 scaling correction factor</th>
<th>-2ΔLL</th>
<th>DF Diff</th>
<th>-2ΔLL p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Configural Model</td>
<td>48</td>
<td>151.507</td>
<td>0.000</td>
<td>0.847</td>
<td>0.785</td>
<td>0.068</td>
<td>-6022.669</td>
<td>24.140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Metric Model</td>
<td>41</td>
<td>174.112</td>
<td>0.000</td>
<td>0.825</td>
<td>0.792</td>
<td>0.067</td>
<td>-6030.733</td>
<td>27.889</td>
<td>7.393</td>
<td>7</td>
</tr>
<tr>
<td>3. Scalar Model</td>
<td>33</td>
<td>201.394</td>
<td>0.000</td>
<td>0.799</td>
<td>0.795</td>
<td>0.066</td>
<td>-6037.131</td>
<td>34.367</td>
<td>10.963</td>
<td>8</td>
</tr>
<tr>
<td>4. Residual Model</td>
<td>25</td>
<td>229.226</td>
<td>0.000</td>
<td>0.771</td>
<td>0.797</td>
<td>0.006</td>
<td>-6041.267</td>
<td>45.143</td>
<td>11.954</td>
<td>8</td>
</tr>
</tbody>
</table>

Notes. Good model fit considered Chi-square p-value >.05, CFI and TLI >.90, RMSEA <.05
<table>
<thead>
<tr>
<th></th>
<th>White Males Estimate (SE)</th>
<th>White Females Estimate (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor Loadings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.87 (0.03)</td>
<td>0.87 (0.03)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.02)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.98 (0.01)</td>
<td>0.99 (0.01)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.99 (0.01)</td>
<td>0.98 (0.01)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.94 (0.02)</td>
<td>0.94 (0.01)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.86 (0.04)</td>
<td>0.87 (0.04)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.51 (0.09)</td>
<td>0.54 (0.09)</td>
</tr>
<tr>
<td><strong>Item Intercepts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>1.08 (0.16)</td>
<td>1.05 (0.18)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>5.82 (0.50)</td>
<td>5.81 (0.53)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>5.40 (0.44)</td>
<td>5.34 (0.48)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>5.95 (0.59)</td>
<td>5.92 (0.62)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>5.02 (0.54)</td>
<td>4.95 (0.53)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>5.17 (0.54)</td>
<td>5.31 (0.55)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>1.81 (0.25)</td>
<td>1.94 (0.28)</td>
</tr>
<tr>
<td><strong>Residual Variances</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White Salience</td>
<td>0.25 (0.05)</td>
<td>0.24 (0.05)</td>
</tr>
<tr>
<td>Bonacich Centrality</td>
<td>0.11 (0.04)</td>
<td>0.12 (0.05)</td>
</tr>
<tr>
<td>Sports Extracurriculars</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
</tr>
<tr>
<td>Other Extracurriculars</td>
<td>0.03 (0.01)</td>
<td>0.03 (0.01)</td>
</tr>
<tr>
<td>Academic Extracurriculars</td>
<td>0.12 (0.03)</td>
<td>0.12 (0.03)</td>
</tr>
<tr>
<td>Leadership Extracurriculars</td>
<td>0.26 (0.07)</td>
<td>0.24 (0.07)</td>
</tr>
<tr>
<td>Percent Black Teachers</td>
<td>0.74 (0.09)</td>
<td>0.71 (0.10)</td>
</tr>
</tbody>
</table>
### Table 16b. Model Fit Statistics and Chi-Square Likelihood Ratio Resting for Invariance Tests of Multiple Group Measurement: White Males, White Females

<table>
<thead>
<tr>
<th># Free Parms</th>
<th>Chi-square Value</th>
<th>Chi-square p-value</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA Estimate</th>
<th>H0/H1 scaling correction factor</th>
<th>-2ΔLL</th>
<th>DF Diff</th>
<th>-2ΔLL p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Configural Model</td>
<td>42</td>
<td>30.038</td>
<td>0.3614</td>
<td>0.997</td>
<td>0.996</td>
<td>0.008</td>
<td>-9466.726</td>
<td>30.755</td>
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<tr>
<td>2. Metric Model</td>
<td>36</td>
<td>36.515</td>
<td>0.3526</td>
<td>0.997</td>
<td>0.996</td>
<td>0.008</td>
<td>-9469.460</td>
<td>35.759</td>
<td>7.480</td>
</tr>
<tr>
<td>3. Scalar Model</td>
<td>29</td>
<td>44.619</td>
<td>0.3222</td>
<td>0.995</td>
<td>0.995</td>
<td>0.009</td>
<td>-9477.464</td>
<td>44.176</td>
<td>18.015</td>
</tr>
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</table>

