Reconsidering Adolescent Society: Racial Differences in Stress Processing, Violence, and Health

by

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Defense Date: March 18, 2024

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An abstract of a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Sociology in The Graduate School of Duke University
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ABSTRACT

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Abstract

This dissertation investigates racial differences in individual stress processes and health as well as the ways social networks characteristics moderate these relationships. I explore (1) how particular network configurations determine the probability of adolescents experiencing victimization, (2) the stress trajectories of victims and non-victims from adolescence to adulthood across racial groups, and finally, (3) the ways racial homophily and social cohesion together, determine depressive symptoms in adolescence. I conduct three studies all using relevant demographic, mental, and physical health data from the National Longitudinal Study of Adolescent to Adult Health. In my first study I find I find that delinquency and integration shape the probability of victimization for adolescents, net of several common correlates of delinquency. In my second study that black respondents have a unique relationship with the stress incurred from victimization, such that black victims and non-victims have virtually equal allostatic loads. Finally, results from my third chapter show that racial homophily mediates the well establish relationship between social cohesion and depression. These findings contribute to the sociology of race and ethnicity, network sociology, and to medical sociological inquires concerned with the vulnerable period of adolescence. Together, these three chapters show that race and networks govern opportunities that individuals have to form positive social relationships and the resulting health consequences of both successful and unsuccessful navigation of one's social environment.

Dedication

This work is dedicated to my community. To everyone who saw me at my worst, struggling to keep up with life, and held me down through it all.

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This dissertation is the culmination of a decade of effort and planning. I fell in love with sociology in 2014 in Hofstra's sociology department. I will never forget the incredible professors there who supported me and cultivated my talent for research. Dr. Bill Mangino, Dr. Cynthia Bogard, Dr. Johanna Shih, Dr. Marc Silver, and Dr. Margaret Abraham, each of you mentored me at different points during my time at Hofstra and left me with new perspectives and tangible skills I'd continue to nurture and use for the next 10 years. And now, as I look to the rest of my life, I know that I will never forget what you all have done for me. It was your care and guidance that put me on the path to earning a PhD in sociology. From the bottom of my heart, thank you.

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twenty-eight years. Thank you for everything you have done and continue to do for me, I love you both.

1. Introduction

The formative years in the lives of many teenagers living in the United States take place within the context of public or private school systems. In these contexts, teens are consistently exposed to opportunities to practice forming and maintaining social relationships. Coleman (1961) offers a classic analysis of these relationships that form adolescent society. He claims that adolescence is a unique context in which teens place great value on the opinions and behaviors of their peers when developing their own sense of self and normative expectations. These behavioral norms and beliefs often determine several health-related outcomes in adolescents marking it as a critical period in medical sociological literature addressing health and development across the life course.

In addition to health and development, a large body of scholarship exists regarding how adolescent social networks determine their delinquent involvement. To illustrate these association structures Coleman draws sociograms and makes connections between network status hierarchies and academic achievement, sports participation, etc. From the network perspective, playing on a sports team is related to higher popularity scores which signals structurally advantageous positions within the social structure. Taking Coleman's conception of school networks a step further using graph theoretical notions of group structure, studies have found several ways to measure social integration and demonstrated how these different notions of integration relate to delinquency, violence, and health (Achat et al. 1998; Haynie 2001; Moody et al. 2011; Andrews et al. 2017; Ford et al. 2019; Adams et al. 2022; McBride and Michèle 2022). This dissertation contributes to medical sociology, the sociology of race and ethnicity, adolescent criminology, and the network sociology by providing insights into the racial differences within the behavioral processes composing integration, delinquency, and health.

To begin this exploration, it is necessary to understand that racial inequality in health outcomes across the life course persists across varying levels of analysis. Even scholarship that accounts for differences in socioeconomic status (SES) in medical sociology and biology find racial disparities in health outcomes across the life course (Geronimus et al. 2006; Marmot et al. 1998; Gugushvili et al. 2021). Geronimus et al. (1992, 2001, 2006) hypothesized that the black-white health disparities reflected a process of biological weathering, citing that racial minorities may experience a decline in health outcomes because of the cumulative impacts of repeated experience with discrimination. Similarly, the attenuation hypothesis suggests that there is only such much stress the body can efficiently process before becoming inured to the impacts of new stressors. Medical sociological work has yet to consider that racialized groups may have unique stress processes or responses to external stressors because these groups experience chronic stress in the form of racial discrimination. This body of literature in general argues that while there are disparities in health outcomes the processes driving stress and its impact on physical and mental health are universal. In addition to chronic stressors, acute episodic stressors such as experiences with violent victimization may shape stress trajectories from adolescence into young adulthood. If there are differences in stress processing across racial groups, these violent experiences provide a uniquely pertinent avenue to observe stress trajectories because respondents who experience such events are likely to have detectable changes in their stress processing systems, allowing me to compare these changes across racial groups. With the increasing concern for safety in school systems, understanding the lasting impacts of such events may be useful to policy initiatives seeking to create safer learning environments for teens.

An often-cited deterrent to delinquency and stimulant for better health outcomes is social integration into institutions, such as school clubs and family units, that encourage healthy, prosocial behavioral norms. Several scholars have sought to explain institutional integration, its

obstacles, and its consequences. Foremost among these outcomes is homophily. Gottfredson & Hirschi (1990) posit that homophily, in general, is the outcome of selective mixing based on similar levels of self-control. It follows that the observed correlation between an individual's delinquency and the delinquency of their peers is spurious. This interpretation however ignores the role of additional processes which influence the formation of social networks, such as triadic closure or the penalties of social isolation. Young (2011) found that in a model accounting for only self-control selection effects, the probability of a social tie occurring between two randomly selected respondents increases as the absolute difference between their levels of self-control decreases. In this model, the correlation between individual and peer behavior is strongly influenced by the selection effects of self-control. However, in the more comprehensive model including triadic closure, and selective mixing terms for demographic features such as SES and gender, the interpretation for network formation is much more consistent with the observed network, suggesting that while it is confirmed to be an important factor, selection alone cannot explain peer influence. Wikstrom & Svennson (2012) revealed that morality, measured partly in terms of the individual's attitudes toward crime, was more strongly associated with crime than self-control. Haynie & Osgood (2005) showed that peer socialization has a meaningful causal influence on delinquency, contrary to claims that this association is entirely attributable to respondents choosing friends who are like themselves. Influence effects manifest themselves in behavior changes while selection effects appear in the observed changes in network ties (Dijkstra et al. 2010) and both affect the influence domains of adolescents. Steinberg & Monahan (2007) showed that when controlling for individuals' willingness to engage in antisocial behavior, i.e. the ability to resist peer pressure to engage in this negative behavior, increases as students age. This signals that there is a relationship between age and social integration into school friendship networks. Over time adolescents may accumulate ties throughout the school network as a

function of classes taken or clubs joined. This increasing integration should be associated with an increase in the social control mechanisms of cohesion that provide protection from delinquent involvement and facilitate growing self-esteem. The link between integration and self-esteem is another important dimension of adolescence because, like the risk of victimization, the risk of depression and suicide is also disproportionately high for this age group. More recent work on the mental health consequences of social cohesion has found patterns shaped by both gender and race (Copeland and Kamis 2022) that suggest cohesion is not a universal mechanism of social control but rather the degree of control exerted by cohesive groups and the subsequent outcomes is contextual. Understanding social structures and friendship formation in adolescence lends itself to the exploration of their health and development. More specifically, how their level of integration is connected to the behaviors that will determine their health and their beliefs about appropriate behaviors.

Cohesion is a prominent feature of social structures but far from being its only relevant feature. Social structure consists of the stable components of organized groups. Durkheim defines social structure as the intersection of two independent parameters, integration, and regulation (Bearman, 1991). Integration can be understood as the extent of social relations binding a person or group to others such that they are exposed to regulations, or the moral demands of the group placed on the individual that come with membership (Bearman 1991). In other words, integration refers to the number, strength, and configuration of social ties, whereas regulation is a set of behavioral norms or expectations attached to the group identity. To further illustrate social structure, Blau's (1977) theory of heterogeneity suggests that the integration of social structure depends on face-to-face contact and interaction, not on functional interdependence or value consensus which are common characteristics of cohesive groups. This may be because influence structures can operate across networks, meaning that actors can be influenced by non-adjacent but

highly visible members of their network. Taken together these concepts suggest a distinction between integration into the larger institutional climate and peer group cohesion. For Blau, social structure refers to the specific distribution of a population among differentiated social positions (Sampson 1984). Blau's conception of social structure implies that there are several distinct groups that exist within a single society with their own norms and values, and perhaps, unique processes for dealing with antisocial behaviors, violence, and stress.

The study of adolescent health and development in sociology spans several decades and fields of study. One area of research in criminology engages the debate between selection and peer influence in the establishment of adolescent behavioral norms. Scholars in this field aim to understand how social networks and the broader environments within which adolescents are embedded influence their development and involvement with delinquency and crime. This dissertation seeks to engage with this body of literature to further contribute to our understanding of how crime, delinquency, race, and violence determine adolescent health and development. Specifically, I study how victimization during adolescence shapes stress trajectories into adulthood as well as the social network antecedents to victimization and depressive symptoms. Through this research I contribute to scholarship in medical sociology, criminology, and the sociology of race and ethnicity.

1.1 Chapter Overview

Chapter 1 deals with the network antecedents to victimization. In this study I seek to identify which adolescents are at the greatest risk of victimization by observing their social relationships and the characteristics of their peers. Criminologists often rely on theories of social control and social learning to explain criminal behavior in adolescence. Unstructured socializing, or time spent with friends outside of the purview of parents, authority figures or any other social

control forces, is significantly associated with delinquency. Haynie & Osgood (2005) found that the impact of friends' delinquency is greater either when respondents feel closer to their friends or when they spend more time in unstructured socializing with their friends. Miller & Hemenway (2004) similarly found that unsupervised gun handling typically involves shooting the gun and usually occurs with friends away from the home or, in other words, away from social control forces. Adolescents who reported handling a firearm without adult supervision or knowledge where disproportionately from rural areas, more likely to have a firearm in their house, more likely to report smoking or binge drinking, to have been threatened with a firearm, to have been seriously injured in the previous year, and to have less parental involvement in their lives. This evidence suggests that violence is a two-way street in that adolescents demonstrating delinquent or criminal behaviors are also the one's mostly at risk of experiencing victimization because violence is most likely to occur in the same unstructured context as crime. Crime, delinquency, and violence have several important empirical connections that make it possible to predict the probability of victimization. This body of literature is well established and claims that delinquency is a primary factor in becoming a victim of violence. This chapter seeks to illustrate how network characteristics might further shape the relationship between delinquency, peer influence, and violence.

In Chapter 2 I contribute to literature on adolescent health and development by investigating how stress trajectories into adulthood are shaped by race and experiences with violence during adolescence. Chapter 1 explores who is the most prone to experiencing such violence and why, while this chapter will examine racial differences in the consequences of experiencing victimization. Medical sociologists find that adolescence is one of many vulnerable periods across the life course characterized by shifting social landscapes and behavioral development. The behaviors teens normalize depends on the messages they receive from peers,

parents, and schools regarding expectations. These behaviors, once normalized, shape adolescent health trajectories. For example, joining a group of peers who regularly smoke or drink outside of adult supervision often has lasting negative impacts on several health outcomes. Additionally medical sociologists have applied the concept of allostatic load to measure physical manifestations of stress. Several theories have since been developed to explain racial differences in allostatic load across a wide array of age groups and racial identities (Geronimus et al 2006; Geronimus et al 2010). Namely the weathering hypothesis, which states that our bodies have limited capacity to deal with repeated exposure to external stressors. Once a critical threshold of stress is reached our bodies become less efficient in processing new stress. Typically, the hypothesis is used to explain why people of color have a consistently higher allostatic load than their white counter parts. No medical sociological literature to date has attempted to develop a method of analyzing health outcomes that account for the possible racial differences in stress processing. This study contributes to this literature by exploring unique patterns of stress processing across racial groups.

In Chapter 2 I contribute to literature on adolescent health and development by investigating how stress trajectories into adulthood are shaped by race and experiences with violence during adolescence. Medical sociologists find that adolescence is one of many vulnerable periods across the life course characterized by shifting social landscapes and behavioral development. The behaviors teens normalize depends on the messages they receive from peers, parents, and schools regarding expectations. These behaviors, once normalized, shape adolescent health trajectories. For example, joining a group of peers who regularly smoke or drink outside of adult supervision often has lasting negative impacts on several health outcomes. Additionally medical sociologists have applied the concept of allostatic load to measure physical manifestations of stress. Several theories have since been developed to explain racial differences

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Lastly, I leverage theories of social control and stress processing in Chapter 3 to explain how racial heterogeneity in friendship networks is an important dimension of social support. Support is integral to the prevention of depressive symptoms during adolescence, but few scholars have explicitly examined the role of racial identity in the generation and perception of social support during adolescence. Scholarship instead tends to focus on the ways mental health appears to be related to numerous forms of socioeconomic status and integration such that the lower one's status or integration the more common symptoms of depression become (Aneshensel and Sucoff 1996). Contemporary studies have found an empirical connection between the network positions adolescents occupy and their level of depression. Adolescents with few or no friends and teens who feel they don't belong in their schools are consistently shown to be at the greatest risk of depression (Barman and Moody 2004; Falci and McNeely 2009; Walker 2015; Yilmaz and Bohara 2021). Integration into social institutions is important for developing a sense of belonging or attachment that fosters the necessary community support that can alleviate depressive symptoms (Maimon and Kuhl 2008). While several studies have empirically verified the connection between the social networks one occupies and their mental health the scholarship

on adolescent health and development often cites symptoms of depression as a common deterrent to social integration. Much of the literature regarding networks and mental health describes the importance of gender and race as mediating factors. Young men and women are repeatedly shown to have unique mental health outcomes in response to their network structural characteristics though much more attention has been given to gender effects (Falci and Mcneely 2009; Copeland and Kamis 2022). This chapter seeks to understand the effects of social integration and racial homophily, as social conditions that facilitate the production and reception of social support. I examine whether the mechanisms underlying social support are mediated by racial heterogeneity and social cohesion in friendship networks.

2. Chapter 1: Risk factors and the social structural antecedents of victimization during adolescence

According to the National Institute of Justice 2020 special issue on violent crime, violence in US schools has been declining over the last few decades. The School Crime Supplement survey collected in 2017, shows that the percentage of students who reported being victimized at school decreased for both violent victimizations (from 2% to 1%) and serious violent victimizations (from 1% to less than 0.5%) between 2001 and 2017 (Frederique 2020). However, single-victim homicide rates have remained stable over the same period and multiple victim homicide rates have increased (Frederique 2022). Of all violent crime, homicide is the most reliably documented. This in addition to the fact that the SCS 2017 survey only tracked violence within schools means it's likely that the amount of violent crime experienced by teens is underreported. The National Longitudinal Study of Adolescent to Adult Health (Add Health) survey data captures experiences with violence within and outside of schools positioning it to assess teens experiences with violence more accurately. With the increasing concern for safety in school systems, understanding the lasting impacts of such events may be useful to policy initiatives seeking to create safer learning environments for teens.

A long line of sociological research on adolescent crime and delinquency suggests that the social characteristics of an adolescent's community heavily influence the likelihood of that adolescent's involvement in delinquent behavior and perhaps the likelihood of their victimization (Shaw & Mckay, 1942; Hirschi, 1969; Sutherland & Cressey, 1974; Groves & Sampson, 1989; Pridemore, 2002; Akers 1996; Moody et al. 2011; Berg, et. al. 2012; Evans & Smokoski 2016; Longmore et al. 2021; Turanovic 2022; Mullet et al. 2023). Fisher et. al. (2004) speculate that research on victimization could benefit from studies emphasizing the peer context of victimization considering delinquency and victimization share many empirical connections. Their

study, and a few others since, have identified peer delinquency as a significant risk factor for violent victimization (Morgan 2018; Tillyer and Tillyer 2016; Carlton 2020). Just as there is a relationship between network position and delinquency (Haynie 2001), it follows, that there is a likely connection between the social network occupied by an adolescent and the likelihood of victimization. However, the probability of victimization compared to the propensity towards delinquency may function differently in terms of causal mechanisms, because delinquency is a learned behavior and victimization is not. According to social control theory integration into institutions and groups protects from both delinquency and victimization. However, numerous empirical studies have shown that behavioral norms are reinforced by social integration ((Berten and Van Rossem 2011; Centola 2015) regardless of whether the behaviors are considered delinquent or prosocial. Additionally, delinquency is a primary predictor of victimization. When considering teens who find themselves deeply embedded into highly delinquent groups, the literature predicts varied outcomes regarding victimization. Do the protective elements of social integration outweigh the negative implications of delinquency? Results from this chapter indicate that high integration defined by degree centrality is a universal deterrent to victimization even in more delinquent groups.

2.1 Background

For many American teenagers, their formative years take place within the context of public or private school systems. In these contexts, teens are consistently exposed to opportunities to practice forming and maintaining social relationships, with a myriad of groups each with their own unique roles and expectations. Scholars often theorize that unmitigated access to several behavioral norms, i.e. a breaking down of normative consensus, is a primary factor in the development of criminal behavior.

Adolescents remain at increased risk for victimization when compared to other age groups. Victimization at school, including victimization resulting from physical fights and exposure to guns has remained high and stable since 2001 (Van Dorn, 2004; Frederique 2022). In 1997, 202, 000 students were victims of nonfatal serious violent crimes at school, including rape, sexual assault, robbery, and aggravated assault. When adding simple assault to the above serious violent crimes a total of 1.1 million students were classified as being victimized in school (Van Dorn, 2004). In fact, in the United States youth are more than 2.3 times more likely than the general population to be victims (Guerra & Hanish, 2000). Today these numbers have declined yet multiple homicide rates inside schools have increased. Important for this study are instances of serious nonfatal forms of victimization and their relationship to the content or behavioral norms of one's friendship network as well as the structural characteristics of the respondent's position within the network.

The prevalence, severity, and impact of violence in schools has prompted increasing attention in recent years by national and international researchers who are committed to providing youth with safer schools (School Crime Survey 2017, Frederique 2020). Van Dorn (2004) found that school-based safety precautions were non-significant throughout his analyses for violent victimization and only showed a trend toward significance with nonviolent victimization. A more contemporary evidence-based policy, geared towards preventing delinquency and gang membership is the Functional Family Therapy (FFT) strategy. Originally implemented in 2009 the FFT was modified and reapplied in 2018 and substantially reduced delinquency and subsequent criminal involvement in the participating youth by addressing negative peer relationships, normative beliefs about the law, constructive use of time, unhealthy family dynamics, and parent behaviors such as substance abuse (Carlton 2020). While the FFT was successful in reducing recidivism and crime, and by proxy instances of victimization violent or

otherwise, the pattern observed by Van Dorn (2004) remains to this day as nonviolent incidents of victimization such as interpersonal conflict and bullying have decreased while rates of homicide have increased within schools (Frederique 2020), suggesting that US education policy makers have much to improve regarding policies geared towards preventing physical violence on and off campus.

2.1.1 Common Correlates of Victimization

Here I identify what we know about the common correlates of victimization in high school particularly, age, gender, and socioeconomic status. The evidence suggests that younger children are at greater risk of victimization because victimization is frequently perpetrated by same-age or older children, rather than by younger children. Younger children are less likely than older children to have developed the physical, social, or cognitive skills that enable them to protect themselves from being victimized (Guerra & Hanish, 2000). However, it is important to note that these victimization trends imply a closeness in age. For example, kindergarteners are not a risk of experiencing violence perpetrated by high school seniors while high school freshmen who are closer in age and proximity to these seniors are somewhat at risk of being the targets of violence as their age and status make them stand out as suitable targets. As for gender, the existing peer victimization literature has consistently demonstrated that boys are more likely than girls to be violently victimized by peers (National Center for Educational Statistics 2019). Empirical research has speculated that this consistent relationship between gender and victimization is due to the increased social pressure for boys to display aggressive behavior to prove their “manhood” and hyper-masculine behavior shares a strong association with victimization (Guerra & Hanish, 2000). Sutherland (1974) proposed in his differential association theory that structural conditions such as class, age, sex, ethnicity, and family status affect

individual criminality by affecting the probability of learning behavior patterns either favorable or unfavorable to violating the law (Matsueda, 1982).

In the past, empirical attention has focused on identifying the risk factors for peer victimization to understand this problem. Studies have revealed several behavioral and social risk factors that work as individual influences and in tandem with one another to influence the likelihood that children will be targeted for victimization. For example, displaying aggressive behavior, having poor self-esteem, and being rejected by peers have all been identified as risk factors for victimization. (Guerra & Hanish, 2000). This chapter includes several individual and peer level delinquency items to isolate the independent effects of an adolescent's friendship network on their likelihood of physical victimization.

To understand these behavioral and social impacts on victimization and adolescent behavior some sociologists and criminologists have utilized a social network perspective when looking at high school instances of violent victimization (Dunham et. al., 2012; Fisher et. al., 2004; Gallaher et. al. 2004). Friendship circles are repeatedly referred to as one of several important factors of school life for American teens mostly due to the structural changes that happen during transitions between elementary, middle, and high school (Coleman, 1961; Coleman 1980; Eckert & Penelope, 1989; Wallace and Ménard 2017). These changes often result in exposure to more heterogeneous populations and the adolescent's social status will be based on which peers they fall in with (Haynie, 2001; Brown et. al., 2004). Should they associate with certain groups of peers their chances for victimization may be determined by the behavioral norms present in their friendship network. In addition to the behaviors and values embedded in the network, that is, the network's content, the teen's structural positioning within the network will either amplify or diminish the victimization risk factors involved with the behavioral patterns present in the network. Victim's social networks are unlikely to provide access to valuable social

information and are characterized by a lack of integration (Evans and Smokowski 2016; Wallace and Ménard 2017; Mullet et al. 2023). Barriers to social integration such as victimization (Mullet et al. 2023) and depression (Schaefer, Kornienko, and Fox 2011) filter adolescents to the outskirts of schools' social circles sometimes to the point of isolation where few if any peers reciprocate friendship. Social isolation is often synonymous with both a lack of social influence and protection in sociological literature suggesting that the negative effects that come from unsuccessful integration and victimization are mutually reinforcing such that isolates are more likely to be victims and victims are more likely to become isolates. In a similar vein, delinquent youth are much more likely to be victims of violence than their non-delinquent counter parts and those who have been victims are much more likely to demonstrate delinquent or criminal behavior, even if it's only in the name of self-preservation. For example, many victims carry weapons to school after being victimized. The distinction between delinquency as a learned behavior and victimization as the result of several overlapping circumstances is an important dimension of adolescent criminology when determining policy initiatives aimed at reducing violence. What may help delinquent youth avoid putting themselves at increased risk is unlikely to help youth who are already demonstrating prosocial behavior and strong social support systems. This chapter seeks to address these policy concerns by making a clear distinction in the probability of victimization for both classes of adolescent by assessing how an adolescents' position within a network determines their likelihood of victimization above and beyond the network's behavioral content. This information should assist policy makers in the development of more universal initiatives geared towards reducing violence for all students.

2.1.2 Social Organization and Victimization

Integration can be understood as the extent of social relations binding a person or group to others such that they are exposed to the moral demands of the groups. In contrast, regulation is

defined as the normative moral demands placed on the individual that come with membership in a group (Bearman, 1991). In other words, integration refers to the number and strength of social ties whereas regulation is a set of behavioral norms or expectations attached to the group identity. For Blau, social structure refers to the specific distribution of a population among differentiated social positions (Sampson, 1984). Blau's conception of social structure implies a distinction between the behavioral and social content of a network and its structural form that is particularly relevant to the high school context. The very conditions that foster the social integration of various groups and strata into a coherent social structure simultaneously precipitate frequent interpersonal conflicts among members (Sampson, 1984). Therefore, it is imperative to account for the values present in the networks composed of these social interactions or the network's content such as average delinquency.

A study done by Gallaher et. al. (2004) found that the number of friendship nominations received was negatively associated with being a victim. When residents form local social ties, their capacity for community social control is increased because they are better able to recognize strangers and more apt to engage in guardianship behavior against victimization (Sampson & Groves, 1989). Yet the study did not account for the network content or the values these friendship nominations brought into the respondent's network.

There is a body of research that shows that children who attend schools in poor neighborhoods are at particularly high risk of exposure to violence at school (Guerra & Hanish, 2000; Heath et al. 2022). Poverty and population heterogeneity purportedly obstruct primary group relations in residents' ability to articulate common goals. This condition in turn causes systems of social control to weaken, ultimately enabling youth to engage in delinquent conduct (Gottfredson and Hirschi 1990; Berg, Brunson & Stewart, 2012). Structural changes in activity patterns influence crime rates by effecting three necessary elements for criminal victimization (1)

motivated offenders, (2) suitable targets, and (3) the presence of capable guardians as victims lack many protective social relationships that would shield them from exposure to violent situations. (Evans, & Smokowski, 2016; Long, et. al., 1987). Hindelang, Gottfredson, and Garofalo (1978) suggest that demographic characteristics (age, gender, income, etc.) are associated with various role expectations, which, in turn, lead to difference in lifestyles, exposure to risk, and subsequently to difference in the likelihood of victimization (Long, et. al., 1987). Hindelang et. al. (1976) report that higher victimization rates for males, the young, low-income persons, and racial/ethnic minorities are consistent with the lifestyle theory because these groups have higher exposure to the risks factors of victimization (Long, et. al., 1987). In a more recent study of patterns of school-based victimization Heath et al. (2022) categorize risk of victimization based on the presence of delinquent behaviors and find an overrepresentation of black youth in high-risk categories, not racial minorities in general.

Shaw and McKay (1942, 1969) developed the social disorganization model, which argued that both cultural and social control processes serve as conduits through which neighborhoods come to influence youths' behavior (Berg, Brunson & Stewart, 2012). The general hypothesis of the theory suggests that low economic status, racial heterogeneity, residential mobility, and family disruption lead to community social disorganization, which, increases crime and delinquency rates (Sampson & Groves, 1989). Shaw and McKay argued that economically disadvantaged communities foster a diverse cultural climate characterized by a wide variety of conflicting and competing values regarding the appropriateness of delinquent conduct (Berg, Brunson & Stewart, 2012). Sutherland & Cressey (1974) use the social disorganization model to develop several postulates of differential association, the first of which claims that criminal behavior is learned through communication with intimate groups. The process of differential association with definitions both favorable and unfavorable to crime is arranged by the broader

social organization in which individuals are embedded, for example, family units, schools, neighborhoods, etc (Longmore et al. 2021). The organization of these environmental contexts is captured by the concept of differential social organization because they are sources providing social networks their behavioral content (Matsueda, 2006). Sutherland also suggested that there were four components that determined the importance of the definitions about crime present in the ego's network: Frequency, the number of times a definition is presented, Duration, the length of time a person is exposed to a definition, Priority, how early was the definition presented to the person's life, and finally, Intensity, which refers to the meaning of the relationship or prestige of the person presenting the definition (Matsueda, 2006). Therefore, the explanation of crime rates, differential social organization, is consistent with the explanation of individual acts of crime, differential association (Matsueda, 2006). Consequently, the theory is particularly suited to handling this study's focus on a social network's content and how it influences behaviors that may contribute to exposing teens to violent victimization.

Individual, school, and neighborhood level factors have all demonstrated an association with school-based victimization. It is rare however, for one study, most often due to data limitations, to incorporate all three units of analysis (Van Dorn, 2004). Community based factors have long been thought to influence the functioning of school and more specifically, the levels of violence and victimization occurring within schools (Van Dorn, 2004). Findings describe the ways individual level correlates of school-based victimization are often extrapolated to the school level; however, the unit of analysis remains the individual (Van Dorn, 2004). This study is primarily concerned with the social network contents and forms that influence violent victimization and employs theories of delinquency applicable to an individual unit of analysis with data collected on individual adolescents.

2.1.3 Social Control vs. Social Learning Theory

Social control theory maintains that persons conform to legal codes not because they are inherently obedient but because they are bonded to society. Accordingly, when a person's bond to society is broken or weakened, they are free to engage in delinquency but not compelled to do so. Hirschi operationalizes differential association theory in his critiques using association with delinquents rather than associations with behavior patterns favorable to delinquency.

Social learning theory predicts that high crime rates are rooted in normative conflict, which he defined as a condition in which society is segmented into groups that conflict over the definition of appropriate behavior. Therefore, when normative conflict is absent in a society, crime rates will be low; when normative conflict is high, societal crime rates will be high. The process of differential association provides a social psychological explanation of how normative conflict in society translates into individual criminal acts and thus exposure to victimization. Sutherland's differential association addresses the relationship between the structural influences of the networks form and the values present within the network, or its content, as the theory is concerned with exposure to language and rationalizations that justify and teach criminal behavior, and thus an increased exposure to violence, whereas social control theory is primarily concerned with obstacles to committing crime such as pressure from cognizant guardians. For this study, I focus on the contextual/ environmental risk factors associated with violent victimization during adolescence through the theoretical framework of differential association.

Each theory lends itself to different outcomes. Social learning theory (Akers 1999) predicts that the effect of social integration on the probability of victimization depends on whether the group one is integrating into is delinquent or not. Social control theory in contrast, predicts that delinquents will have a hard time integrating and thus any integration or attachment to larger social institutions will be universally protective. The individual level hypothesis of

differential association theory states that a person will engage in criminal behavior if the following conditions are met: the person has learned the requisite skills and techniques of committing crime, the person has learned an excess of definitions favorable to crime over unfavorable to crime and the person has the objective opportunity to carry out the crime (Matsueda, 2006). Sutherland recognized that definitions favorable to crime can be offset by definitions unfavorable to crime, and therefore hypothesized that criminal behavior is determined by the ratio of definitions favorable to crime versus unfavorable to crime that are present in the community in which the individual exists i.e. their social network (Matsueda, 2006).

Even in high crime communities, some residents are isolated from the abundant definitions and exposed to the few anti-criminal definitions present in the community (Matsueda, 2006). For this reason, differential association lends itself well to the social network perspective by considering one's position inside of their social network and the definitions they are exposed to as a result of that positioning. The social network perspective allows us to examine the extent to which the values within a network will affect the individual ego by providing a means to account for the influence of the values present. Structural characteristics of adolescent network's determine whether the network has control over its member's behavior. Which is to say, behavioral influences from a respondent's friendship network depend on the behavioral norms already present within the network i.e., content and are modified by structural components of the ego network such as the density, centrality, and popularity, i.e., form. Haynie (2001) tested the effects of a networks structure coupled with the average delinquency of the network on the respondent's propensity to engage in delinquent behavior. This study looks away from committing delinquent acts and instead gages how likely the respondent is to become a victim of violence given the contexts and structural position within their friendship networks.

2.2 Hypotheses

The conceptual framework established in Social Control and Social Learning Theory can be organized into a single research question and two hypotheses:

RQ1: How do social integration and delinquency work together to determine the probability of victimization for adolescents?

(H1) Control theory predicts that social integration will be a strong protective factor against victimization. Delinquent teens will have trouble integrating into prosocial groups and thus are more likely to be isolates who are more prone to victimization.

(H2) In contrast, social learning theory suggests that the effect of social integration on the probability of victimization depends on the behavioral norms of the group the adolescent is embedded in, such that integration into delinquent groups will increase the probability of victimization above and beyond the increases from individual delinquency.

2.3 Data & Variables

To test the influence of friendship network content and structure on teen's exposure to violent victimization, this study employs data from the first wave of The National Longitudinal Study of Adolescent to Adult Health (Here after Add Health). The data consists of a nationally representative sample of teens, ages 10 to 19, nested in randomly selected public and private schools throughout the United States in 1994-95. Information on the sample was collected from the respondents, their peers, school administrators, parents, siblings, and romantic partners through an initial in-school survey followed by four in-home interviews.

Add Health's In-School Questionnaire, a self-administered instrument, was distributed to more than 90,000 students in grades 7 through 12 in an hour-long class period between fall 1994 and spring 1995. The questionnaire consisted of many topics, from education and parental

occupation to self-esteem and risk behaviors, but most important to this study was the information collected on student's behaviors and friendships. Respondents were asked to name their five closest female friends and their five closest male friends. In instances where the friendship nominations were members of the same school as the respondent, as more than 80 percent of nominations were, data was also available on the nominees. The Add Health study design makes it possible to reconstruct the social networks of most students. This network information enables researchers to calculate behavioral attributes present in each respondent's own friendship network, such as delinquency, as well as test the structural influences the network may have on behavior or propensity to victimization.

Data from the more in-depth in-home interviews contains sensitive information on the adolescents such as experience with drugs and alcohol and various other risky behaviors such as carrying a weapon. One of the most advantageous components of this in-home method was the use of laptop computers which played prerecorded questions about experiences with victimization. This method of data collection helped to maintain confidentiality on numerous sensitive subjects. These self-reported experiences from the first wave of in-home interviews was used to construct the dependent variable – victim – for this study. The final research sample for the project consists of 10381 respondents with complete data from both the in-school and in-home interviews. Table 1 shows the descriptive statistics for each of the variables included in the study.

Table 1: Descriptive statistics.

Variable	Mean	Std. Dev.	Min	Max	N
Victimization	0.18	-	0	1	14248
Age	15.05	1.71	10	19	14273
Sex (male ref.)	0.51	-	0	1	14220
Family SES	0.00	1.00	-1.89	2.12	13639
Race (white ref.)	0.46	-	0	1	14704
Black	0.19	-	0	1	14704
Asian	0.07	-	0	1	14704
Latino	0.06	-	0	1	14704
Indigenous	0.01	-	0	1	14704
Mixed Race	0.20	-	0	1	14704
Other Race	0.01	-	0	1	14704
Weapon Carrying	0.09	-	0	1	14237
Self Control	19.10	3.04	0	25	14319
Unsupervised Drinking	0.40	-	0	1	14309
Unsupervised time with friends	1.97	1.00	0	3	14308
School Attachment	10.65	2.97	3	15	12677
Alters Delinquency	7.62	4.48	0	42	14319
Indegree	4.34	3.65	0	32	14319
Ego Network Density	0.29	-	0	1	14319
Core Membership	0.93	-	0	1	13796
school size	948.61	620.15	30	2559	14319
School Type (Private Ref.)	0.06	-	0	1	14076
Public School	0.95	-	0	1	14076

The dependent variable for the study is a binary indicator for victimization. The variable victim is a composite indicator of violent victimization experienced in the twelve months prior to the wave 1 in-home interviews, when the respondents were aged 11 to 19. It takes on the value of 0, if the respondent experienced none of the forms of physical victimization listed in Table 1, or 1 if they have experienced at least one of the forms. Table 1 shows that 16.7% of the research sample experienced some form of violent victimization.

Figure 1 compares the theoretical distribution of victimization across schools with the observed distribution. Most schools in the sample show a rate of victimization between 0.1 and 0.2. While a few schools reported no instances of victimization, the prevalence of violence in the US school system cannot be understated.

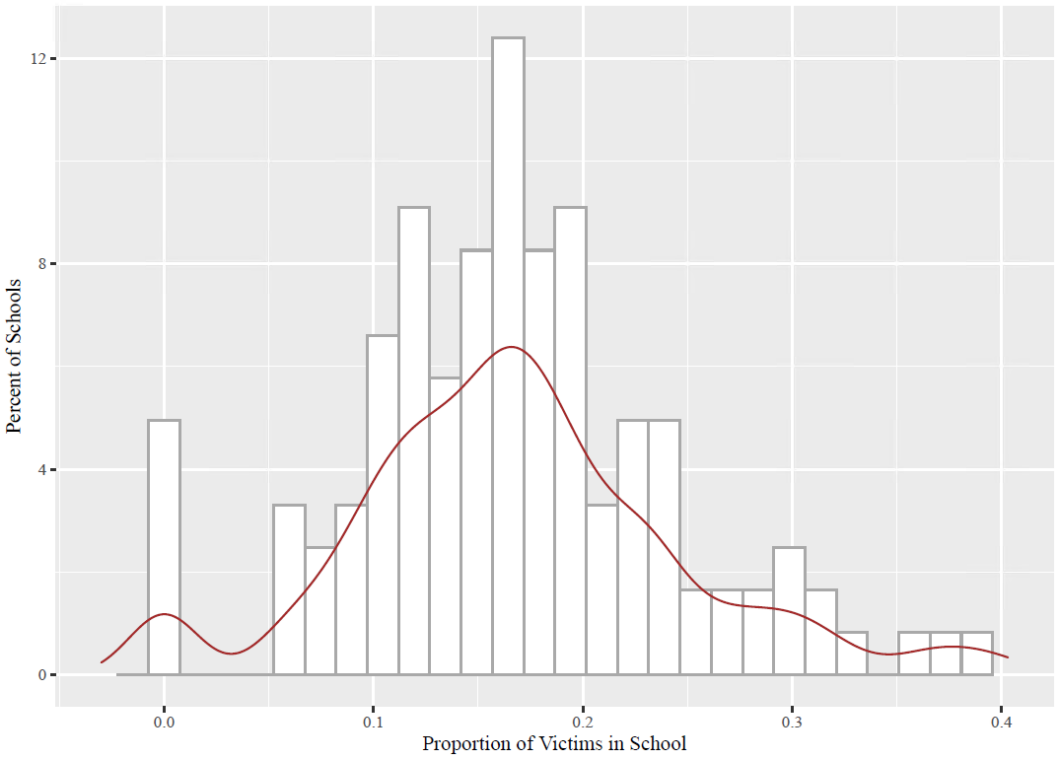

Figure 1: Rate of victimization across US schools.

The graph reveals the prevalence of violence experienced by adolescents as roughly 5% of schools have a 0% victimization rate. The graph also suggests that school environments may influence the rate of victimization. Schools are also nested in neighborhoods which vary greatly in the socioeconomic conditions that determine the probability of victimization.

This chapter uses standard indicators known to impact health outcomes to isolate the relationship between victimization, race, and adult stress. The variable race contains the self-reported racial identity from five selected categories: White (48.4%), Black (19.2%), Asian (5.8%), Latino (5.5%), Indigenous American (0.9%), and Other Race (1.1%). I modified the categories to also include mixed race individuals (19%), who selected more than one racial identity. Age is measured in 2008 as part of the fourth wave of Add Health's data collection. Respondents' age ranges from 24 to 35 at the time. The variable has a mean of 29.07 and a

standard deviation of 1.7. Sex is self-reported sex category collected in 1995 as part of Add health's first in school questionnaire. The categories are 0 for males and 1 for females showing that 54% of the sample is female.

To construct the variable socioeconomic status, I first determine the respondent's present parent(s) highest level of education and then place it on a 8-point scale. Next, I take their reported family income and situate it on a similar 8-point scale based on empirically observed quantiles. Both variables are then standardized and summed. The variable has a range of -1.89 to 2.12 and an average of 0 with a standard deviation of 1.

The variable weapon carrying asks respondents whether they have carried a weapon to school in the past 30 days. The variable takes the value of 0 if they have not carried a weapon to school or 1 if they have. As victimization extends to the past 12 months prior to the in-home interviews weapon carrying in this case may signal a response to victimization. This reaction is common in victimized youth (Wallace 2017). The variable has an average of 0.09 meaning that a little less than 1% of the sample had carried a weapon to school in the last month.

Selection effects are often controlled in studies examining adolescent crime and delinquency. Individual self-control is an often-used measure for this concept (Gottfredson and Hirschi 1990; Schreck, Stewart, and Fisher 2006). The variable self-control is the average of five Likert scale variables that measure how respondents approach finding solutions to problems. Do they like to get as many facts as possible before acting? Do they search for different approaches or just do the first thing that comes to mind? The variable self-control ranges from 0 to 25 with an average of 19.1 and a standard deviation of 3 signaling that most respondents in the sample have a high degree of self-control or in other words low levels of impulsivity. The variable scale has a Cronbach's alpha of 0.733.

Unstructured time with friends away from parents or other guardian supervision is the most likely time for victimization to occur (Turanovic 2022). The more time teens spend in these conditions in conjunction with their school and neighborhood contexts affects their probability of victimization. Two variables are designed to measure this period of vulnerability. First, unsupervised time with hanging out with friends. The variable ranges from 0, meaning the respondent did not hang out with their friends in the last week to 3 signaling that they hung out with their friends 5 or more times in the last week. The variable has an average of 1.97 and a standard deviation of 1. This means that most respondents are hanging out unsupervised with their friends about 3 or 4 times a week. The second variable takes this vulnerable period a step further by asking whether the respondents ever drink during this period of unsupervised time. The variable Drinking has a minimum value of 0 and a maximum value of 1 and an average f 0.4 meaning that 40% of the sample do drink when there is no parent or guardian supervision.

School orientation is also a common correlate of victimization with students exhibiting positive attitudes towards schools being at lower risk of delinquent involvement and thus a lower likelihood of engaging with violence. The variable school attachment in this paper is a composite measure of three Likert variables asking whether respondents felt like a part of their school, close to the people at their school and whether or not they are happy to be at their school. The variable school attachment ranges from 0 to 15 and has an average of 9.75 and a standard deviation of 4.05. The composite measure has a Cronbach's alpha of 0.883.

The next set of variables measures the respondents network form and content. Alter delinquency measures the average delinquency of the respondent's friendship group. This network content measure determines how much delinquency the teen is exposed to. It sums the respondent's friends' answers to a set of six questions regarding delinquency on a seven-point

scale. The variable has a range of 0 to 42, an average of 7.62 and a standard deviation of 4.48. The composite measure has a Cronbach's alpha of 0.72.