Notes. Good model fit considered Chi-square p-value > .05, CFI and TLI > .90, RMSEA < .05
<table>
<thead>
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<th>#</th>
<th>FreeParms</th>
<th>Chi-Square Value</th>
<th>Chi-square p-value</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA Estimate</th>
<th>H0/H1 value</th>
<th>H0/H1 scaling correction factor</th>
<th>-2ΔLL</th>
<th>DF Diff</th>
<th>-2ΔLL p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Base Model</td>
<td>96</td>
<td>223.972</td>
<td>0.000</td>
<td>0.906</td>
<td>0.868</td>
<td>0.045</td>
<td>-17921.690</td>
<td>30.022</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. BM vs. BF</td>
<td>95</td>
<td>226.656</td>
<td>0.000</td>
<td>0.905</td>
<td>0.868</td>
<td>0.045</td>
<td>-17921.881</td>
<td>30.329</td>
<td>-0.382</td>
<td>1</td>
<td>0.5044</td>
</tr>
<tr>
<td>3. BM vs. WM</td>
<td>95</td>
<td>226.452</td>
<td>0.000</td>
<td>0.905</td>
<td>0.868</td>
<td>0.045</td>
<td>-17927.717</td>
<td>30.271</td>
<td>-0.162</td>
<td>1</td>
<td>0.8733</td>
</tr>
<tr>
<td>4. BM vs. WF</td>
<td>95</td>
<td>226.174</td>
<td>0.000</td>
<td>0.905</td>
<td>0.868</td>
<td>0.045</td>
<td>-17925.317</td>
<td>30.271</td>
<td>-7.254</td>
<td>1</td>
<td>0.2858</td>
</tr>
<tr>
<td>5. BF vs. WM</td>
<td>95</td>
<td>226.605</td>
<td>0.000</td>
<td>0.905</td>
<td>0.868</td>
<td>0.045</td>
<td>-17931.547</td>
<td>30.253</td>
<td>-19.714</td>
<td>1</td>
<td>0.1182</td>
</tr>
<tr>
<td>6. BF vs. WF</td>
<td>95</td>
<td>226.096</td>
<td>0.000</td>
<td>0.905</td>
<td>0.869</td>
<td>0.045</td>
<td>-17928.235</td>
<td>30.243</td>
<td>-13.090</td>
<td>1</td>
<td>0.2285</td>
</tr>
<tr>
<td>7. WM vs. WF</td>
<td>95</td>
<td>226.735</td>
<td>0.000</td>
<td>0.904</td>
<td>0.868</td>
<td>0.045</td>
<td>-17922.172</td>
<td>30.332</td>
<td>-0.964</td>
<td>1</td>
<td>0.1942</td>
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</table>

Notes. Good model fit considered Chi-square p-value > .05, CFI and TLI > .90, RMSEA < .05
<table>
<thead>
<tr>
<th>Variables</th>
<th>Range/Values</th>
<th>Total (N=3441)</th>
<th>Black (N=1205)</th>
<th>White (N=2102)</th>
<th>χ² or F-stat</th>
<th>p value</th>
<th>Male (N=1644)</th>
<th>Female (N=1797)</th>
<th>χ² or F-stat</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students at your school are prejudiced</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>n/a</td>
<td>8.02 (276)</td>
<td>13.36 (161)</td>
<td>5.14 (115)</td>
<td>174.11</td>
<td>0.00</td>
<td>7.30 (120)</td>
<td>8.68 (156)</td>
<td>3.45</td>
<td>0.49</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td>21.21 (730)</td>
<td>27.97 (337)</td>
<td>17.58 (393)</td>
<td>20.99</td>
<td>0.05</td>
<td>20.99 (345)</td>
<td>21.42 (385)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td>26.18 (901)</td>
<td>26.14 (315)</td>
<td>26.21 (586)</td>
<td>25.85</td>
<td>0.01</td>
<td>25.85 (425)</td>
<td>26.49 (476)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td></td>
<td>29.70 (1022)</td>
<td>23.73 (286)</td>
<td>32.92 (736)</td>
<td>30.66</td>
<td>0.00</td>
<td>30.66 (504)</td>
<td>28.83 (518)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
<td>14.88 (512)</td>
<td>8.80 (106)</td>
<td>18.16 (406)</td>
<td>15.21</td>
<td>0.02</td>
<td>15.21 (250)</td>
<td>14.58 (262)</td>
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</tr>
<tr>
<td>continuous</td>
<td>1-5</td>
<td>3.22 ± 1.17</td>
<td>2.87 ± 1.18</td>
<td>3.41 ± 1.13</td>
<td>179.25</td>
<td>0.00</td>
<td>3.25 ± 1.16</td>
<td>3.19 ± 1.18</td>
<td>2.47</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Notes: 
- a significant test of proportions significant (p<.05) at strongly disagree between black and white adolescents
- b significant test of proportions significant (p<.05) at disagree between black and white adolescents
- c significant test of proportions significant (p<.05) at agree between black and white adolescents
- d significant test of proportions significant (p<.05) at strongly agree between black and white adolescents
Table 19. Distribution of Prejudice, Total, and by Race-Gender Subgroups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (N=3441)</th>
<th>Black Male (N=544)</th>
<th>Black Female (N=661)</th>
<th>White Male (N=1,100)</th>
<th>White Female (N=1,136)</th>
<th>( \chi^2 ) or ( F )-stat</th>
<th>( p ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students at your school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>are prejudice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>n/a</td>
<td>8.02 (276)</td>
<td>12.50 (68)</td>
<td>14.07 (93)</td>
<td>4.73 (52)</td>
<td>5.55 (63)</td>
<td>177.06</td>
</tr>
<tr>
<td>Disagree</td>
<td>21.21 (730)</td>
<td>28.49 (155)</td>
<td>27.53 (182)</td>
<td>17.27 (190)</td>
<td>17.87 (203)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>26.18 (901)</td>
<td>25.18 (137)</td>
<td>26.93 (178)</td>
<td>26.18 (288)</td>
<td>26.23 (298)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>29.70 (1,022)</td>
<td>25.18 (137)</td>
<td>22.54 (149)</td>
<td>33.36 (367)</td>
<td>32.48 (369)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>14.88 (512)</td>
<td>8.64 (47)</td>
<td>8.93 (59)</td>
<td>18.45 (203)</td>
<td>17.87 (203)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>continuous</td>
<td>1-5</td>
<td>3.22 ± 1.17</td>
<td>2.89 ± 1.17</td>
<td>3.44 ± 1.18</td>
<td>3.39 ± 1.13</td>
<td>60.13</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Notes.  