In the Add Health data friendship nominations are sent and received. In degree measures how many people have nominated the respondent. Colloquially, popularity is a good measure of the respondents' overall position within the larger school network where students with more nominations occupy more central positions. Occupying highly central positions within delinquent contexts at the peer, school and neighborhood levels increases one's own delinquency above and beyond the level of their environment (Haynie 2001). The variable in degree has a minimum value of 0 and a maximum value of 32. The variable has an average of 4.34 and a standard deviation of 3.65.

Ego network density is a measure of connectivity between friends of friends within a social network. High density networks are characterized by high levels of social cohesion and conformity. Highly dense networks reinforce the behavioral norms and beliefs of its members (Haynie 2001). The variable density has a minimum of 0 meaning that the respondent (ego) has no ties to others and 1 meaning that all possible ties in the ego network exist. Maximum density is rarely observed empirically. The variable has an average of 0.29 and a standard deviation of 0.16.

Social networks in US high schools tend to organize themselves into a core periphery structure where most adolescents are a part of a large cohesive core in school friendship networks (Coleman 1981; Moody 2001). Measurement of social cohesion in networks rests on the robustness of the network to disconnection when members are lost. (Moody and White 2003; Moody 2004; White and Harary 2001; Coleman 1961). In this chapter I control for whether the respondent is a member of this cohesive core in their schools because socially isolated teens are much more likely to be victims. The variable core membership ranges from 0 to 1 and has an average of 0.93 meaning that most students are a part of their school's core friendship network.

Finally, I control for some school level features to further parse the effects of the fixed antecedents to victimization. The first is the size of each school. The variable school size is a measure of how many students are attending each school in the sample and comes from the school code counts in the original restricted data. The variable ranges from 30 to 2559 and has an average of 948.61 and a standard deviation of 620.15. The second school level variable included in the model is the school classification as either a public or private school. Each comes with its own set of behavioral and social expectations as well as administrative practices that shape the schools' normative environment. This context may impact the probability of students being victims of violence. Table 1 shows that 6.8% of the sample attends a private school while 93.2% of the sample attends public schools.

2.4 Analytic Strategy

Respondents in the Add Health data are nested into unique school and neighborhood contexts. A student's likelihood of experiencing violent victimization can be determined by what happens in their friendship circles, their attachment to family, schools, and their neighborhood environments. Multilevel models are best suited when there is clustering of an outcome along categorical variables that makes error dependent and ordinary least squares regression inappropriate (Garson 2019; Oyefuga and Shakeshaft 2023) as is the case with victimization in schools and neighborhood contexts. The variables used to construct these groups come from the schools' respondents attend as well as the degree of neighborhood disadvantage that characterizes their lives outside of their schools. Neighborhood disadvantage was calculated using census track level data that captures the proportion of children living below the poverty line, the rate of violent crime, the overall crime rate, and finally the level of unemployment. Each of these categories

were standardized and summed to form the grouping variable, neighborhood disadvantage (alpha = 0.785).

Two null models for this analysis were run to justify the use of Multilevel models. Both null models predict victimization using only the grouping classifications for the school and neighborhood climate, respectively, with victimization as a binary outcome. The models' intercepts were both significant signaling a substantive portion of the variance in victimization is explained by these categorical groups. The ICC for the school grouping model is 0.0208 and the ICC for the neighborhood grouping model was 0.0193. These together with the significant intercepts indicate that there is little between group variance in adolescent victimization.

To simplify the processes of explanation I include variables to the model in related blocks and assess each model's information criteria to determine model fit. The first group is common demographic correlates to victimization during adolescences. Age, sex, family socioeconomic status, and racial identity. The second group includes individual level risk factors relating to the respondents' degree of autonomy, delinquency, and attachment to school. The third group adds friendship network variables that may expose or protect individuals from victimization. Finally, the fourth group adds school level indicators to see if controlling for the school environment substantively changes results from prior models. I explain each block in the analysis as I build the most robust explanatory model. As I move through the models, certain variables will be excluded for clarity as their robust estimates and p-values do not significantly change with the inclusion of additional predictors.

Interaction terms were included to test whether a respondent's network content and form worked together to determine the likelihood of their victimization within school and neighborhood contexts. Marginal effects were then calculated and interpreted based on the control variable averages.

2.5 Results

An important distinction to make for scholarship on delinquency and victimization is the difference between perpetrators of violence and the victims themselves. Much of the literature describes delinquency as a primary factor in determining the likelihood of victimization. And while add health data does not ask respondents if they have recently perpetrated criminal violence, it does ask if they have experienced violence as a victim. To illustrate the relationship between these variables I visualize the average rate of victimization across increasingly delinquent groups. Past literature has provided empirical evidence that shows victims tend to also be highly delinquent or belong to antisocial groups. In contrast to delinquency having a direct positive relationship with victimization it is equally plausible that suitable targets of violence who do not exhibit delinquent behaviors also exist. Figure 2 shows that the more delinquent an individual is the more likely they are to experience victimization. However, the figure also shows that youth who are not delinquent are still at risk of victimization, albeit lower risk. The distinction between victimization and delinquency is important to make in scholarship on victimization because it allows policy makers to understand unique points of intervention. Preventing delinquency has been shown to reduce violence in schools but these initiatives, while important, are less impactful for youth who are already more prosocial and still find themselves becoming victims of violence (Heath et al 2023; Carlton 2020).

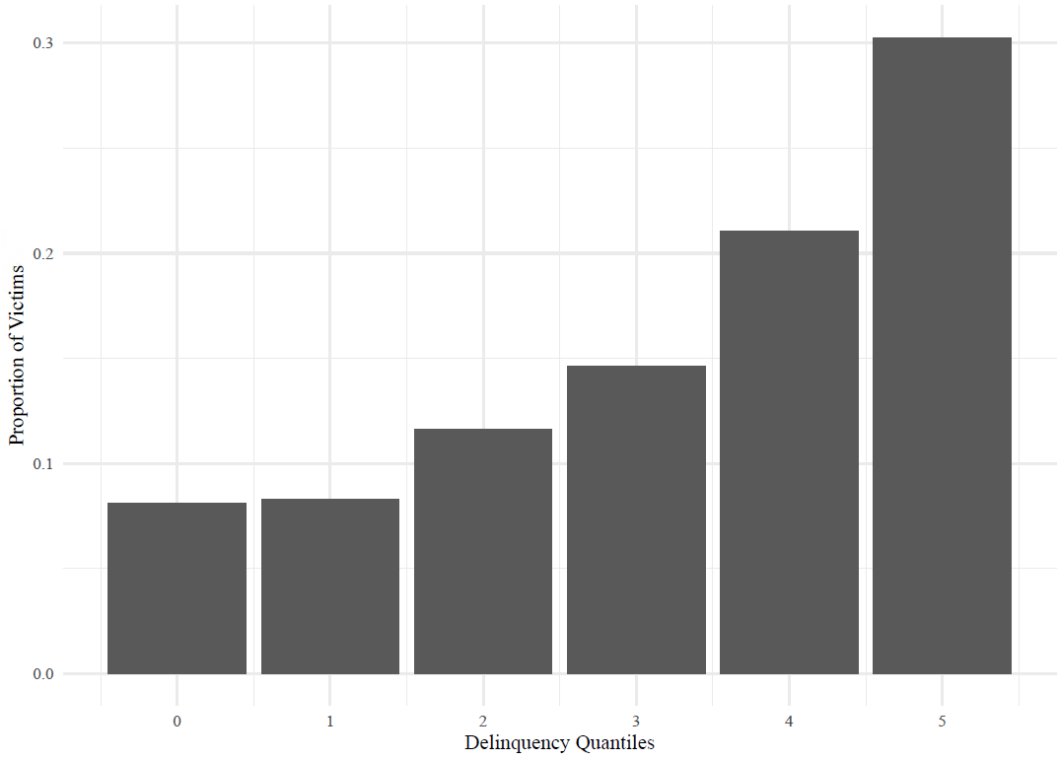

Figure 2: Rate of victimization across increasingly delinquent groups.

Table 2 shows the regression coefficients and their standard errors from two weighted linear models predicting the probability of violent victimization. Model 1 included several relevant demographic and socioeconomic controls to the null model while Model 2 adds individual level delinquency variables, self-control, and attachment to school.

Table 2: Fixed effects estimates from cross-classified multilevel logit models.

	Model 1				Model 2			
Term	Coefficient	OR	Std. Error	P-value	Coefficient	OR	Std. Error	P-value
Intercept	-2.279	0.102	0.301	0.0000	-1.279	0.278	0.347	0.0002
Age	0.063	1.065	0.020	0.0016	-0.023	0.977	0.023	0.3070
Sex (male ref.)	-1.040	0.353	0.059	0.0000	-0.998	0.369	0.067	0.0000
Family SES	-0.154	0.857	0.032	0.0000	-0.134	0.874	0.035	0.0001
Race (white ref.)	-	-	-	-	-	-	-	-
Black	0.295	1.343	0.100	0.0032	0.347	1.415	0.113	0.0021
Asian	-0.166	0.847	0.181	0.3589	-0.010	0.990	0.197	0.9593
Latino	0.571	1.770	0.167	0.0006	0.459	1.582	0.195	0.0187
Indigenous	0.872	2.393	0.212	0.0000	0.761	2.140	0.250	0.0024
Mixed Race	0.296	1.345	0.086	0.0005	0.236	1.266	0.095	0.0134
Other Race	0.693	1.999	0.196	0.0004	0.870	2.388	0.221	0.0001
Weapon Carrying					1.259	3.524	0.089	0.0000
Self Control					0.003	1.003	0.033	0.9227
Unsupervised Drinking					0.315	1.370	0.034	0.0000
Unsupervised time with friends					0.116	1.123	0.033	0.0004
School Attachment					-0.213	0.808	0.031	0.0000
AIC	8425.2				6968.1			
Neighborhood Var	0.0841				0.0598			
School Var	0.1707				0.2136			

Model 1 shows the association between the set of included demographic controls and victimization. Of these demographic variables age (B= 0.063, p = 1.57e-3) and race were positively associated with the probability of experiencing violent victimization. As respondents age 1 year their likelihood of violent victimization increases by 6.5%. As for racial identity, each racial group, to varying degrees, is predicted to have a higher likelihood of experiencing violent victimization than their white counterparts save for people who identified as Asian (p = 0.3589) who are no more or less likely to experience victimization than white respondents. Finally, the model predicts that a one standard deviation increase in family SES would result in a 14.3% decrease likelihood of victimization (B = -0.154, p = 9.94e-7). The AIC for the model is 8425.2.

Model 2 adds individual level delinquency and autonomy variables to the original set of demographic predictors. The inclusion of these variables does not substantively change the coefficients or p-values of most of the variables included in the first model. The exception is the variable age which is no longer significant or positive in direction. Model 2 predicts that as respondents age 1 year the probability of them experience victimization decreases by 2.3%

however the effect is not significant (B = -0.023, p = 0.307). The coefficients of the first new variable in the model, weapon carrying, show that students who have carried a weapon to school in the past month are 252.4% likely to experience violent victimization (B = 1.259, p < 2e-16) than their counterparts who have not carried a weapon to school. The measure self-control does not significantly affect the probability of a respondent experiencing violent victimization (p = 0.9227) net of the included variables. Drinking alcohol without guardian supervision is positively associated with victimization. The model predicts a 37% (B= 0.315, p < 2e-16) increase in the likelihood of victimization for adolescents who find themselves in these unstructured situations. Similarly, unsupervised time with friends is also predicted to increase the likelihood of victimization. For each standard deviation increase in the unstructured time spent with friends per week the model predicts a 12.3% (B = 0.116, p = 4.06e-4) increase in the likelihood of violent victimization. Finally, attachment to school is negatively associated with victimization with students who exhibit more attachment to school having a 19.2% (B = -0.213, p = 7.76e-12) lower probability of victimization. The AIC for the model is 6968.1, showing a better fit than either model 1 or the null model.

Table 3: Fixed effect estimates from cross-classified multilevel logit models.

	Model 3				Model 4			
Term	Coefficient	OR	Std. Error	P-value	Coefficient	OR	Std. Error	P-value
Intercept	-0.707	0.493	0.391	0.0703	-0.576	0.562	0.388	0.1379
Age	-0.033	0.968	0.024	0.1617	-0.028	0.972	0.024	0.2503
Sex (male ref.)	-1.002	0.367	0.069	0.0000	-0.990	0.372	0.069	0.0000
Family SES	-0.115	0.891	0.036	0.0015	-0.100	0.905	0.036	0.0059
Race (white ref.)	-	-	-	-	-	-	-	-
Black	0.390	1.477	0.116	0.0008	0.383	1.467	0.116	0.0010
Asian	0.094	1.098	0.205	0.6470	0.067	1.069	0.208	0.7472
Latino	0.425	1.529	0.199	0.0331	0.413	1.511	0.201	0.0400
Indigenous	0.711	2.036	0.251	0.0046	0.686	1.986	0.252	0.0064
Mixed Race	0.238	1.269	0.098	0.0149	0.262	1.299	0.098	0.0075
Other Race	0.807	2.241	0.231	0.0005	0.794	2.213	0.232	0.0006
Weapon Carrying	1.247	3.481	0.091	0.0000	1.243	3.466	0.091	0.0000
Self Control	0.006	1.006	0.034	0.8652	0.005	1.005	0.034	0.8810
Unsupervised Drinking	0.295	1.343	0.035	0.0000	0.295	1.342	0.035	0.0000
Unsupervised time with friends	0.107	1.113	0.034	0.0014	0.103	1.109	0.034	0.0021
School Attachment	-0.209	0.811	0.032	0.0000	-0.201	0.818	0.032	0.0000
Alters Delinquency	0.142	1.153	0.035	0.0001	0.138	1.148	0.035	0.0001
Indegree	-0.020	0.980	0.010	0.0358	-0.021	0.979	0.010	0.0303
Ego Network Density	-0.963	0.382	0.262	0.0002	-0.957	0.384	0.263	0.0003
Core Membership	-0.087	0.917	0.130	0.5023	-0.133	0.875	0.129	0.2995
school size					0.000	1.000	0.000	0.1549
Private School (Public Ref.)					-0.160	0.852	0.239	0.4931
AIC	6743.4				6702.3			
Neighborhood Var	0.0703				0.06774			
School Var	0.2058				0.19654			

In Model 3 I add ego network variables concerning the structure of the network as well as the behavioral norms expressed by the network members. Beginning with peer delinquency the model shows that for each standard deviation increase in the delinquency of a respondent's friends, the respondent themselves have an increased probability (b = 0.142, p = 5.90e-5) of experiencing violent victimization. Next, indegree also has a positive relationship to victimization. The more friendship nominations a person receives, or in other words the more popular they are, the less likely they are to also become victims. For each friendship nomination received the likelihood of victimization decreases by 2% (B = -0.02, p = 0.0358). Similarly, Ego network density has a strong, negative relationship to victimization. Because the variable ranges from 0 to 1 a one-unit increase illustrates a respondent moving from a network devoid of ties to one where all possible ties exist. Both instances are empirically rare, and the prediction is moving from one extreme to another, partially explaining the magnitude of the effect size. The model

predicts that this increase in network density significantly lowers the probability of victimization by 61.8% (B = -0.963, p = 0.0002). Belonging to their school's cohesive friendship core does not significantly affect a student's probability of experiencing violent victimization (p = 0.5023). This was an unexpected result as much of the literature finds that several measures of integration have positive outcomes for adolescences including a reduction in their likelihood of victimization. The inclusion of this block does not substantively affect any of the previous variables' coefficients or p-values.

Model 4 adds the final set of variables accounting for school level context including the size of the school and the school's classification as public or private. Neither variable significantly affected the respondent's likelihood of experiencing violent victimization. Additionally, the effect sizes and significance levels of the variables from the previous blocks had no substantive changes with the addition of these variables. However, the AIC of the model is marginally improved from 6743.4 in Model 3 to 6702.3 in Model 4 signaling that the addition of these school level variables, while not individually significant net of the other controls, improves the Model fit.

Table 4: Fixed effect estimates from cross-classified multilevel logit models.

	Model 5			
Term	Coefficient	OR	Std. Error	P-value
Intercept	-0.522	0.593	0.389	0.1796
Age	-0.033	0.967	0.025	0.1752
Sex (male ref.)	-0.995	0.370	0.069	0.0000
Family SES	-0.096	0.909	0.036	0.0086
Race (white ref.)	-	-	-	-
Black	0.396	1.485	0.116	0.0007
Asian	0.078	1.081	0.208	0.7081
Latino	0.403	1.496	0.201	0.0451
Indigenous	0.700	2.014	0.252	0.0055
Mixed Race	0.258	1.295	0.098	0.0084
Other Race	0.822	2.275	0.232	0.0004
Weapon Carrying	1.233	3.432	0.091	0.0000
Self Control	0.004	1.004	0.034	0.9033
Unsupervised Drinking	0.286	1.331	0.035	0.0000
Unsupervised time with friends	0.099	1.104	0.034	0.0033
School Attachment	-0.203	0.816	0.032	0.0000
Alters Delinquency	0.005	1.005	0.050	0.9149
Indegree	-0.027	0.973	0.010	0.0063
Ego Network Density	-0.890	0.411	0.263	0.0007
Core Membership	-0.114	0.893	0.129	0.3771
school size	-0.0002	1.000	0.000	0.1622
Public School (Private Ref.)	-0.161	0.851	0.239	0.5014
Alters Delinquency X Indegree	0.043	1.044	0.011	0.0001
AIC	6688.5			
Neighborhood Var	0.06769			
School Var	0.19914			

The final Model included in the chapter analysis incorporates an interaction term between respondent's indegree and their friends' delinquency to the complete set of variables in Model 4 to test whether the behavioral content and structure of an adolescent's ego networks work together to determine the probability of their victimization net of the included variables. The interaction term is significant ($p = 0.0001$) signaling that the effects of degree centrality and peer delinquency on victimization moderate each other. Model 5 also shows an AIC of 6688.5, the

lowest in the analysis, signaling it has the best fit with the observed data. To observe the predictions more easily from Model 5 it is necessary to solve the regression equations and plot the marginal effects. First, I determine three levels of peer delinquency based on the variable's interquartile range. I then set all other variables in the model to their means and plot the predicted probabilities across the variable indegree or received friendship nominations. The results are shown in Figure 3.

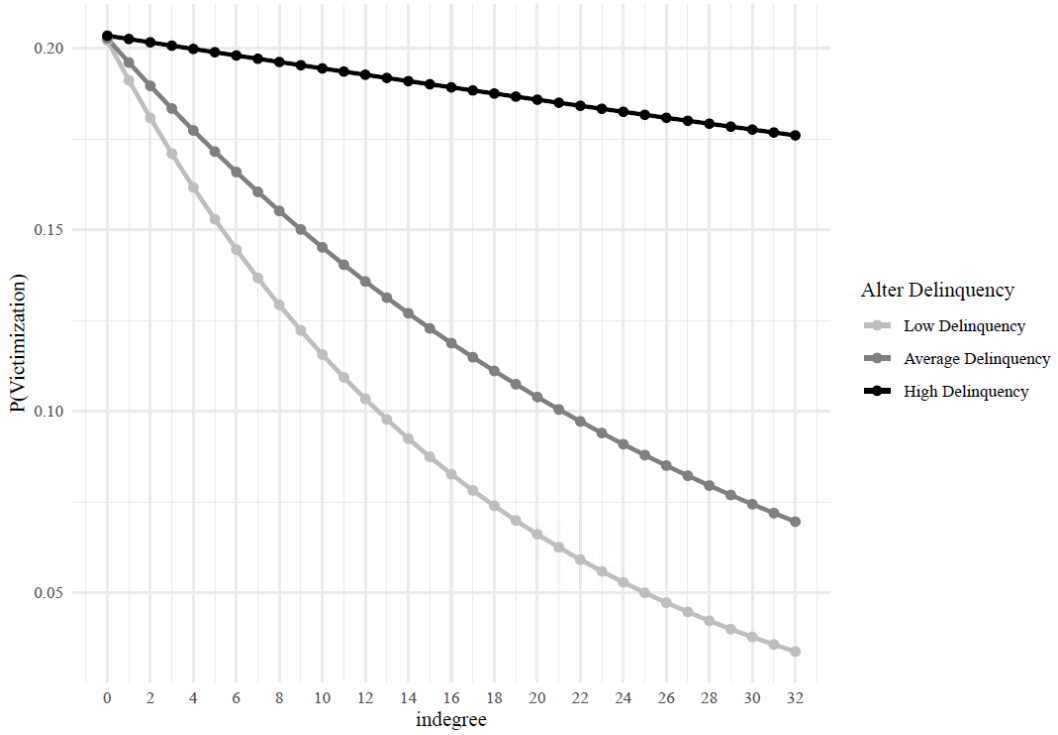

Figure 3: Predicted probability of victimization across indegree and peer delinquency.