a significant test of proportions (p<.05) at disagree between black male and white male  
b significant test of proportions (p<.05) at disagree between black male and white female  
c significant test of proportions (p<.10) at agree between black male and white male  
d significant test of proportions (p<.05) at agree between black female and white male  
e significant test of proportions (p<.05) at agree between black female and white female  
f significant test of proportions (p<.05) at strongly agree between black female and white male  
g significant test of proportions (p<.05) at strongly agree between black female and white female  
h significant test of differences in means (p<.05) between black males and white males  
i significant test of differences in means (p<.05) between black males and white females  
j significant test of differences in means (p<.05) between black females and white males  
k significant test of differences in means (p<.05) between black females and white females  

Notes.
Table 20. Distribution of Unfair treatment, total, by race, and by gender. Chi-square difference tests and Anova.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (N=3444)</th>
<th>Black (N=1207)</th>
<th>White (N=2237)</th>
<th>χ² or F-stat</th>
<th>p value</th>
<th>Male (N=1646)</th>
<th>Female (N=1798)</th>
<th>χ² or F-stat</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers at your school treat students fairly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>n/a</td>
<td>4.56 (157)</td>
<td>5.05 (61)</td>
<td>4.29 (96)</td>
<td>20.73</td>
<td>4.19 (69)</td>
<td>4.89 (88)</td>
<td>6.83</td>
<td>0.145</td>
</tr>
<tr>
<td>Disagree</td>
<td>14.20 (489)</td>
<td>16.82 (203)</td>
<td>12.78 (286)</td>
<td></td>
<td></td>
<td>14.40 (237)</td>
<td>14.02 (252)</td>
<td></td>
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</tr>
<tr>
<td>Neutral</td>
<td>24.42 (841)</td>
<td>25.77 (311)</td>
<td>23.69 (530)</td>
<td></td>
<td></td>
<td>22.84 (376)</td>
<td>25.86 (465)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>41.46 (1428)</td>
<td>39.52 (477)</td>
<td>42.51 (951)</td>
<td></td>
<td></td>
<td>42.16 (694)</td>
<td>40.82 (734)</td>
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</tr>
<tr>
<td>Strongly Agree</td>
<td>15.36 (529)</td>
<td>12.84 (155)</td>
<td>16.72 (374)</td>
<td></td>
<td></td>
<td>16.40 (270)</td>
<td>14.40 (259)</td>
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<tr>
<td><em>continuous</em></td>
<td>1-5</td>
<td>2.51±1.06</td>
<td>2.62±1.06</td>
<td>2.45±1.05</td>
<td>18.79</td>
<td>2.48±1.06</td>
<td>2.54±1.05</td>
<td>3.12</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Notes. No significant pairwise comparison of proportions present.
Table 21. Distribution of Unfair treatment, Total, and by Race-Gender Subgroups. Chi-square Difference Tests and Anova.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Range/Values</th>
<th>Total (N=3444)</th>
<th>Black Male (N= 545)</th>
<th>Black Female (N=662)</th>
<th>White Male (N=1101)</th>
<th>White Female (N=1136)</th>
<th>χ² or F-stat</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers at your school treat students fairly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>n/a</td>
<td>4.56 (157)</td>
<td>4.77 (26)</td>
<td>5.29 (35)</td>
<td>3.91 (43)</td>
<td>4.67 (53)</td>
<td>32.13</td>
<td>0.00</td>
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<tr>
<td>Disagree</td>
<td>14.20 (489)</td>
<td>15.78 (86)</td>
<td>17.67 (117)</td>
<td>13.71 (151)</td>
<td>11.88 (135)</td>
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<tr>
<td>Neutral</td>
<td>24.42 (841)</td>
<td>23.12 (126)</td>
<td>27.95 (185)</td>
<td>22.71 (250)</td>
<td>24.65 (280)</td>
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<td></td>
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<tr>
<td>Agree</td>
<td>41.46 (1428)</td>
<td>42.75 (233)</td>
<td>36.86 (244)</td>
<td>41.87 (461)</td>
<td>43.13 (490)</td>
<td></td>
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</tr>
<tr>
<td>Strongly Agree</td>
<td>15.36 (529)</td>
<td>13.58 (74)</td>
<td>12.24 (81)</td>
<td>17.80 (196)</td>
<td>15.67 (178)</td>
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</tr>
</tbody>
</table>