In Figure 3 I find support for control theory and hypothesis 1 in that social integration consistently reduces the probability of violent victimization in adolescents. As indegree increases the probability of victimization decreases across each level of peer delinquency. I do not find support for the second hypothesis that integration into a delinquent group will increase the likelihood of victimization rather than diminish it. Figure 3 shows that the rate of decline in the

probability of victimization is related to peer delinquency but again the pattern is a consistent decline across all levels of delinquency. Friendship circles with high delinquency remain at the highest likelihood of falling victim to violence while low delinquency groups are at the lowest likelihood. Social control literature predicts that integration is the chief deterrent to both delinquent involvement and victimization as well as a producer of several developmental objectives for adolescents, such as social skills and school achievement. Results from model 5 corroborate this prediction, however the full story is a bit more nuanced. Highly integrated delinquents are at less risk than their more peripheral delinquent counter parts, but delinquency alone still puts teens at a much higher risk of victimization, regardless of their level of integration. Integration on the other hand reduces the effect of delinquency on victimization risk rather than amplifying this relationship.

2.6 Discussion

Violence in US schools is a great public health concern that policy makers and school administrators have been working to address for decades. And while in recent years we see the fruit of their efforts in the sharp decline of non-violent crimes and instances of bullying over the last decade, suicide and homicide rates have remained relatively stable, if not increased in certain areas, for this vulnerable age group over the same period. The hypotheses in this chapter provide some insight into the social mechanisms driving exposure to violence during adolescence.

The models presented in the analysis provide support of the hypothesis that social integration provides protection from victimization while involvement with delinquent peers increases the risk of engaging with violence. This chapter provides evidence that belonging to a delinquent network slows the rate of decline in the likelihood of victimization that being highly integrated in ones' school offers. In addition to this finding the models offer insight into possible

solutions policy makers might implement to protect more prosocial youth from victimization. Initiatives to fight delinquency such as the Functional Family Therapy program have shown considerable progress in the decline of delinquency and its consequences (Carlton 2020). However, few programs direct their attention to non-delinquent youth who are still victims. Integration is one area administrators can look to improve that will provide protection to all students regardless of their level of delinquent involvement. Results from this chapter suggest that either policy direction alone will have minimal effect on adolescent crime and violence yet taken together they may provide substantial protection. That is, the simultaneous implementation of programs geared towards reducing delinquent involvement and improving social integration via extracurricular activities, affinity groups, etc. will have the largest impact when it comes to violence prevention in US schools.

Following these policy implications, the results provide insight into both social control and social learning theories. Model 5 shows that adolescents who are highly embedded into non-delinquent networks have the lowest probability of victimization. These findings support pieces of both social control and social learning theories. Control theory predicts that the more involved one is in their surrounding institutions, such as school, church, or family, the less likely they are to be involved with criminal activity or any of its subsequent outcomes such as victimization or involvement with the criminal justice system. Social Learning Theory in contrast predicts that the social context of each environment must be considered when determining the probability of criminal behavior such that being highly integrated into a criminal network increases one's own criminality above and beyond that of the network. The equations shown in the final models included self-control to account for individual's own tendency towards more impulsive or delinquent behaviors as well as the delinquency of their peers. These controls allowed me to test how a friendship network's delinquent content coupled with the teens' own tendency for self-

control and their level of integration within the network determine their chances of facing victimization. The models in this chapter contradict the predictions social learning theory provide by showing that delinquent groups simply had diminished returns on the protection provided from social integration into their schools rather than an amplification of risk. This amplification would have been shown if the high delinquency group in figure 5 showed an upward trend rather than a downward trend, providing evidence that highly integrated delinquent teens are not afforded the protection integration provides as predicted in social control theory.

In addition to the actual hypothesis the study shows the importance of making a distinction between the behavioral norms and expectations held by network members and the structural characteristics of the network itself. School administrators are likely aware of their schools' social norms to some degree and likely make decisions with these norms in mind when creating policy to prevent violent altercations. The results from this chapter suggest that an effective way to prevent violence in US schools is to focus on teens' overall level of social integration as well as their delinquent conduct. This means that rather than focusing solely on the forms of delinquency occurring within schools, it is more efficient to focus on fostering connections between students and increasing their overall involvement with their peers in school. Even teens who are involved in highly delinquent peer groups see a decline in the likelihood of victimization when they are also highly integrated into their schools. This, however, raises the issue of deterrents to integration. It is much more likely for prosocial youth to successfully integrate into larger networks than for criminals, delinquents, or even unhealthy teens, as each of these conditions creates unique obstacles to social integration. The trick then, will be to find ways to successfully integrate teens who may not appear to be as attractive for friendship, while simultaneously discouraging delinquency.

2.7 Conclusion

The results presented are not without limitations. This study has several limitations that must be included in any consideration of the results. First, the variable victimization from add health asks respondents how many times in the last twelve months they experienced various forms of violence. The categories range from none to three or more times however very few respondents of the original 90,000 claimed to experience victimization more than once. This poses a limitation in the data such that it virtually forces researchers to dichotomize the variable and lose potentially important variation in the sample. Rather than asking students to recall discrete violent experiences, asking respondents for more continuous experiences of violence would retain some of the variation in the variable. For example, how often do you witness violence in your school? This line of questioning would be even more effective if generated from multiple sources such as teachers. Understanding student perceptions of violence is an important dimension of school climate, however it is also necessary to incorporate information from teachers, administrators, and parents to illustrate a complete picture of such environments.

The variable victimization is also composed of multiple dimensions of violence: physical fights and weapon related violence. While similar, these dimensions should be distinct in analyses of adolescent victimization because physical fighting is incredibly normative for male students. In order to accurately capture trends in violence separating the data and expectations along gender lines is likely important. In this study I sought to illustrate overall trends. However, this methodology is not without significant limitations as there is incredible differentiation in the amount and type of violence experienced by young girls and boys. Splitting the sample across sex categories is on way to account for these known patterns in adolescent violence. Future research interested in policy suggestions for reducing violence in US high schools can still learn from this study despite its limitations. First, policy initiatives must include a component for reducing

individual delinquency, punishments must consider that disconnecting students from their school networks via suspension are likely to worsen student exposure to violence and finally sex and gender are important dimension that are critical to patterning exposure to violence in adolescence.

3. Chapter 2: Racial differences in stress proliferation after victimization

Despite growing scholarship & policy initiatives to address racial inequality in health outcomes across the life course these disparities persist. Even literature accounting for varying levels of socioeconomic status (SES) in medical sociology and biology still finds racial disparities in health outcomes across the life course (Geronimus et al. 2006; Marmot et al. 1998; Gugushvili et al. 2021). According to the National Academies of Sciences 2017 report "Communities in Action: Pathways to health Equity" this pattern holds across a wide variety of health outcomes. The report found that racial minorities living in the United States have higher rates of chronic disease and premature death than their white counterparts. Additionally, while overall infant mortality rates have steadily decreased in recent years striking racial differences persist among indigenous and black American populations when compared to other racial groups. In 2013, Native Americans and Alaskan Natives had an infant mortality rate 60% higher than the rate of their white counterparts. Moreover, in the same year, Black American mothers experienced the highest rate of infant mortality at 11.11 infant deaths per 1000 births while white American mothers experienced a rate of 5.06 deaths per 1000 births. Obesity, a condition linked to chronic disease and other debilitating conditions affects racial minorities disproportionally, and is linked to heart disease, which is more often fatal for Black Americans than white Americans. Finally, in 2014 the Center for Disease Control and Prevention reported nearly 44% of Black men and 48% of black women had some form of cardiovascular disease. Subsequently, Black, and Indigenous people have higher rates of stroke related deaths than White or Latino populations (Weinstein et al. 2017). These patterns persist to this day. The Kaiser Family Foundation's 2023 report on Disparities in Health and Health Care shows that these patterns still exist in insurance coverage,

life expectancy, infant and pregnancy related mortality, and a host of other health outcomes (Ndugga and Artiga 2023).

Scholars have also speculated the causes of such persistent gaps in health outcomes. Notably, Geronimus et al. (2001, 2006) hypothesized that the black-white health disparities, patterned by age, reflected a process of biological weathering. More specifically, the weathering hypothesis states that racial minorities may experience early declining health because of the cumulative impacts of repeated experience with socioeconomic and political marginalization. Similarly, the attenuation hypothesis suggests that there's is only such much stress the body efficiently process before becoming inured to the impacts of additional stressors. It follows then that racialized groups may have unique responses to episodic stressors because these groups experience chronic stress in the form of racial discrimination.

In addition to chronic stressors, acute episodic stressors such as experiences with violent victimization may shape stress trajectories from adolescence into young adulthood. Violence in schools is a prevalent issue still plaguing US schools. Though overall crime and violence have been declining in US school systems in recent years, multi-homicide incidents have been increasing (Frederique 2020). With the increasing concern for safety in school systems, understanding the lasting impacts of such events may be useful to policy initiatives seeking to create safer learning environments for teens.

The literature on cumulative disadvantage suggests that repeated exposure to traumatic events will negatively impact one's health over time (Aiyer et al. 2014; Priest et al. 2019; Hoffman 2016). However, studies seeking to understand how racial identity may shape one's experience of stressors and the resulting impacts on adult stress have shown varied results. Some studies show weak support for the stress vulnerability hypothesis but often along gendered (Magdol 2002) or life course (Kilic et al 2003) patterns. Scholarship investigating racial group

vulnerability often show no support for the hypothesis (Sternthal et al. 2011). Here I seek to understand how experiencing violence in the US school system during adolescence determines physical health and wellbeing into adulthood and whether these links are patterned by race.

Results indicate that the stress incurred from adolescent victimization does not significantly impact the probability that black respondents will have high allostatic load scores into early adulthood. While initially counterintuitive, this finding aligns seamlessly with the weathering and attenuation hypotheses as well as arguments that racism and racial discrimination are fundamental causes of health inequality. Implications are discussed.

3.1 Background

Sociological research on racial health disparities often benefits from taking a life course approach. This perspective asserts that age-patterned exposure, sensitive periods, and stress proliferation likely affects racial inequality in health (Gee, Walsemann, and Brondolo 2012). As individuals age, they continuously engage with social systems such as the education and criminal justice systems or the labor market. Transitions provide contexts for potential exposure to discrimination and other stressors. More specifically, their forms, frequency and how they change over time, with age. Additionally, certain events have a more profound effect on health when they occur during specific developmental stages and weaker effects outside of these periods. For example, the impacts of poverty on mental health can be exacerbated if one is also going through a social transition such as loss of a parent or divorce.

Adolescence is a critical period of the life course characterized by change and adjustment. During this period experiences shape beliefs and behaviors that have significant impacts on health into adulthood, such as drinking or smoking habits. The life course perspective suggests that traumatic events during critical periods such as adolescence will result in

compounding stress. Racial discrimination for example, can be understood as social exclusion and marginalization based on race and as a chronic stressor for people of color who may frequently experience discrimination over the life course. Focusing on racial discrimination as a singular, episodic experience may underestimate its effects on individual health (Wallace et al 2016; Priest et al. 2019). But understanding racial discrimination as a normative feature of racial minority life may lend itself to more accurately assess disparities in health outcomes.

Fundamental Cause Theory is another useful lens to view research on racial health inequality. Phelan and Link (2015) identify an important implication of the theory regarding the persistence of racial health inequalities. Inequalities stemming from a fundamental cause cannot be challenged by addressing intervening mechanisms. This is because there are enduring inequalities in knowledge, money, power, prestige, and other beneficial social resources across racial lines. These disparities ensure that the mechanisms causing health inequality across racial groups are reliably reproduced.

Since Link and Phalen (1996) there has been a growing body of literature in medical sociology that argues racism is a fundamental cause of health inequality. Fundamental causes embody resources, or the lack thereof, that can be used to avoid or alleviate health risks (Link and Phalen 1996). An important finding from studies examining health gradients across socioeconomic status (SES) levels is that the gradient between hierarchically organized racial groups remains at all levels of SES (Marmot et al. 1998). Additionally, more recent research focused on black-white differences in health found that these differences are larger at higher levels of SES (Thomas Tobin and Hargrove 2021; Charron-Ce… & Raphael 2018). Some scholars speculate this counterintuitive difference is due to unmet expectations surrounding racial discrimination once higher levels of economic status is achieved (Gugushvili et al 2021).

Fundamental cause theory implies that the experience of racial discrimination and racism may induce psychological distress that can adversely affect health and health related behaviors (Williams and Collins 1995). Discrimination has been linked to numerous health risk categories such as high blood pressure (Thayer et al 2017; Beatty-Moody et al. 2016; Orom et al. 2016; Wagner et al. 2015; Lewis et al. 2009), heart rate and disease (Hill et al. 2017; Kemp et al 2016; Hoggard et al. 2015; Greer 2014), high levels of cortisol secretion (Lucas et al. 2017; Lucas et al. 2016; Zeiders et al. 2015), telomere length (Lee 2017; Liu 2017), psychological distress (Nguyen 2018), and Cardiometabolic risk biomarkers (Nguyen 2019). These linkages between social experiences and physical health are the cornerstones of cumulative disadvantage theory and the weathering hypothesis.

3.1.1 Theories of stress proliferation

There is a widespread assumption in the medical sociological literature that racial differences in stressors exist and that stress is the principal mechanism linking racial identity to poor health outcomes (Turner 2013; Hatch and Dohrenwend 2007; Paradies 2006). Several theories have been developed and applied to the study of social stress and health outcomes and each predicts a unique pattern of association between trauma and health outcomes.

The first is cumulative disadvantage theory, which argues that adverse life events or circumstances often compound over the life course to produce health risks because physiological, emotional, and behavioral stress responses are mutually reinforcing (Wickrama et al. 2017). An often cited finding in research on social stress is that individual stressors beget additional stressors. For example, low-income families reference money as a barrier to resources that could alleviate pain or discomfort from chronic illness. Further, youth who come from low SES backgrounds face numerous stressors related to their family and community environments,

including life events, violence, social isolation, and lack of protective resources (Wickrama et al. 2017; Lee et al. 2021).

Measuring cumulative disadvantage captures a developmental snapshot of youth's status characteristics, adverse experiences with discrimination or violence, and access to psychosocial resources i.e., family, peers and educational resources that may summarize health risks. (Nurius, Prince, and Rocha 2015). The accumulation of disadvantages should increase psychosocial stressors that impact well-being over the life course. Variations in stress exposure, access to resources and socially patterned differences in the effectiveness of resources link disadvantaged identities to physical and emotional health vulnerability (McLeod & Owens 2004; Nurius, Prince, and Rocha 2015). In addition to chronic stress, extreme events such as violent victimization may reveal similar patterns of stress proliferation. Cumulative disadvantage theory implies that the link between adolescent experiences with violence and adult stress will be strong especially in the case of those belonging to marginalized communities (McFarland et al. 2018).

In contrast to cumulative disadvantage, age-as-leveler theory argues that inequalities in health outcomes tend to converge as respondents age due to processes related to 'universal biological frailty' and the onset of mortality (Yang and Lee 2009; MacFarland et al 2018). it is well established in the medical sociological literature that the accumulation of wear and tear on our bodies increases as respondents age across the life course (Geronimous et al. 2006; Taylor et al. 2019). This theory may explain the potential for weak associations between traumatic adolescent experiences and health outcomes into adulthood. Despite the theory's implications, some studies have shown a large gap between the health outcomes of Black and White Americans at high levels of SES in a sample containing people aged 25 to 74 (Marmot et al 1998). These studies imply cumulative disadvantage may have effects net of age-related risk factors yet leveler theory suggests that over the life course the association between traumatic events and stress

should decrease. However, this biological leveling often involves a critical period of physiological fragility that may not be captured in this sample of adolescents and young adults.

Two additional hypotheses have routinely been used by sociologists to explain the relationship between stress and poor health outcomes. They are the differential stress exposure hypothesis and the stress vulnerability hypothesis. The stress exposure hypothesis suggests that individuals with greater exposure to sources of stress will have worse health outcomes. The important thing to note is the frequency and magnitude of the stressors. The stress exposure hypothesis in medical sociology suggests that individuals who are exposed to acute or chronic stressors are more likely to experience negative health outcomes. This hypothesis is based on the idea that exposure to stress can have a range of negative effects on an individual's physical and mental health, including increased risk of heart disease, diabetes, and mental health problems (Turner 2013). Conversely, the stress vulnerability hypothesis implies that individuals may have unique responses to stressors along demographic lines. For example, certain racial groups yielding more negative manifestations of stress in the form of worse health outcomes. The vulnerability hypothesis predicts that the characteristics of individuals exposed to stressors may impact how these stressors influence health outcomes beyond the frequency and magnitude of the stressors. Additionally, individuals who are exposed to chronic stressors, such as poverty, discrimination, and social exclusion, may be more vulnerable to developing physical and mental health problems. According to this hypothesis, these stressors can have a cumulative effect on an individual's health, making them more likely to experience negative health outcomes. In 1995, Turner et al. claimed that both the exposure and vulnerability hypotheses are important for understanding disparities in health however, there has been very little support for stress vulnerability since. Sternthal et al. (2011) examined whether racial health disparities were related to each other through a stress mediator due to the stress vulnerability hypothesis or the

differential stress exposure hypothesis and did not find support for the vulnerability hypothesis as a key mechanism driving racial inequality in health outcomes.

Lastly, rather than positioning racial groups as particularly vulnerable to stressors the attenuation hypothesis argues that under the condition of chronic stress the human nervous system has a maladaptive response to prolonged hypersecretion of cortisol. This adaptive mechanism is designed to decrease allostatic load and occurs when the body must make repeated physiological adjustments to stressors to maintain a state of calm regulation (Aiyer et al. 2014). However, the stress response may become less effective when we are consistently exposed to high levels of contextual stress, such as racial discrimination. This is especially true in children (Blair 2010; Aiyer et al. 2014). This maladaptive biological response to stress may increase the likelihood of developing in to physical and mental health disorders while simultaneously making it more difficult to detect the effects of numerous stressors on respondents (Miller et al. 2007; Aiyer et al. 2014). In context, if a person is exposed to 5 similar and intense stressors in a vacuum the attenuation hypothesis predicts that the first stressor would cause the largest shift in health while the fifth instance of an acute stressor would cause the smallest shift in health as the person's body adapts. After experiencing a critical mass of stress, our bodily systems become inured to and inefficiently cope with additional stress. This means that measures designed to capture the amount of stress being held in the body may underestimate changes in individuals who are carrying a stress load beyond the critical mass required to affect the body's natural responses to stress.

3.1.2 Stress processing: How it works and how we measure it

Our brains process and prepare for environmental demands by monitoring, regulating, and coordinating internal systems in a process of predictive regulation (McEwen 1998; Sterling 2012; Goosby, Cheadle, and Mitchell 2018). Chronic stressors have a potent and lasting impact

on our body's chemical responses. These responses are designed to engage our fight or flight state and then safely return us to a state of calm regulation, also known as allostasis. Our bodies have two major systems that work to help us cope with stressful situations. The Sympathetic Nervous System (SNS) and Hypothalamic-Pituitary-Adrenal axis (HPA-axis) work together to efficiently manage our bodies' response to stressful events. An efficient response to an acute stressor involves activation of the SNS to send resources to the fight or flight systems. Next the HPA-axis increases cortisol to control the aftermath of SNS activation, mainly inflammation (Sapolsky et al. 2002; Geronimus et al. 2010). Chronic exposure to stressors and repeated activation of the body's stress response systems can cause these responses to not only become inefficient but overtime they also result in a heavier stress load on the body (McEwan 1998). Continued activation of SNS alongside HPA-axis dysfunction i.e., cortisol losing its ability to regulate inflammation, would result in increased risk of cardiovascular, immune, and metabolic dysfunction (Khansari et al. 2009). Biomarkers often used to measure respondents' stress levels such as blood pressure, heart rate, hip to waist ratio, etc. capture elevated health risk due to cardiovascular disfunction (Geronimous et al. 2006; Fuller-Rowell, Evans, and Ong 2012; Niño and Cai 2020; Thomas Tobin and Hargrove 2021; Taylor, McFarland, and Carr 2019).