Notes. No significant pairwise comparison of proportions present.

a significant test of differences in means (p<.05) between black males and white males

b significant test of differences in means (p<.05) between black females and white males

c significant test of differences in means (p<.05) between black females and white females

d significant test of differences in means (p<.05) between white males and white females

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Figure 1. Conceptual Model

**School-Level Racial Climate**
- Segregation index based on cross race friendships
- Race-based friendship preference
- White to black relative differences in centrality
- White to black relative differences in extracurricular activity participation
- Percent black teachers
- Racial busing practices

**Level 2—Schools**

**Level 1—Adolescents**

**Unfair treatment**—teachers at your school treat students fairly

**Race**

**Gender**

**Prejudice**—students at your school are prejudice

**Sedentary Behavior**—total number of hours per week spent watching television, and videos, playing video and computer games, and listening to the radio.

*control variables not shown
Figure 2. Multi-level Structural Equation Model for Black Males, standardized coefficients shown

Notes. * denotes p<.05, ^ denotes p<.10 Scale of latent variable, racial climate, set at a variance of 1. Model includes the following controls: wave 1 sedentary behavior. Both white salience and % black teachers were reverse coded.

Model Fit Indices:

Chi-square = 58.63, p=.22
RMSEA = .017
CFI = .990
TLI = .986

(Good Fit Indices Guidelines: Chi-square p>.05, RMSEA<.05, CFI/TLI >.90)
Figure 3. Multi-level Structural Equation Model for Black Females, standardized coefficients

Notes: * denotes p<.05, ^ denotes p<.10. Scale of latent variable, racial climate, set at a variance of 1. Model includes the following controls: wave 1 sedentary behavior and school type. Both white salience and % black teachers were reverse coded.

Model Fit Indices:  
Chi-square = 69.87, p=0.23  
RMSEA = 0.014  
CFI = 0.990  
TLI = 0.987

(Good Fit Indices Guidelines: Chi-square p>.05, RMSEA<.05, CFI/TLI >.90)
Figure 4. Multi-level Structural Equation Model for White Males, standardized coefficients

Notes. * denotes p<.05, ^ denotes p<.10. Scale of latent variable, racial climate, set at a variance of 1. Model includes the following controls: wave 1 sedentary behavior, individual racial heterogeneity, individual Bonacich Centrality, urbanicity. Segregation index, White Salience and % Black Teachers were reverse-coded.

Model Fit Indices: 
Chi-square = 160.92, p=0.00
RMSEA = 0.021
CFI = 0.950 TLI = 0.936

(Good Fit Indices Guidelines: Chi-square p>.05, RMSEA<.05, CFI/TLI >.90)
Figure 5. Multi-level Structural Equation Model for White Females, standardized coefficients

Notes. * denotes p<.05, ^ denotes p<.10. Scale of latent variable, racial climate, set at a variance of 1. Model includes the following controls: wave 1 sedentary behavior, parent’s education, adolescent age, percent black students within school, and school type. Segregation index, white salience, and % black teachers were all reverse coded.

Model Fit Indices: Chi-square = 159.24, p=0.00
RMSEA = 0.032
CFI = 0.926
TLI = 0.903

(Good Fit Indices Guidelines: Chi-square p>.05, RMSEA<.05, CFI/TLI >.90)
References


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young adolescents: The teens eating for energy and nutrition at school study. *Preventive Medicine, 34*(2), 266-278.


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