Allostatic load refers to a measure developed to capture the cumulative wear and tear on a body's systems owed to repeated adaptation to stressors. Social Scientists often use allostatic load to measure the impacts of these processes (Geronimous et al 2006; Geronimus et al. 2010; Nino and Caio 2020; Gugushvili et al. 2021). Allostatic load functions as a summary biological measure of stress mediated wear and tear on the body. High scores are associated with old age, mortality, lower socioeconomic status, cognitive decline, and unsupportive childhood / adult relationships (Geronimus et al. 2006; Geronimus et al. 2010). Physiological indicators, such as biomarkers, allow social science researchers to observe processes that would otherwise be

invisible to us (Goosby, Cheadle, and Mitchell 2018). For example, Nino and Caio (2020) use the national longitudinal survey of adolescent to adult health to construct an allostatic load measure and examine how parental incarceration determines adolescent physical stress levels. Nino and Caio focus on how experiencing trauma at different points in time impacted allostatic load and not how race might shape these responses to trauma. Nonetheless, it is well established in the literature that there are racial differences in allostatic load measures (Geronimus et al. 2006; Geronimus et al. 2010), yet less well understood is the unique stress adaptation processes that may occur within racial groups.

3.1.3 Racial differences in biological indicators of stress

Interpersonal racism is a form of social exclusion enacted via discrimination based on race (Priest & Williams 2018; Goosby, Cheadle, and Mitchell 2018). The neural structures supporting the emotional component of physical pain are shared with those supporting the experience of social pain that results from social exclusion and marginalization (Goosby, Cheadle, and Mitchell 2018). These effects accumulate over time via repeated exposure and adaptation to stressors.

Following from research on the persistence of racial health inequality there may be racial differences in the body's response to stress. Evidence for this pattern can be seen in biological literature examining racial differences in telomere length. Telomeres are the stabilizing caps on the end of chromosomes (Geronimus et al. 2010). These stabilizers shorten through the process of cellular division and this shortening can be exacerbated by the body's response to stressful stimuli. Because disadvantage is structured by racial stratification biologists hypothesize that telomeres are shorter in people of color who routinely cope with social, economic, and political marginalization. However, literature on racial differences in telomere length is often inconsistent with some studies showing that black people have longer telomeres than white people and others

showing that they have shorter telomeres (Geronimus et al. 2010). Absolute telomere length may not adequately compare between-group differences due to stress because starting lengths vary by race (Hamad, Tuljapurkar, and Rehkopf 2016). Consideration for unique racially patterned experiences with stress are necessary if we intend to accurately describe and provide solutions to racial disparities in health.

As of 2016 roughly four percent of genome-wide association studies have been conducted among non-European populations (Hamad, Tuljapurkar, and Rehkopf 2016). Additionally, Hamad, Tuljapurkar, and Rehkopf (2016) find that Black people, men, and older individuals are more likely to have a genetic predisposition towards longer telomeres. They also find that, after controlling for genetic population structure, the association between telomere length and self-reported race disappears. The genetic markers identified by biologists as associated with telomere length were found in studies conducted among white and Asian populations and the association is weaker within other racial groups such as Black and Latinx populations. While telomere length is a common measure associated with stressors, empirical studies have yet to show a consistent pattern in how these associations are shaped by racial identity. Meedham et al. (2019) find that the rate of telomere shortening may be faster in Black Americans, but not their absolute length. This suggests unique physiological processes related to stress may be occurring across racial groups. Furthermore, genetic variation among socially constructed populations such as racial groups does not explain health disparities (Copper et al. 2001, Geronimus et al. 2010; Wallace 2001). Scholars must account for environmental and social contributions to health outcomes if we intend to accurately research them.

3.2 Hypotheses

This chapter extends prior work on the persistence of racial disparities in health by incorporating experiences with violence during adolescence. I seek to demonstrate how these experiences may change stress trajectories into adulthood and across racial groups.

Cumulative disadvantage theory and the stress exposure hypothesis argue that stress compounds over the life course, implying that the data will show a strong relationship between adolescent victimization and adult stress over time. Leveler theory and the attenuation hypothesis on the other hand, suggest that the impact of stressors may diminish as we transition to later stages of the life course. If the data show a weak relationship between experiencing violence as a teen and stress into adulthood, then leveling or attenuation may be occurring even in this sample of young respondents.

Next, I seek to explore whether the relationship between adolescent victimization and adult stress is mediated by self-reported racial identity. Fundamental Cause theory argues that racial discrimination is a chronic stressor and that racial minorities are more likely to experience a higher frequency and magnitude of stressors across the life course (Charron-Chenier & Raphael 2018; Colen 2011, Geronimus et al. 2006; Link and Phelan 2015). This suggests that racial minorities will have visibly higher average allostatic load than their white counterparts even at early stages of the life course. And that this higher baseline allostatic load will remain consistent with the addition of victimization.

In contrast to this idea of compounding stress the data may reveal a different pattern between victimization and stress conditioned by racial identity as suggested by the Stress Vulnerability Hypothesis. If some racial groups show massive increases in stress after victimization and others do not, this implies that racial groups have unique experiences with and coping mechanisms for dealing with violence. This pattern may also signal that attenuation is

occurring i.e. after years of enduring the chronic stress of racial discrimination, new stressors have diminished impacts.

In summary, the research questions and hypotheses for this chapter are as follows:

RQ1: How does the relationship between adolescent victimization and adult stress change as respondents age across this critical period?

(H1) Cumulative disadvantage theory and Stress Exposure Hypothesis both predict that the association between adolescent victimization and adult stress will be strong, positive, and robust to change as more risk factors are added to the model, including age.

(H2) In contrast, Leveler Theory and the Attenuation Hypothesis predict that the association between violent victimization and adult stress will diminish as respondents age and new stressors level out respondents' health across the life course.

RQ2: Are there unique mechanisms influencing the stress proliferation process across racial groups?

(H3): Because of the difference in exposure to racial discrimination, Fundamental Cause Theory predicts that people of color will uniformly show higher stress than their white counterparts who have similar experiences with violence and live in similar socioeconomic circumstances.

(H4): The Stress vulnerability and Attenuation hypotheses imply that the association between adolescent victimization on adult stress will be distinct across racial groups as each group is likely to have unique histories and characteristics shaping their experience of violence.

3.3 Data & Variables

To test the impacts of adolescent victimization on stress proliferation into adulthood this study uses the restricted use data from wave I and wave IV of the National Longitudinal Study of Adolescent to Adult Health (Add Health). The Add Health questionnaires combine longitudinal survey data on respondents' social, economic, psychological, and physical well-being with data on the family, neighborhood, community, school, friendships, peer groups, and romantic relationships. The first wave of data was collected in 1994-95 and consists of a sample of roughly 90,000 teenagers, grades 7 – 12 (ages 10-19), nested in randomly selected public and private schools throughout the United States. Information on the sample was collected from the respondents, their peers, school administrators, parents, siblings, and romantic partners through an initial in-school survey followed by four in-home interviews.

In 2008 the Add Health study completed its fourth wave of in-home interviews. Respondents were aged 24 to 35 at the time of data collection. Data from the more in-depth in-home interviews contains sensitive information on the adolescents such as experience with drugs, alcohol, and various other risky behaviors such as carrying a weapon. But importantly for this study was the collection of biospecimen data used to operationalize adult stress. The research sample for this project comes from the in-home wave 1 and wave 4 surveys with socioeconomic and demographic data from the first wave of in-school interviews. Summary statistics for each of the included variables are shown in Table 5.

Table 5: Descriptive statistics.

Variable	Mean	Std. Dev.	Min	Max	N
Allostatic Load	2.54	2.15	0.00	10.00	9008
Age	29.08	1.70	25.00	34.00	10926
Sex (male ref.)	0.54	-	0.00	1.00	10859
Socioeconomic Status	0.00	1.00	-1.91	2.08	10467
Victim	0.17	-	0.00	1.00	10689
Alters' Health	2.09	0.49	1.00	5.00	10514
Discrimination	0.68	-	0.00	1.00	10924
White	0.49	-	0.00	1.00	10755
Black	0.19	-	0.00	1.00	10755
Asian	0.06	-	0.00	1.00	10755
Latino	0.05	-	0.00	1.00	10755
Indigenous	0.01	-	0.00	1.00	10755
Mixed Race	0.19	-	0.00	1.00	10755
Other Race	0.01	-	0.00	1.00	10755

The dependent variable for this study operationalizes adult stress using the concept of allostatic load (Geronimus et al. 2006; Nino and Caio 2020; Gugushvili et al. 2021). Though numerous approaches to the construction of allostatic exist there is little consensus on best practice (Gugushvili et al. 2021). What is agreed upon in the literature however it the measure's utility as a multidimensional indicator of physiological dysregulation that significantly contribute to the progression of disease (Gugushvili et al. 2021; Geronimus et al. 2010).

To measure allostatic load, I selected 10 biomarkers based on prior research and the availability of biospecimen data that were designed to capture cardiometabolic risk, glucose metabolism, cardiopulmonary function, and inflammation (Nino and Caio 2020; Geronimus et al 2006; Gugushvili et al. 2021). The indicators used to capture cardiometabolic risk are total cholesterol, triglycerides, body mass index (BMI), and waist circumference. Glycosylated hemoglobin is used to measure glucose metabolism. Biomarkers used to capture cardiopulmonary function are pulse rate, mean arterial pressure, systolic and diastolic blood pressure. And finally, inflammation is captured by high sensitivity c-reactive proteins. The biomarkers included in this

measure encompass a wide range of physiological processes across multiple regulatory systems that have been routinely used in prior allostatic load research with the same data (Nino and Caio 2020; Gugushvili et al. 2021).

For each of the selected biomarkers I empirically determined a risk threshold based on the sample distribution (Geronimus 2006; Nino and Caio 2020). Triglycerides and total cholesterol are measured in deciles, and the rest of the categories are on continuous scales. Each participant who showed a value at or above the 75th percentile was given a point and marked as 'at risk' in that category. Finally, I summed the respondents' points across each category to get their individual allostatic load scores. The variable has a maximum value of 10, signaling the person was considered at risk in each category and a minimum value of 0, meaning they were at risk in none of the categories. The sample average for the variable is 2.54 with a standard deviation of 2.15. The items showed a Cronbach's alpha of 0.73 demonstrating the internal consistency and reliability of the measurement, as well as the robustness of the risk threshold determination based on the sample distribution.

Table 6 shows the risk thresholds for each included biomarker in wave IV of the restricted Add Health sample. For most of the biomarkers the 75th percentile revealed values that were confirmed to put respondents at risk of negative health outcomes. For resting pulse rate, however, the 75th percentile for the variable was around 81.5bpm which is healthy and shouldn't be considered a risk. For this category I set the risk threshold to 100bmp which is understood to be a dangerous resting pulse rate. Some of these biomarkers also put respondents at risk when they fall below certain levels. E.g., it is dangerous to have systolic blood pressure anywhere outside of 70-100mmHg. However, I do not include these lower risk levels in the allostatic load measure because the health processes driving these biomarkers down are distinct from the stress processes that drive them up, which are the focus of this study.

The dependent variable for the analysis comes from this composite measure, allostatic load. I first determine that the 75th percentile for the variable allostatic load in my sample is 4, demonstrating that being at risk in 4 or more categories is unusual in the sample and may lead to declining health outcomes. I then assign individuals who are at risk in 4 or more categories a value of 1 and those who are not a value of 0. This binary indicator is the dependent variable for this chapter. The variable describes the respondents overall stress level as either at risk of impacting health or not (Geronimus et al. 2006; Geronimus et al., 2010).

Table 6: Allostatic load biomarker items.

Biomarker (units)	Mean	Std. Dev.	Min	Max	Risk Threshold	N at Risk	N
Systolic Blood Pressure (mmHg)	124.51	13.63	74.00	222.50	132.50	2766	10703
Diastolic Blood Pressure (mmHg)	79.04	10.16	30.00	145.00	85.50	2692	10703
Mean Arterial Pressure (mmHg)	94.20	10.67	46.30	167.30	100.70	2686	10703
Pulse Rate (bpm)	74.16	11.75	40.00	143.50	81.50	2706	10626
Blood Sugar (%)	5.62	0.81	4.00	23.10	5.80	2497	9965
C-reactive Protiens (mg/L)	5.00	8.54	0.08	150.17	5.59	2426	9698
Waist Circumference (cm)	97.92	17.55	50.00	197.00	107.00	2827	10832
Triglycerides	5.47	2.86	1.00	10.00	8.00	2784	9449
Cholestoral	5.49	2.87	1.00	10.00	8.00	2879	9668
Body Mass Index	29.14	7.53	14.40	97.40	32.90	2706	10758

The variable victim is a composite indicator of violent victimization experienced in the twelve months prior to the wave 1 in-home interviews, when the respondents were aged 11 to 19. The items used to create the variable include questions such as “have you been shot, stabbed, jump or in a physical fight?”. The variable takes on the value of 0, if the respondent did not experience any of the included forms of physical victimization, or 1 if they have experienced at least one of the forms. The variable was designed to measure physical manifestations of violence as these experiences may leave behind tangible, physiological impressions on the body that can be captured by the allostatic load measure. Table 1 shows that 17% of the research sample experienced some form of violent victimization.

This chapter uses standard indicators known to impact health outcomes, such as household income and parent's education, to isolate the relationship between victimization, race, and adult stress. The variable race contains the self-reported racial identity from five selected categories: White (49%), Black (19%), Asian (6%), Latino (5%), Indigenous American (1%), and Other Race (1%). I modified the categories to also include mixed race individuals (19%), who selected more than one racial identity. Age is measured in 2008 as part of the fourth wave of Add Health's data collection. Respondents' age ranges from 24 to 35 at the time of biomarker collection. The variable has a mean of 29.08 and a standard deviation of 1.7. Sex is self-reported sex category collected in 1995 as part of Add health's first in school questionnaire. The categories are 0 for males and 1 for females showing that 54% of the sample is female. Finally, to construct the variable socioeconomic status I first determine the respondent's present parent(s) highest level of education and then place it on an 8-point ordinal scale based loosely on years of education. Next, I take their reported family income and situate it on a similar 8-point scale based on empirically observed quantiles. I then standardize both variables and sum them to capture socioeconomic status. The variable has a range of -1.91 to 2.08 and an average of 0 with a standard deviation of 1.

3.4 Analytic Strategy

My analytic strategy begins with a descriptive exploration to confirm whether racial differences in allostatic load exist and if these differences vary by victimization status. I first categorize each respondent in the sample by race and victimization i.e., each racial group was split into victims and non-victims. I then find the average allostatic load of each group. Next, I determine whether there is a meaningful difference between these group averages. To observe

any potential difference between the groups, I run unbalanced t-tests. Results are presented in Table 7 and Figure 4.

Following the descriptive exploration, I run logistic regression models to predict how race and victimization determine the likelihood that respondents will have risky allostatic loads in early adulthood. The logistic regression analysis interprets the odd's ratios for the independent variables that represent each measure's influence on the likelihood of having an allostatic load of 4 or higher while holding all other variables in the equation constant. The statistical method used in this paper anticipates adult stress as the data used to construct the primary independent variables were collected in the first wave survey and interview while the data used to construct the variable allostatic load come from the in-home interviews conducted approximately thirteen years after the first wave of in school surveys were administered. Results are shown in Table 4.

To test whether victimization spurs unique patterns of stress proliferation across racial groups, interaction terms are necessary. I find the cross-product estimation between racial identity and violent victimization then solve the logistic regression equation to calculate the predicted probability of having an allostatic load of 4 or higher for each racial group conditioned on victimization status. These marginal effects presented in Figure 5 reveal that black respondents indeed have a unique relationship to victimization when compared to all other racial groups.

3.5 Results

Table 7 describes the relationship between race, victimization, and adult stress in the research sample. The table groups respondents by race and victimization status and shows the average allostatic load for each group. Also shown are the p-values from unbalanced t-tests to determine whether there was a meaningful difference between the allostatic loads of victims and non-victims.

Table 7: Unbalanced T-tests comparing average allostatic load across race and victimization status.

Victimization	Race	N	%	Avg AL	P value
Non-victims	Black	1320	81%	2.762	0.7935
Victims	Black	312	19%	2.728	
Non-victims	White	3855	87%	2.374	0.0080
Victims	White	578	13%	2.630	
Non-victims	Latino	355	77%	2.504	0.0069
Victims	Latino	107	23%	3.140	
Non-victims	Asian	448	86%	2.250	0.0006
Victims	Asian	70	14%	3.286	
Non-victims	Indigenous	62	72%	2.710	0.0137
Victims	Indigenous	24	28%	4.042	
Non-victims	Mixed Race	1303	80%	2.556	0.0007
Victims	Mixed Race	319	20%	3.006	
Non-victims	Other Race	75	81%	2.520	0.2249
Victims	Other Race	18	19%	3.167	

For most racial groups, victims and non-victims showed different levels of adult stress with victims exhibiting higher allostatic loads. When comparing people of color to their white counter parts we see some support for hypothesis 1; that victimization will significantly increase allostatic load and that people of color will have higher averages than their white counterparts. Most groups in Table 7 show higher average allostatic loads than their white counterparts across victimization status. E.g. people of color who were never victims of violence tended to have higher allostatic loads than their white counter parts. Next, I explore the within group differences between victims and non-victims within each racial group. In every racial category except black and other, I find that the average allostatic load is significantly higher for victims than non-victims. For black respondents the unbalanced t-test for the difference in allostatic load between black victims and black non-victims was 0.7935 signally there was no detectable difference in the groups. Respondents who identified with the other racial category showed a p-value of about 0.13. Though the difference between victims and non-victims in the other racial category is much

larger than that between black victims and non-victims the t-test suggests that the sample sizes for the other category is too small to detect any significant differences between the groups. Regardless, the prevailing pattern for all racial groups, except black, is that victimization increases one's allostatic load. This suggests that with sufficient sample size the other category might bend towards the common pattern.

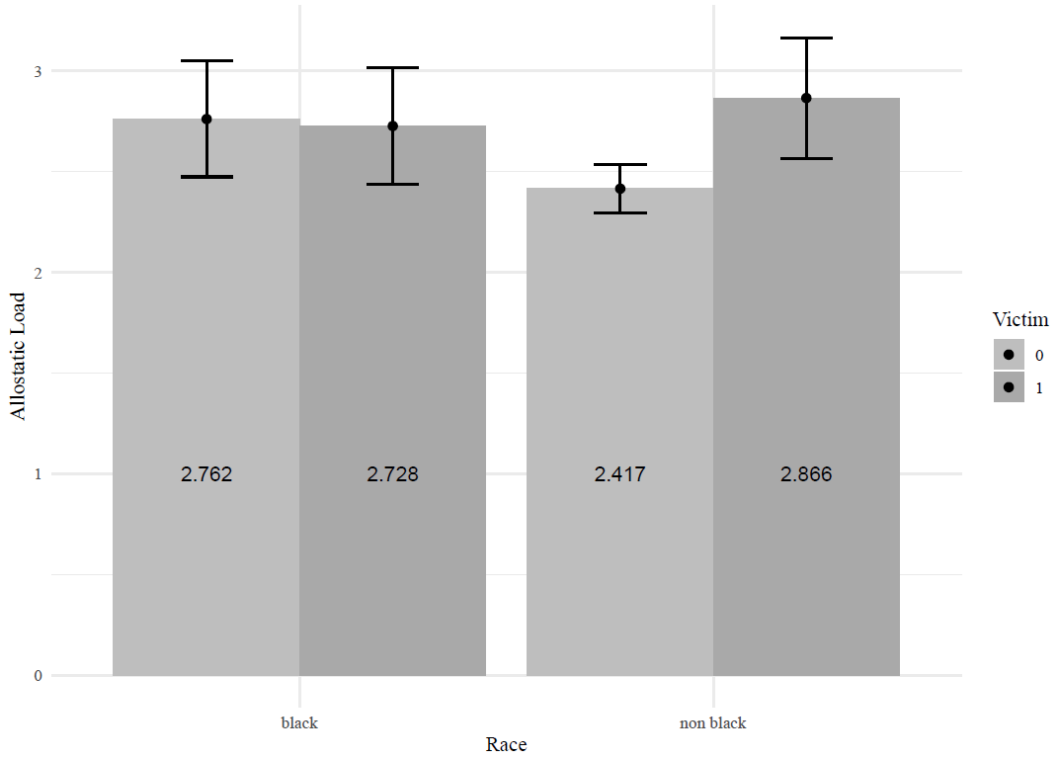

Figure 4: Average adult stress by race and victimization.

Figure 4 summarizes the comparisons between the average allostatic loads of victims and non-victims across black and non-black racial identities. The figure illustrates that adolescent victimization does not meaningfully affect stress proliferation into adulthood in Black respondents. Further, it provides evidence that there is no meaningful difference in the average allostatic loads of non-black victims and black respondents regardless of victimization status. This stark lack of difference may be a signal indicating the latent and chronic stress of racial

discrimination detailed in Fundamental Cause Theory. Because black respondents are chronically exposed to racial discrimination resulting in the repeated activation of their stress processing systems their bodies may be inured to additional instances of stress, as described by the attenuation hypothesis. This means that events that would normally be traumatic and impactful no longer have as much bearing on respondents' stress profiles, lending support to hypothesis 3; that some racial groups may have unique patterns of association between acute stressors and allostatic load. Black respondents experience a unique stress response to violence in the add health sample.

Table 8 shows the results from two logistic regression models predicting the probability of having high allostatic load into young adulthood. Model 1 offers insight into the first research question by examining the baseline effects of racial identity and victimization on the probability of having a high allostatic load. Model 1 shows that experiencing violent victimization as an adolescent increases the likelihood that a respondent will have an allostatic load of 4 or more as an adult by 17.7% ($p = 0.027$) providing some initial support for hypothesis 1 in that the relationship between allostatic load and victimization is strong and positive. As for racial identity the model shows a consistent pattern. Asian ($B = -0.224$, $p = 0.171$), Indigenous ($B = -0.068$, $p = 0.786$), Latino ($B = -0.098$, $p = 0.576$), Mixed Race ($B = -0.051$, $p = 0.544$), and Other Race ($B=-0.394$, $p = 0.124$) are all statistically similar in that the probability of having a risky allostatic load is not significantly different than their white counterparts net of victimization. The singular exception is black respondents ($B = 0.295$, $p = 0.001$) who show a 34.3% increase in the likelihood of having risky levels of stress into adulthood compared to their white counterparts, net of victimization.

Table 8: Logistic regression models predicting the probability of having a high allostatic load in early adulthood.

	Model 1				Model 2			
Variable	Coefficient	OR	Std. Error	P-value	Coefficient	OR	Std. Error	P-value
(intercept)	-0.8472	0.429	0.02907	0.0000	-1.765	0.171	0.45	0.0000
Victim	0.163	1.177	0.07	0.0270	0.067	1.069	0.10	0.3260
Race (white ref.)	-	-	-	-	-	-	-	-
Asian	-0.244	0.783	0.18	0.1710	-0.402	0.669	0.20	0.0430
Black	0.295	1.343	0.09	0.0010	0.315	1.370	0.10	0.0010
Indigenous	-0.068	0.934	0.25	0.7860	-0.361	0.697	0.32	0.2630
Latino	-0.098	0.907	0.18	0.5760	-0.306	0.736	0.22	0.1560
Mixed Race	-0.051	0.950	0.08	0.5440	-0.111	0.895	0.09	0.2360
Other Race	-0.394	0.674	0.26	0.1240	-0.198	0.820	0.29	0.4890
Age					0.063	1.065	0.02	0.0000
Sex (male ref.)					-0.509	0.601	0.05	0.0000
Socioeconomic Status					-0.164	0.849	0.03	0.0000
Neighborhood					0.015	1.015	0.01	0.1257
Peer Health Rating					0.173	1.188	0.05	0.0016
Discrimination					0.060	1.062	0.06	0.3019
Victim X Asian					1.022	2.779	0.49	0.0380
Victim X Black					-0.051	0.950	0.21	0.8070
Victim X Indigenous					0.897	2.452	0.54	0.0970
Victim X Latino					0.703	2.020	0.38	0.0660
Victim X Mixed Race					0.314	1.369	0.21	0.1300
Victim X Other Race					-0.798	0.450	0.64	0.2140

Model 2 explores the same relationship as seen in Model 1 but includes several socioeconomic and demographic controls as well as the interaction terms between racial identity and victimization. First, the main effect of victimization is no longer significant with the inclusion of these new controls. Though the magnitude of the effect of victimization diminishes net of these additional variables, clearly displaying the protective elements of these demographic and socioeconomic conditions on the stress process overtime, the interaction terms show a pattern that reflects what is shown in Table 3 with each non-black racial group showing some evidence that victimization increases the probability of having high levels of stress into early adulthood for them. Next, the model predicts that as respondents age one year, the odds that they will be at risk in 4 or more allostatic load categories increases by 6.5% (B = 0.063, p = 3.58e-5). Female respondents have a 39.9% (B = -0.509, p < 2e-16) lower likelihood of having a risky allostatic load than their male counterparts net of the other controls. As Family socioeconomic status

increases by one standard deviation the model predicts a 15.1% lower likelihood (B = -0.164, p < 1.04e-8) of having a high allostatic load into adulthood. Increasing neighborhood disadvantage (B = 0.015, p = 0.1257) and experiencing discrimination (B = 0.06, p = 0.3019) do not significantly change the probability that respondents will have high allostatic loads net of the included controls according to the model. In contrast, peer health ratings are significantly related to stress proliferation into adulthood. Model 2 predicts that for a one unit increase in peers' health rating, respondents themselves will experience an 18.8% (B = 0.173, p = 0.0016) increase in the likelihood that they will have a risky level of stress as young adults.

The interaction terms in model 2 examine the relationship between the respondent's experiences with violence and their adult stress to understand whether this relationship is conditioned by respondent's self-reported racial identity. Across racial groups, Model 2 shows a pattern that reflects what is shown in Table 3 with some notable exceptions. Though I do not find support for unique probabilities across all racial groups I do find suggestive support for the unique relationship black respondents have with violence when compared to non-black respondents, providing partial support for hypothesis 4, that racial groups may have unique responses to acute stressors. These interaction terms range in statistical significance with most racial categories showing the positive influence of victimization on adult stress. The black and other racial groups however show that victimization does not impact their adult stress levels. To understand this interaction, I solve the logistic regression equation. To do this I first condensed the race variable into two categories, black and non-black. This alongside the victimization variable allowed me to predict the probability of high allostatic load scores for four categories of respondents. They are as follows: Black people who were never victims of violence, Black people who were victims of violence, Non-Black people who were never victims of violence and Non-Black people who were. Creating these categories allowed me to explore the unique stress

trajectory for black respondents by classifying everyone in the sample by racial identity and victimization status. Next, I set all remaining variables to their respective means and plot predictions from the logistic equation across age using the exponentiated coefficients from Model 3. Using these values and categories the predicted probabilities of having a high allostatic load were calculated and displayed in Figure 5.

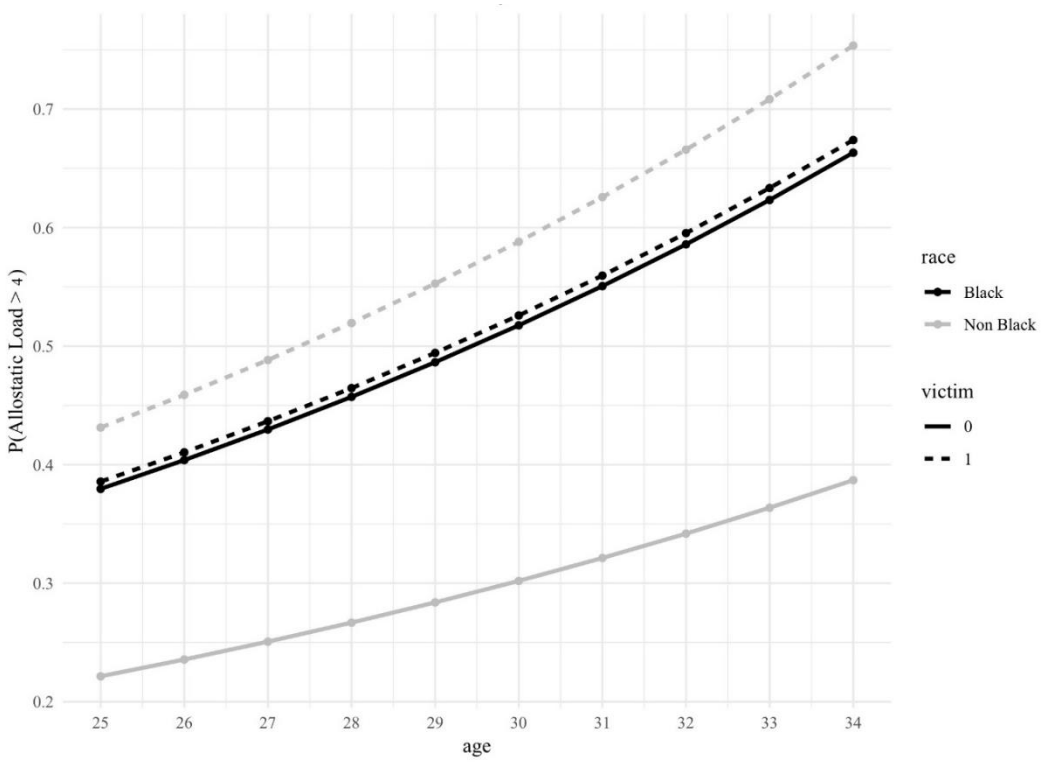

Figure 5: The predicted probability of having a high allostatic load by racial identity and victimization.

Figure 5 shows the steady and stable effect of aging on the probability of having a high allostatic load. Older respondents are routinely predicted to have higher probability of having risky allostatic loads than their younger counterparts. This lends support to the cumulative disadvantage hypothesis in that stressors accumulate overtime and compound to wear down our bodies. In contrast, hypothesis 2 states that there may be diminishing effects of age on stress.

Aging, though known to level out the stress proliferation process over time, especially in old age, is not shown to diminish the effects of victimization on adult stress in young adults age 25 to 34. Additionally, the effect of victimization can clearly be seen between the categories. The consistent pattern between non-black respondents lends support for hypothesis 3 that the impact of victimization on stress will be similar across racial groups. However, black respondents were the exception to the patterns exhibiting a unique pattern and a large enough sample to back it up. People who do not identify as black and who were not victims of violence during adolescence are predicted to have the lowest probability of high allostatic load scores across the entire age range in the sample. In contrast to non-black people, those who did identify as black and who have not been victims of violence show a much higher probability of having an allostatic load of 4 or more. Respondents who do not identify as black and who were victims of violence in adolescence are predicted to have much higher probabilities of having a risky allostatic load than either their non victim or black counter parts. For black respondents' victimization does not significantly alter the probability that they will have a risky allostatic load. Their predicted probabilities remain stable and similar regardless of victimization status or even age. The attenuation hypothesis argues that there is a critical mass of stress our bodies can handle before becoming inured to the impacts of additional stressors. While not directly tested in this study the results provide suggestive support for the hypothesis.

3.6 Discussion

Racial inequality in health outcomes across the life course is a robust finding in medical sociological literature despite growing attention and scholarship accounting for socioeconomic differences in respondents. In this chapter I show that, for black respondents, stress proliferation from adolescence into early adulthood is not significantly affected by experiencing violent

victimization. The attenuation hypothesis suggests that there is a critical mass of stress that our bodies can efficiently process, and additional stressors will have diminished effects on our body's physical manifestations of stress. This is counterintuitive as the biological response to stress implies that prolonged hyper secretion of cortisol reduces our ability to handle internal inflammation caused by stress. It follows then that increased inflammation would show up in biomarker data designed to capture such changes and result in a higher allostatic load. This is the idea behind cumulative disadvantage theory. However, the data show a unique pattern for black respondents. Fundamental Cause Theory (FCT) asserts that racial discrimination is an enduring casual mechanism driving gaps in a variety of health outcomes between racial groups (Phalen and Link 2015). FCT and Attenuation together offer insight into the patterns observed in the data and the model predictions. If racial discrimination is an important chronic stressor as described in FCT, then racial minorities will have higher allostatic load scores than their white counter parts over time (Geronimus 2006; Goosby et al. 2013). Therefore, racial minorities who are chronically impacted by racial discrimination, are more likely to have impaired stress processing systems. An event like violent victimization should increase stress. Yet, after reaching a critical mass of stress from racial discrimination by the time they are between the ages of 11 and 19 the new stress that should have been incurred from violent victimization does not appear in the allostatic load scores for black respondents in early adulthood. This suggests that the detectable impacts of stressors on black bodies do not show up in allostatic load measures and are better represented via racial health disparities: e.g., birth weights, infant mortality, disease progression, etc. Its possible that the respondents experiencing violent victimization so early in life were also predisposed to a multitude of other stressors that contributed to their attenuation beyond racial discrimination. Growing up in dangerous neighborhoods for example. The magnitude and frequency of stressors is not represented in the data however based on prior research it is plausible that black

adolescents circa 1995-1996 across the US were exposed to many more intense acute and chronic stressors than their non-black counterparts.

3.7 Conclusion

Dichotomization of variables reduces their potential variation. In this chapter for instance, the allostatic load variable originally ranged from 0 to 10 counting the number of categories respondents are at risk in. Convention holds that most people register on this allostatic load scale however being at risk in a normative number of categories is not impactful for health outcomes. Thus, much of the scholarship on the stress process suggests a threshold for when the variable stress will begin to have a visible effect on health outcomes. I follow this convention in chapter 2, however, I do so at the cost of potentially interesting variation. For example, there may be racially distinct thresholds, meaning that allostatic load may begin to impact health at different levels across each racial group. Future research must consider the potential for these unique patterns. Furthermore, sensitivity analyses including several variations of the allostatic load measurement are necessary to strengthen the claims suggested by the results I this chapter. For example, I originally set the high threshold to 4 on the allostatic load variable scale based on the 75th percentile of the variable in the research sample. Testing how the results change based on new risk categories across racial groups may offer more generalizable insights. Risk thresholds of 5 or 8 might be a more appropriate delineation for impactful stress for some racial groups while 3 might be more appropriate for other groups. Beyond new directions for the dichotomized variable, these limitations together suggest that there may be a better combination of biomarkers than those used in this chapter's analysis.

Additional sensitivity analysis for the variable allostatic load must be included in studies of stress processing. The variable is not robust to change, in that switching biomarker categories

drastically changes the variables predictions and associations with other health related variables. To test the robustness of the variable in this chapter I run an OLS regression analysis on the ordinal variable to see if the predictions are radically different from those predicted in the logit models. I find that the coefficients and standard errors are comparable, but the significance levels of many variables rise above the 0.05 level. When running similar analysis across different combinations of biomarkers I find that the predictions change in both magnitude and significance. In medical sociology focused on stress proliferation there are 10 conventional biomarkers used and those are the 10 I chose for this chapter but it will be necessary for future scholarship to fully assess how different combinations of biomarker data alter results across different sets of independent variables, especially racial identity.

In addition to the aforementioned limitations, the dependent variable from the study, allostatic load, suffers from significant attrition between the full sample and the final sample used in the analysis. The full sample for wave IV in the Add Health data has around 20,000 respondents and around 15,000 respondents participated in the biospecimen collection. In the final sample the variable has a little over 9000 cases. This is a significant decline from the original sample size. This attrition limits the external validity of the study in that nearly 6000 of the original cases are omitted from the analysis. To partially account for the attrition bias I use add health's wave IV sample weights to insure the sample's demographic characteristics are proportional to the US population in 2008. However it may have been better to use multiple imputations to fill in estimated values for the 6000 respondents missing between wave I and wave IV.

Lastly, this chapter suggests that black respondents have a unique stress response when processing experiences with violence. However, the research design decision to meld racial groups with similar patterns may limit the generalizability of the findings. Even if the prevailing

pattern across racial groups is similar, it may still be necessary for future researchers to parse the stress trajectories of each racial group individually. This would allow scholars to see the exact trajectories predicted by the model for each racial category and whether distinct racial patterns in stress processing exist.

4. Chapter 3: Racial homophily, social support, and depression in adolescence

The 2022 health of women and children report shows that over the past decade, trends in adolescent mental health have worsened across the US. The rate of suicide among teens aged 15 to 19 has risen from 8.4 to 10.8 suicides per 100,000 people (United health foundation 2022). Furthermore, in 2020, suicide was the second-leading cause of death among those ages 10-34. Depressive symptoms are among the strongest and most robust predictors of suicidal ideation and attempts marking it as an important dimension of mental health to examine for policy initiatives that seek to prevent suicidal ideation (Kandel, Raveis and Davies 1991). In the U.S., children ages 3-17 who claim to have experienced anxiety rose from 7.5% to 9.2%. An increase of more than 1 million children. Similarly, the number of children and adolescents who have depression increased from 3.3% to 4.2% between 2017-2018 and 2020-2021. These conditions together have affected roughly 8.1 million children in 2020-2021 alone (United Health Foundation 2022). Additionally, many mental health disorders develop and are diagnosable early in the life course. 75% of mental health disorders have their onsets by age 24 and 50% are onset by age 14 (Gladstone, Beardslee, and O'Connor 2011). These statistics display the magnitude of the issue adolescents in the US face, the relevance of studying depressive symptoms among this age groups, and the need for effective policy to address it.

Research on social inequality and mental health has identified a host of correlates and antecedents to depression. Mental health disorders appear to be inversely associated with various forms of social status and integration. Sociologists have found that youth in neighborhoods characterized by low socioeconomic conditions perceive greater ambient hazards such as crime, violence, and drug use, than those in high socioeconomic status (SES) neighborhoods. The more hazardous youth perceive their neighborhoods to be, the more common symptoms of anxiety and

depression become (Aneshensel and Sucoff 1996). Beyond neighborhood and socioeconomic conditions determining depression, contemporary studies have found an empirical connection between the network positions adolescents occupy and their level of depression such that socially isolated teens with few or no friends and teens who feel they don't belong in their schools are at far greater risk of depression (Barman and Moody 2004; Falci and McNeely 2009; Walker 2015; Yilmaz and Bohara 2021). In a similar vein, if a respondent's peer group is characterized by high levels of depression or suicidal ideation, they are much more likely to seriously consider suicide themselves (Bearman and Moody 2004; Baller and Richardson 2009; Walker 2015).

Integration into social institutions is important for developing a sense of belonging or attachment that fosters social support that can alleviate or prevent depressive symptoms (Maimon and Kuhl 2008). Adolescence has been identified as a vulnerable period, characterized by shifting social landscapes where integration may be more challenging. While several studies have empirically verified the connection between the social networks one occupies and their mental health the scholarship on adolescent health and development often cites symptoms of depression as a common deterrent to social integration. So it is likely that network characteristics and mental health have mutually reinforcing mechanisms (Schaefer et al. 2011). Finally, much of the literature regarding networks and mental health describes the importance of gender and race as mediating factors. Young men and women are repeatedly shown to have unique mental health outcomes in response to their network structural characteristics though much more attention has been given to gender effects (Falci and Mcneely 2009; Copeland and Kamis 2022).

This chapter seeks to understand the effects of social integration and racial homophily, as forms of social support, on depression during adolescence. Using social control theory and stress processing theory as guides I examine whether the mechanisms underlying social support are mediated by racial heterogeneity and social cohesion in friendship networks. Findings indicate

that belonging to a racially homogeneous group is generally protective against depressive symptoms. However, this effect is mediated by social cohesion within groups such that the level of depression present in cohesive groups is more robust to changes in racial composition than more fragmented groups.

4.1 Background

Evidence from scholarship on stress suggests that differential exposure to stress is the primary mechanism by which race, and social status translate to worse health conditions (Turner 2013). Despite this evidence, the explanatory power of social stress and the stress process model in general has been called into question because of misclassification of unwell respondents and difficulty estimating the empirical differences in exposure to social stress. The strength of stress process models is in their ability to identify the relationships between exposure to stressors, their negative impacts on health across multiple measures, and the social resources that might mitigate these effects. The model assumes that variations in exposure to stress and the accessibility of social resources are determined by the environmental conditions one is exposed to, in this case social control elements. And the extent of difference between life conditions are defined by one's race, gender, and socioeconomic status. Stress process models predict that the established connections between these statuses, health and wellbeing are patterned by social differences in elements that compose the model. Previous work on stress has shown that each social element makes a significant and independent contribution in the determination of one's health accounting for a large portion of the observed variation in health outcomes (Turner 2013; Turner and Lloyd 1999).

Social control theory further supports the claims made in general by stress processing models. Control theory asserts that children learn good behaviors from attachment to parents or

guardian figures and that these attachments, involvement, and subsequent systems of belief mediate the relationship between parenting and behavioral outcomes such as substance use or other health related behavior (Gottfredson & Hirschi, 1990; Hirschi, 1969; Wu and Farmer 2021).

The Stress processing model and social control theory argue that one's connection to social institutions is a key dimension when analyzing the ways discrete life events determine mental wellbeing. These connections anchor adolescents to support systems that foster mutual reinforcement between prosocial behaviors and self-esteem, both of which have been shown to contribute to lower levels of depression in respondents.

Adolescence is a critical period of the life course characterized by change and adjustment. During this period experiences shape beliefs and behaviors that have significant impacts on health into adulthood. For example, drinking or smoking habits and friendship selection processes. A myriad of sociological perspectives view friendship groups as a resource that fosters emotional development and social support, both important protective factors when studying depression (Sullivan 1953; Bronfenbrenner 1979; Coleman 1988; Crosnoe 2000). Successful navigation of these developmental tasks and integration into their social environments tends to occur within schools and can lead to a number of positive implications for teens. Studies have found that young people with friends are more confident, altruistic, less aggressive, demonstrate greater school involvement and work orientation (Fletcher et al. 1995; Hartup and Stevens 1997). Attachment to school determines a sense of belonging that can affect teens depressive symptoms. School age children who were integrated into their schools' social environment followed more positive behavioral and emotional trajectories across four years then did their socially isolated peers (DeRosier, Kupersmidt, and Patterson 1994). This demonstrates that selection effects are important in that well-adjusted children are more capable of forming friendships than their counterparts who are struggling with mental health (Schaefer et al 2011).

Peer traits provide insight to the behavioral norms and beliefs present within a friendship network. Young people contribute to the construction of their own ecologies through their friendship choices (Matsueda and Anderson 1998; Crosnoe 2000) and there is a strong association between the characteristics and behaviors of adolescents and those of their friends (Haynie 2001; Adams 2022). This association holds for problem behaviors such as delinquency and substance use but also for positive domains such as school involvement and prosocial behaviors (Crosnoe, Erickson and Dronbush ----; Steinberg, Brown, and Dornbusch 1996; Whitbeck, Conger, and Kao 1993; Haynie 2001; Crosnoe 2000). For example, smoking may influence one's relative attractiveness to peers with differential predispositions to smoke. Much of this research also shows that a person's position within their local and global networks influences the degree of similarity between their own behavior and the behavior of their peers (Haynie 2001). This chapter controls peer depression along with several network structural characteristics to isolate the effect of an individual's level of social integration on depressive symptoms.

4.1.1 Network Correlates of Mental Health

Much of the literature connecting the health of individuals to the structure of their social networks examined the impact of social support that individuals derive from their interpersonal relationships (Pescosolido 2001; Haas, Schaefer, and Kornienko 2010). Social network analysis provides a suite of tools for modeling social integration. Network density, degree centrality, and peer traits are common network measures related to integration in unique ways. First, network density refers to the proportion of observed ties to the theoretical maximum number of ties. High levels of density are often associated with social cohesion, conformity, and support while low levels of density often refer to fragmented groups where friends of friends do not know each other. Greater cohesion facilitates social interaction, common identity, trust, and behavioral

reinforcement; even delinquent ones (Haynie, 2001; McGloin et al., 2014; Walker, 2015). Studies have found that those in poor health hold less prominent positions within their social networks and that their friends are less connected to one another, i.e. depressed teens should belong to lower density networks (Cornwell 2009a; Haas, Schaefer, and Kornienko 2010). Depressed teens are less likely to belong to densely connected cohesive groups.

In contrast to density, degree refers to respondent's direct connections and is highly correlated with many measures of network centrality. This measure is often used to capture an individual's status, influence, or visibility within social networks. Adolescents who report poor self-rated health have fewer friends in their immediate networks, are significantly more likely to be social isolates, and they have fewer reciprocal ties. In other words, the literature reports depressed teens have lower degree than teens who are not struggling with mental health. Each of these factors contribute to adolescents with poorer health occupying less central positions within their larger networks (Haas, Schaefer, and Kornienko 2010). Students' relative position within their schools' larger social networks contributes to how they felt about school overall with adolescents who occupied highly central positions within their school friendship networks feeling more positive towards school than their more peripheral counter parts (Moody 2001; Crosnoe 2000).

Adolescents seek social connection with peers (Baumeister and Leary 1995; Chu 2005). If their efforts go unfulfilled, they are more likely to experience exclusion and loneliness and to develop depressive symptoms (Rosenberg and Cullough 1981; Yilmaz and Bohara 2021). This is particularly salience for black respondents in predominantly white schools. Failing to create bonds with other black students has been shown to have detrimental effects on the mental health of black college students (Borr 2019). Adolescents with few supportive friendships are less likely to feel that they belong at school and are at greater risk of depression. Relatedly, Ueno (2005) found that a single close friend is not

sufficient to protect against depressive symptoms and that the influence of under-integration on depressive symptoms is mediated by perceived belonging. This suggests that teens who score high on attachment to school, but have relatively few friends will be at lower risk for depression. Small networks are associated with low perceptions of friendship support and belonging, so it's likely that attachment to school and friendship networks size are mutually reinforcing deterrents to depression. Hence, perceptions of social relationships mediate the ill effects of occupying peripheral positions within a school network on depressive symptoms (Falci and McNeely 2009).

Apart from isolation, belonging to a large group of loosely connected friends can have detrimental effects on one's mental health. As the number of friends an individual has increases the time and energy costs of maintaining them also increases and may outweigh the benefits of having friends (Eder 1985; Eder, Evans and Parker 1995). Empirical evidence shows that social integration has a curvilinear relationship with depressive symptoms such that having either too few (under integration) or too many (over integration) friends can be harmful to mental health (Durkheim 1951; Pescosolido and Levy 2002; Falci and McNeely 2009). Role strain in turn can lead to poor self-assessment of one's success in enacting the role of friendship. Both role strain and negative role performance evaluations are likely to lead to depressive symptoms (Thoits 1991). Large, fragmented networks should exacerbate the role strain of numerous friendships. From a developmental perspective, children feel secure in small groups but move into larger networks as they gain more social contacts and greater confidence (Hartup 1993). The typical trajectory of adolescent friendship groups is growth, but this is mediated by race, gender, and health which all impact teens' ability to make friends (Crosnoe 2000; Falci and McNeely 2009; Copeland and Kamis 2022).

4.1.2 Gender, Networks, and Mental Health

As early as elementary school social interactions are transformed by the growing awareness of gender and these socialization processes structure adolescent peer relations in important ways (Thorne 1993; Copeland and Kamis 2022). Girls' friendship groups tend to be smaller and more exclusive than those of boys. Within groups, girls give priority to closeness and disclosure while boys typically emphasize shared activities and status. In general, gender differences in friendship reflect boys' and girls' differential socioemotional development, which patterns relationships into adulthood (Maccoby 1998; Crosnoe 2000; Copeland and Kamis 2022). Because gender patterns social interaction with friends, it likely also creates gendered differences in the effects of network structure on depressive symptoms. Large cohesive networks should be better able to share and coordinate social support to a network member, thereby preventing the overburdening of anyone network member. Despite this, literature has found that, for girls, the negative effects of belonging to a large network only occur when the network cohesion is low. Boys however, belonging to a large group exacerbated depression only at high levels of network cohesion (Falci and McNeely 2009). The lack of research on network structure at intersecting racial/ethnic and gender identities means that prior work does not support specific expectations for each group. Young men of color may experience additional disadvantages associated with their race/ethnic that exacerbate potential detriments of cohesion for boys (Copeland and Kamis 2022). Racialized gender stereotypes of boys of color leading to potential sanctions for tight knit groups may cause additional stress. Conversely white youth may experience combinatory returns to privileged statuses that advantage health. This chapter seeks to demonstrate that racial homophily amplifies the conformity and support that comes with high social cohesion.

4.1.3 Racial Homophily and Social Support

Sociological literature on the developmental outcomes of cross-race friendships during adolescence is mixed. Some literature reports positive outcomes such as cultural competency, a strong send of self-concept, satisfaction with college, feelings of belonging, adolescent development, retention, confidence, and positive aspirations (Lewis et al 2017; Douglass et al 2017; Kawabata and Crick 2008). While other research has found more negative outcomes of cross-race friendships citing low academic performance, low self-confidence, and intergroup exclusion (Ruck et al 2015). Most research on race and friendship structure centers on cross-race relations because homophily is so well established in the literature. This large body of literature suggests that people prefer friends who are like themselves along multiple dimensions, including race (Hallinan and Williams 1989; Kandle 1978; McPherson and Smith-Lovin 1987; Tuma and Hallinan 1979; Moody 2001). Propinquity, or closeness in physical space, governs friendship formation during adolescence because young people are more likely to befriend those whom they see most often such as those they share classes with. Additionally, similarity between adolescents increases the probability of friendship because people are attracted to those who share their own characteristics, behaviors, and attitudes (Baron and Byrne 1994; McPherson and Smith-Lovin 1987). Therefore, friendship formation processes are not random but guided by opportunities to meet and by homophilous forces (Crosnoe 2000). Successfully establishing friendships under these conditions is associated with feelings of belonging, self-confidence, and perceptions of support in adolescents while failure to create close bonds with peers is related to higher levels of depression and lower levels of attachment to school in general. This is especially true for black adolescents who are continuously part of more racially homogeneous networks than other racial groups, even in places with very few black individuals (Borr 2019). This strong pattern of relations between racially similar individuals suggests that racial homogeneity in friendship

networks is desirable because it creates systems of support that generate the feelings of attachment and self-esteem that deter depression in adolescents.

Systematic, generational disadvantage has created spatial isolation and disproportionately high rates of concentrated poverty (Rhoden 2006). In a similar vein mental and emotional disorders are not uniformly distributed throughout social systems but are more densely concentrated in some social strata than others (Aneshensel and Sucoff 1996). Research indicates that black, Latino, and Asian youth have greater depressive symptoms than white youth from adolescence into early adulthood (Hargrove et al., 2020). Fundamental cause theory explains that the various forms of systemic and structural racism unequally exposes people of color to stressors that may strain relationships and can increase risk of mental distress (Umberson et al. 2014). In addition to structural antecedents to depression disproportionately impacting people of color sociological literature has found that rates of reciprocated same-sex best friendships vary by race with the lower reciprocity for black boys and the highest for white girls (Vaquera & Kao 2008). This low reciprocity may relate to feelings of belonging and perceptions of support that are integral to preventing depression.

The association between network structure and friendship patterns may widen differences between social groups when these structural features determine the opportunity for contact. In general, adolescent social networks are patterned by racial/ethnic homophily such that same-race ties are more likely to occur than cross-race ties (Moody, 2001). The rate of cross-race friendship should equal the opportunity for contact in schools. However, when race remains salient for friendship formation schools remain substantively segregated because teens are mostly interacting with peers who share their racial identity. (Moody 2001). For example, when admins shape the opportunities for student contact by implementing policy that determines academic tracking and selection into extracurricular activities, they often create racial segregation between academic

tracks and extracurricular clubs in high schools regardless of their intentions (Lewis and Diamond 2015). As a result, social ties may further concentrate advantages among privileged groups so that greater cohesion yields greater access to status and power for white youth on academic oriented tracks compared to other racial/ethnic groups (Stanton-Salazar 1997; Lewis and Diamond 2015). Empirically, sociologists observe very different levels of friendship segregation across similarly heterogeneous settings. Work on race and ethnicity has consistently found a nonlinear relation between heterogeneity and racial relations. The salience of race in nominations for friendship is highest in the middle ranges of heterogeneity. In contexts where racial homophily is most salient in friendship formation, it is also likely to determine adolescents' level of integration as well as how much support they receive or perceive from these relationships (Blalock 1967; Smith 1981; Moody 2001; Ruck et al 2015). While social cohesion is a commonly used mental health correlates, little research has emphasized the role of racial homophily as a critical predictor of adolescent mental health (Ueno 2005).

4.2 Hypotheses

The stress processing model and social control theory can be organized into three research questions and hypotheses.

RQ1: Successful integration into racially homophilous groups is a recurring social goal for many racial minorities but especially black adolescents, related to self-esteem and social support. Does the racial heterogeneity of adolescent friendship networks have a meaningful effect on their depression?

(H1): Racial heterogeneity in adolescent friendship networks will meaningfully increase depressive symptoms.

RQ2: Is there a conceptual difference in the social cohesion implied from high network density and network racial homogeneity?

(H2): The variables will have a low correlation as they measure conceptually distinct mechanisms of social support and cohesion.

RQ3: Social cohesion is a known deterrent to depression in contexts where role strain is not actively occurring, as it provides avenues for increasing social support and self-esteem. Does racial heterogeneity moderate this established relationship?

(H3): Racial heterogeneity in friendships will moderate the effect of social cohesion on depressive symptoms such that cohesive and homogeneous groups will have the lowest rate of depressive symptoms.

4.3 Data & Variables

To examine the influence of racial homophily and social cohesion on depressive symptoms in adolescents I use data from the first wave of The National Longitudinal Study of Adolescent to Adult Health (Here after Add Health). The data consists of a nationally representative sample of teens, ages 10 to 19, nested in randomly selected public and private schools throughout the United States in 1994-95. Information on the sample was collected from respondents, their peers, school administrators, parents, siblings, and romantic partners through an initial in-school survey followed by four in-home interviews.

Add Health's In-School Questionnaire, a self-administered instrument, was distributed to more than 90,000 students in grades 7 through 12 in an hour-long class period between fall 1994 and spring 1995. The questionnaire consisted of many topics, from education and parental occupation to self-esteem and risk behaviors. Important to this study was the information collected on student's mental health and friendships. Respondents were asked to name their five

closest female friends and their five closest male friends. In instances where the friendship nominations were members of the same school as the respondent, as more than 80 percent of nominations were, data was also available on the nominees. The Add Health study design makes it possible to reconstruct the social networks of most students. This network information enables researchers to calculate racial segregation indices for each respondent's friendship network, as well as test ways the structural characteristics of the network, such as cohesion, may determine depressive symptoms.

Data from the more in-depth in-home interviews contains sensitive information on the adolescents such as experience with drugs and alcohol and various other risky behaviors such as carrying a weapon. One of the most advantageous components of this in-home method was the use of laptop computers which played prerecorded questions about experiences with victimization. This method of data collection helped to maintain confidentiality on numerous sensitive subjects. These self-reported experiences from the first wave of in-home interviews was used to construct the dependent variable – victim – for this study. The final research sample for the project consists of 10671 respondents with complete data from both the in-school and in-home interviews. Table 9 shows the descriptive statistics for each of the variables included in the study.

Table 9: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	N
Depression	11.11	7.49	0	56	14247
Age	15.05	1.71	10	19	14273
Sex	0.51	-	0	1	14220
White	0.46	-	0	1	14074
Black	0.19	-	0	1	14074
Asian	0.07	-	0	1	14074
Latino	0.06	-	0	1	14074
Indigenous	0.01	-	0	1	14074
Mixed Race	0.20	-	0	1	14074
Other Race	0.01	-	0	1	14074
Socioeconomic Status	0.00	1.00	-1.89	2.12	13639
School Atachment	10.65	2.97	3	15	12677
Adults Care	4.39	0.81	1	5	14237
Teachers Care	3.55	0.98	1	5	14210
Parents Care	4.80	0.56	1	5	14247
Friends Care	4.24	0.80	1	5	14228
Ego Network Density	0.29	-	0	1	14319
Indegree	4.34	3.65	0	32	14319
Racial Heterogeneity	0.29	0.23	0	0.8	13737
Ego Network Size	7.91	4.38	1	34	14319
Peer Depression	1.20	0.64	0	4	13598

The dependent variable for the study is a composite measure averaging respondent scores across 19 symptoms of depression. Each of these items ranges from 0 to 3 and are coded such that increasing scores signal increasing risk of depression. The variable ranges from 0 to 3 with an average of 0.585 and a standard deviation of 0.394.

Next the set of included demographic controls are age, sex, race and socioeconomic status (SES). Respondent's ages ranged from 10 to 19. The average age among respondents is 15 and the standard deviation for the variable is 1.709. The variable sex represents respondents self-identified sex category at the time the survey was conducted. The variable ranges from 0 (males) to 1 (females) and has an average of 0.513 showing that 51.3% of the sample is female. Next the race variable is comprised of 6 categories: White (46.1%), Black (19.1%), Asian (6.9%), Latino

(5.6%), Indigenous (1.1%) Mixed Race (19.8%) and Other Race (1.3%) with white being the reference category in each of the regression models. To construct the variable socioeconomic status, I first determine the respondent's present parent(s) highest level of education and then place it on a 8-point scale. Next, I take their reported family income and situate it on a similar 8-point scale based on empirically observed quantiles. Both variables are then standardized and summed. The variable has a range of -1.886 to 2.115 and an average of 0 with a standard deviation of 1.

Following the demographic and SES variables the next set of measures captures respondents' attachment to school, their peers, and various adults in their lives. The variable school attachment is a sum of respondent answers to 3 questions regarding whether they are happy to be at school, feel like a part of their school, and feel close to people at their school. The variable ranged from 3 to 15, has a mean of 10.645, and a standard deviation of 2.97. The next four variables included in this chapter measure how much respondents feel various groups of people care about them and each ranged from 1 to 5. The means and standard deviations for the variables are as follows: Adults Care, has a mean of 4.392 and a standard deviation of 0.808, Teachers Care, has a means of 3.547 and a standard deviation of 0.983, Parents Care has a mean of 4.796 and a standard deviation of 0.557, and finally Friends Care has a mean of 4.238 and a standard deviation of 0.795. We can see that on average, respondents perceive very high levels of care from each of these groups. The lowest average is regarding how much teachers care but is still high relative to the minimum value for the variable.

The final set of included variables measures different network measures known to be related to depression. The variable Density measures the proportion of ties present in a respondent's ego network. The measure ranges from 0 to 1 with 0 representing isolates with no ties and 1 signally that all theoretically possible ties exist empirically. The mean for the variable

is 0.287 and the standard deviation is 0.156. Next, ego network size measures the number of adolescents in each respondents immediate friendship circle. The variable ranges from 1 to 34 with 1 representing social isolates as the respondent is the only one present in their ego network. The variable has a mean of 7.914 and a standard deviation of 4.378. Respondents were asked how often in the last month they had felt depressed. Alter's depression is the average of score on this variable for each friend included in the respondent's ego network. The variable ranges from 0 to 4, has a means value of 1.2 and a standard deviation of 0.635. Finally, the variable heterogeneity is the proportion of all racial identities present in the school which are also represented in the ego network. If all members of the ego network who have valid data on attribute A share the same trait the heterogeneity value will be 0. The variable ranges from 0 to 0.8 with 0.8 signaling that 80% of the racial groups present in the school are also present in the respondent's friendship network. The mean for heterogeneity in the sample is 0.285 and the standard deviation is 0.225.

4.4 Analytic Strategy

The connection between gender and mental health is well established with several studies citing the deleterious yet differential effects of network structure on mental health across gender (Copeland and Kamis 2022). In a departure from the established findings, I begin analysis by showing gender differences in average levels of depression by racial heterogeneity. This exploration addresses research question 1 by describing the relationship gender and racial heterogeneity have with depression.

Next, I explore the various relationships between known mental health correlates and racial heterogeneity as a proxy for support. Density, an established measure of social cohesion, is related to social support in that more cohesive groups are better equipped to lend support to members and thus higher cohesion should lead to lower levels of depression. In a similar vein

homogeneous groups are associated with an increased ability to provide support to members via similarity and mutual understanding of their social environments. To illustrate the distinction between these concepts I create a scatterplot showing how network racial heterogeneity and network cohesion move together in the sample. This plot is important to show that the variables, while similar, are indeed measuring distinct dimensions of social support.

Lastly, because the variable depression is continuous and the literature does not suggest that depression is driven by school level characteristics, i.e. racial segregation is incredibly varied across schools with similar levels of racial heterogeneity, and much of the variation in mental health associated with neighborhood disadvantage is captured in individual level socioeconomic status variables, I perform ordinary least squared regression models to predict how racial heterogeneity acts as a form of social support to determine depression.

4.5 Results

Beginning with Figure 6, I examine the relationship between gender and racial heterogeneity in ego networks as they relate to depression in adolescents. From the graph we can see that young girls in the sample tend to have slightly higher levels of depression than their male counterparts. While other studies have found unique patterns regarding the effect of network structure on depression across gender, results indicate a consistent pattern in the effect of racial heterogeneity for boys and girls. That is, racial homogeneity is empirically related to a decline in depressive symptoms. This provides suggestive support for hypothesis 1 that racial heterogeneity will increase depressive symptoms.

The literature cites socialization processes as a primary factor shaping gender differences in depressive symptoms, yet few studies have accounted for race in their work (Copeland and Kamis 2022). This finding suggests that more attention should be paid to how race might further

mediate the relationship between gender and health in conjunction with network structural factors because adolescents who belong to racially homogeneous groups tend to have lower levels of depression across gender categories.

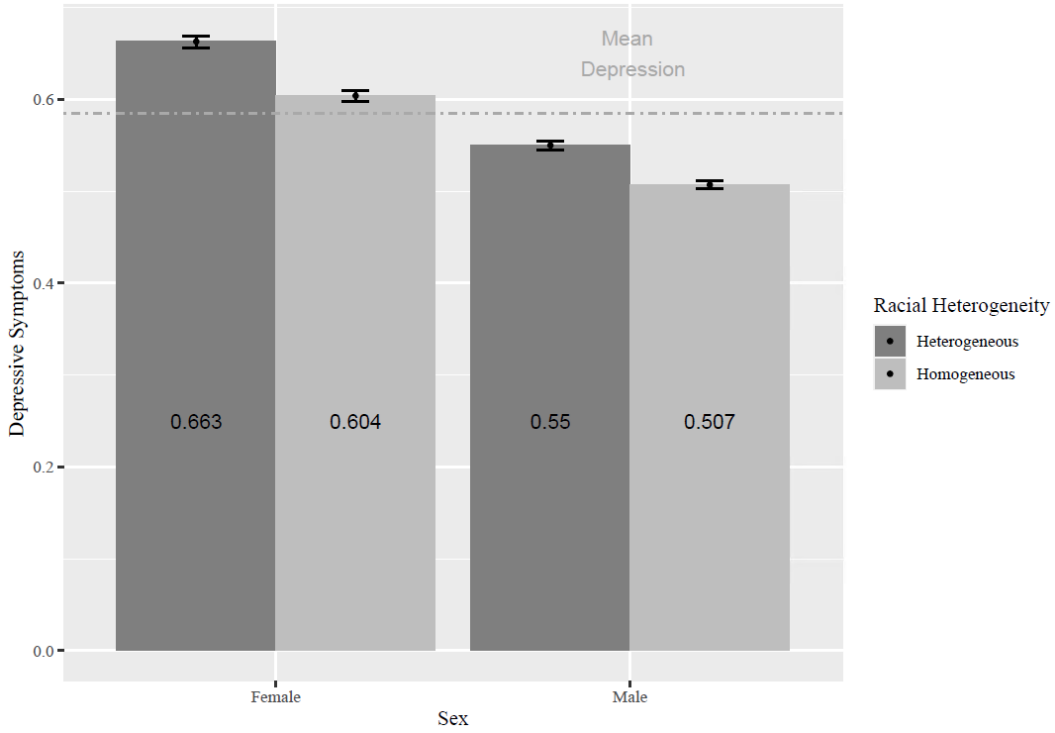

Figure 6: Average depressive symptoms by sex and network racial heterogeneity.

To assess the relationship between ego network density and racial heterogeneity I visualize their empirical relationship in the scatterplot shown in Figure 7. I find rather strong support for the claim in hypothesis 2 that these variables measure distinct concepts. The plot lacks any semblance of a strong pattern, signaling the variables have a weak relationship (correlation = -0.1418). This important note means that the variables capture unique dimensions of social cohesion. Literature implies that both homophily and cohesion apply the pressure to conform to group norms and expectations as well as provide a degree of social support but despite the similarity in their social outcomes the variables are still conceptually distinct and may operate

differently when it comes to the prevention of depression. This is an important distinction to make because it suggests that density and friendship with racially similar others are employing different mechanisms of social support and cohesion when they are applied to depressive symptoms in analysis. The following OLS models continue to shed light on both variables relationship to depression.

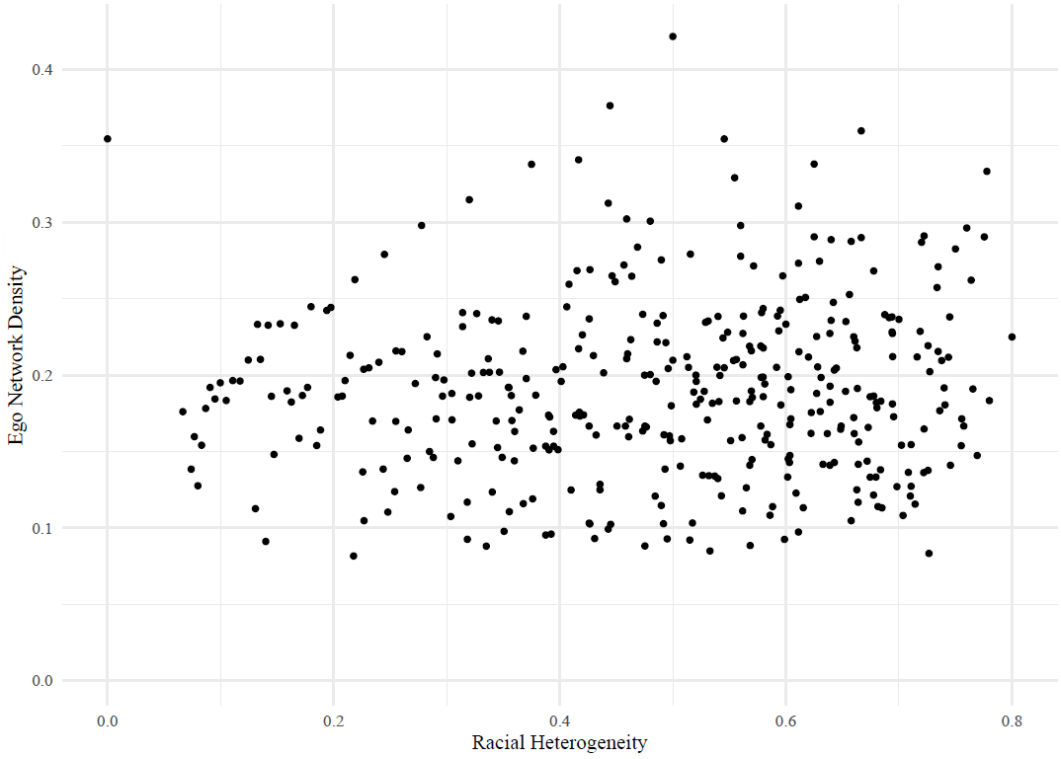

Figure 7: Average network density by racial heterogeneity.

Table 10 shows the regression coefficients and their standard errors from two OLS regression models predicting depressive symptoms. Each model is progressively more complex as variable blocks are added and results are interpreted.

Table 10: OLS regression models predicting adolescent depressive symptoms.

	Model 1			Model 2		
Term	Coefficien	Std. Error	P-value	Coefficien	Std. Error	P-value
(intercept)	3.107	0.555	0.0000	27.991	0.899	0.0000
Age	0.407	0.037	0.0000	0.228	0.037	0.0000
Sex (male ref.)	1.915	0.130	0.0000	2.185	0.131	0.0000
Socioeconomic Status	-1.045	0.067	0.0000	-0.763	0.067	0.0000
Race (white ref.)	-	-	-	-	-	-
Asian	2.304	0.360	0.0000	2.372	0.355	0.0000
Black	0.871	0.196	0.0000	0.416	0.201	0.0379
Indigenous	3.737	0.598	0.0000	2.382	0.611	0.0001
Latino	1.890	0.409	0.0000	1.920	0.414	0.0000
Mixed Race	1.829	0.191	0.0000	1.295	0.192	0.0000
Other Race	-0.285	0.543	0.5990	-0.577	0.579	0.3188
School Attachment				-0.470	0.023	0.0000
Adults Care				-1.281	0.097	0.0000
Parents Care				-1.339	0.138	0.0000
Teachers Care				-0.626	0.075	0.0000
Friends Care				-0.681	0.093	0.0000

Model 1 shows the association between the set of included demographic controls and depression. As respondents age 1 year their depressive symptoms increase by 0.021 ($p < 2e\text{-}16$). The model predicts that female respondents will score higher ($B = 0.101$, $p < 2e\text{-}16$) on the depressive symptoms scale than their male counter parts. This is consistent with the literature on adolescent depression. Next, Model 1 shows that one standard deviation increase in socioeconomic status is predicted to reduce depression ($B = -0.055$, $p < 2e\text{-}16$). As for racial identity, each racial group was predicted to have marginally higher depression than their white counterparts save for those who identified as other race ($p = 0.599$) who did not significantly differ from white respondents. Model 1 shows established relationships to depression that we'd expect to see based on extent literature and prior empirical work.

Model 2 adds social support variables to Model 1. Each of the attachment variables were significant and lowered levels of depression in respondents. As respondents become more attached to school ($B = -0.025$, $p < 2e\text{-}16$), their teachers ($B = -0.033$, $p < 2e\text{-}16$), their friends (-

0.036, p = 3.12e-13), their parents (B = -0.07, p < 2e-16) and the adults in their lives (B = -0.067, p < 2e-16), their depressive symptoms decrease. Feelings of support from adults and parents have the largest impact on depression symptoms nearly double that of either teachers or friends. This is in line with theories of social control that predict attachment to social institutions and family reduce negative behaviors and protect against depression via social support. The addition of these support variables doesn't substantively change the predictions made in the prior block. However, the p-value for the coefficient for the variable black is reduced from 8.82e-6 to 0.0379 with the inclusion of these variables. This suggests that for black respondent's social support absorbs some of the effect of racial identity on depression. Table 11 shows the results from Models 3 and 4 which add the ego network characteristics to the previous models.

Table 11: OLS regression models predicting adolescent depressive symptoms.

	Model 3			Model 4		
Term	Coefficien	Std. Error	P-value	Coefficien	Std. Error	P-value
(intercept)	28.376	1.006	0.0000	27.718	1.023	0.0000
Age	0.207	0.040	0.0000	0.211	0.040	0.0000
Sex (male ref.)	2.099	0.134	0.0000	2.102	0.135	0.0000
Socioeconomic Status	-0.767	0.069	0.0000	-0.770	0.069	0.0000
Race (white ref.)	-	-	-	-	-	-
Asian	2.441	0.375	0.0000	2.519	0.376	0.0000
Black	0.402	0.208	0.0536	0.385	0.208	0.0642
Indigenous	2.286	0.624	0.0003	2.282	0.624	0.0003
Latino	1.905	0.436	0.0000	1.872	0.436	0.0000
Mixed Race	1.252	0.214	0.0000	1.260	0.214	0.0000
Other Race	-0.910	0.599	0.1287	-0.927	0.599	0.1216
School Attachment	-0.475	0.024	0.0000	-0.474	0.024	0.0000
Adults Care	-1.295	0.099	0.0000	-1.284	0.099	0.0000
Parents Care	-1.377	0.141	0.0000	-1.377	0.141	0.0000
Teachers Care	-0.606	0.076	0.0000	-0.612	0.076	0.0000
Friends Care	-0.687	0.096	0.0000	-0.681	0.096	0.0000
Network Size	-0.085	0.057	0.0137	-0.086	0.057	0.1311
Network Size^2	0.0051	0.002	0.0327	0.0051	0.002	0.0307
Peer Depression	0.419	0.112	0.0002	0.430	0.112	0.0001
Ego Network Density	-0.511	0.571	0.3710	1.103	0.732	0.1320
Racial Heterogeneity	0.694	0.343	0.0427	2.867	0.705	0.0000
Heterogeneity X Density				-7.164	2.032	0.0004

Model 3 adds network structural characteristics to the model and addresses the study hypotheses. Beginning with ego network size the model predicts that the main effect of network size reduces depression. That is, that model predicts that depression will decline (B = -0.004, p = 0.0137) for each new friend inside the respondent's ego network. However, the quadratic term is also significant and predicts an increase (B = 0.0003, p < 0.0327) in depression. This result is consistent with role strain and the pressure to perform. Initially the growth of a respondent's friendship network has positive implications for depressive symptoms. The positive coefficient for the quadratic term along with the negative coefficient from the main effect signals that there is a turning point where too many friends can begin to have detrimental effects on respondent depression. Next, network density is not predicted to have any impact (p = 0.371) on respondent's depression net of the variables included in the model. This is an unexpected result as much of the literature on depression in adolescence predicts that network cohesion is a strong deterrent for depression as it generates social support. One possible explanation is that the effect of network density and cohesion on depression always depends on gender, such that social cohesion is almost always positive for boys and detrimental for girls in large friendship groups (Copeland and Kamis 2022). Next, peers' depression is predicted to increase depressive symptoms in respondents (B = 0.022, p = 0.0002). As depressive symptoms among peers increases so does the depression of the respondent themselves. Finally, as racial heterogeneity within respondent's friendship networks increases so do their depressive symptoms (B = 0.037, p = 0.0427). This finding lends support for hypothesis 1 in that increasing ego network racial heterogeneity is related to increases in individual depression. This coupled with the insignificant effect of depression despite the variables well established relationship to depression in the literature suggests that other included variables are absorbing some of density's effect on depression. Figure 7 shows the weak correlation between network heterogeneity and density so it is unlikely that this variable is taking

up space density would otherwise occupy. Its much more likely that the support variables are a proxy for the positive climate that characterize highly dense groups suggesting support for hypothesis 2.

To further examine the implications of racial heterogeneity on depression and test whether its effect is dependent on network structural characteristics, I include the cross-product of the two variables in model 4 and results are presented in Table 11. The interaction term gives the cross product of racial heterogeneity and network density to test whether the effects of racial similarity on depression are mediated by network cohesion. The interaction term is significant, and the effect is relatively strong (B = -0.377, p = 0.0004). To accurately assess how network cohesion determines the effect of racial heterogeneity on depressive symptoms I solve the regression equation and plot the marginal effects. The results are shown in Figure 8.

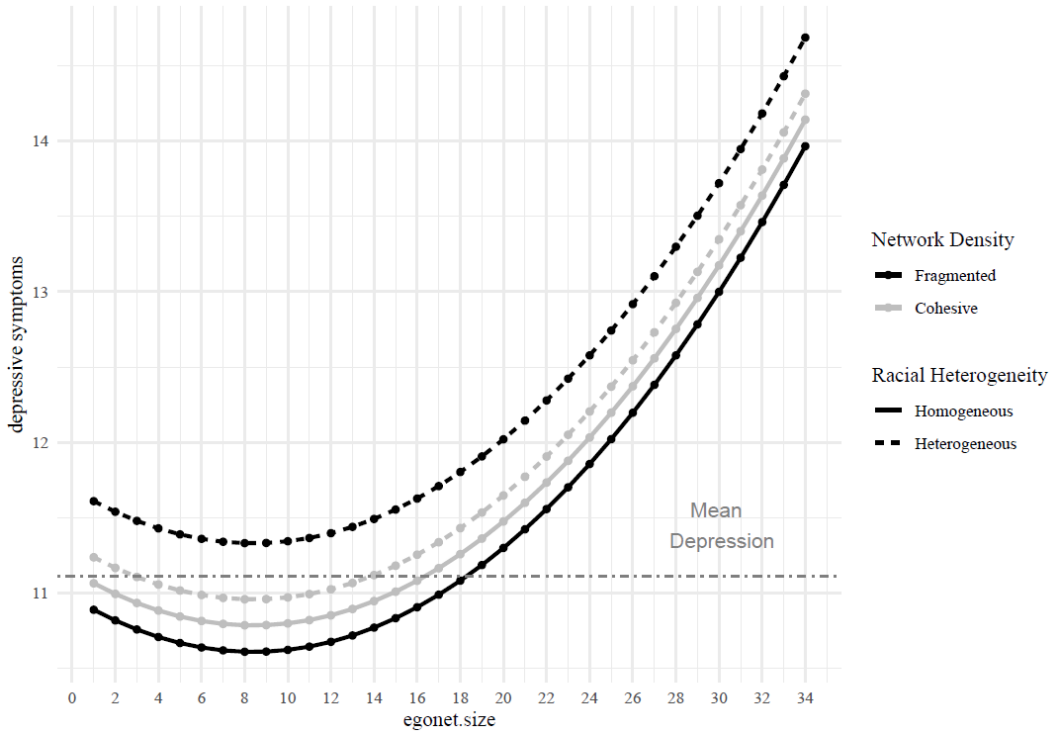

Figure 8: Predicted value of depressive symptoms across network size by density and racial heterogeneity.

Figure 8 plots the predicted values for depressive symptoms across ego network size, network racial heterogeneity, and network density. Network density and racial heterogeneity are split into high and low levels based on their respective interquartile ranges. For each variable the low category is based on the 25th percentile while the high category holds the variable at its 75th percentile. The low category for network density is labeled fragmented, while the high category is labeled cohesive. For racial heterogeneity the low category signals a racially homogeneous friendship group while the high category represents a more racially heterogeneous group of friends. The plot shows that the model predicts the lowest levels of depression for adolescents who have between 6 and 10 friends in their ego networks. The model predicts that as respondents gain friends, up to 10, their depressive symptoms will decline. This is consistent with control theory in that successful integration into social circles will allow for the development of self-esteem and support from these social groups. Next, the model predicts that after reaching beyond 10 friends, depressive symptoms will begin to rise. This is finding is consistent with role strain theory which argues that as respondents' immediate networks expand the social energy necessary to maintain quality relationships also increases to the point where it is no longer a deterrent but rather a source of stress. As for network density we see that the effect of belonging to a cohesive friendship group on depression is less prone to changes in racial heterogeneity than more fragmented groups which show a greater difference between racially homogeneity and heterogeneous groups. The difference between cohesive groups that are racially heterogeneous and cohesive groups that are racially homogeneous is much smaller than the difference between their fragmented counterparts. Additionally, the plot does not show support for hypothesis 3 that socially cohesive and racially homogeneous groups will have the lowest levels of depression. Instead, we see that fragmented groups with a high degree of racial homogeneity are at the lowest risk. This may be because lower levels of density are associated with a breakdown of normative

consensus and role expectations i.e. an absence of the social pressure to conform to norms. Without behavioral norms and expectations, it can be difficult for adolescents to feel like they have successfully integrated themselves into a supportive group. An alternative explanation is that the pressure to conform to particular norms can be harmful to one's health depending on the nature of the norms and the willingness of participants. In a context that is characterized by both racial homogeneity and high social cohesion the pressure to conform is likely immense. In a similar vein to role strain perhaps the intensity of this pressure to conform instead becomes yet another source of stress for adolescents.

4.6 Discussion

This chapter explores the relationship between network racial heterogeneity, density, and adolescents' depressive symptoms. Much of the literature on adolescent depression has covered racial differences and the ways gender determines mental health. But few studies have considered expanding ideas about the ways racial identity and network structural characteristics might contribute to this process. Literature on adolescent depression tends to focus on friendships and the ways gender and network structural characteristics change the flow and meaning of social cohesion. Network cohesion is shown to have a robust relationship to depressive symptoms in adolescence such that more cohesion is virtually synonymous with less depression. However, studies have shown that this effect is dependent on gender and more recently racial identity (Copeland and Kamis 2022) such that cohesion can be detrimental for girls in larger networks. This chapter contributes to this body of literature by examining the ways structural density and racial heterogeneity in networks influences depression in teens. The models presented speak to the ways racial representation in one's immediate friendship network is akin to social cohesion in that homogeneous networks are associated with a high degree of social support and conformity.

These variables also have a similar relationship to depression in that racial heterogeneity and low-density groups are both associated with an increase in depressive symptoms.

As far as policy to address adolescent mental health issues, there are two typical approaches taken in the US. First is a universal approach which attempts to service every student in generic ways. This approach has the least resistance, requires the least resources, but is also generally the least effective in addressing the issues it claims to combat. The second is selective programs that focus on students at increased risk of developing depression. This increased risk is determined by depression correlates such as suicide in the family, divorce, traumatic experiences, etc. This approach in general is more costly because it requires an individualized approach to policymaking but it is also much more effective than the universal approach adopted by most school administrators in reducing depression in adolescents (Bodicherla et al. 2021). The primary focus of this research is the comparison between racial heterogeneity and network density as independent sources of social cohesion and support. Policy initiatives may benefit from a deeper understanding of social cohesion and how it relates to depression. This may inform and increase the efficacy of universal approaches while also avoiding the issue of misclassification in individualized approaches by incorporating more information into assessments.

As a result of academic tracking and administrative policy making schools are often highly segregated spaces (Lewis and Diamond 2015). School administrators that show enthusiastic support for affinity groups and extracurriculars such as black student unions, gay straight alliances, etc. might contribute to bringing out the positive side of racial homophily into schools.

4.7 Conclusion

This chapter delt with various conceptualizations of social integration. Network density for example is a proximate measure of social cohesion, however adolescent depression may depend on social support and successful conformity which density may not effectively capture. Literature generally considers network density to be related to these concepts. However, the structural characteristics of networks are unique measures of social organization that contribute to adolescent depression in unique ways. For instance, Copeland and Kamis 2022 found that the effect of network density on depression was moderated by gender and race because peer network structures differ across these demographic categories e.g. white girls tend to have the highest levels of cohesion and are impacted differently by fluctuations in network density. Predominantly white samples may skew the effect of network structural characteristics on depression for adolescences of color. Add Health's weighted sample statistics should account for this limitation however it is still important to note because I do not split the sample by gender and instead include it as a simple control. This may potentially skew results such that the independent effects of variables in the model may show significant changes if placed along gendered lines.

In addition to gender, the variable racial heterogeneity compares the number of racial groups in one's school to those present in their ego network. This study however, does not control for school level heterogeneity in the models presented. This may have a significant impact on the results because a person who has high heterogeneity relative to their school may not belong to a meaningfully heterogeneous network. Take for example, a school containing only two racial groups and students who have friends of both racial identities. Those students should not be considered the same as students attending schools with much more racial diversity. Further there is likely a difference in the level of heterogeneity in friendship groups across racial groups. Black students are known to put considerable effort into building homophilous connections. This means

that we can expect to see black students appearing to have less heterogeneous friendship networks regardless of school climate. Separating the sample by race may offer a solution to this issue of school level heterogeneity and the ways it impacts adolescent friendship formation.

5. Conclusion

Sociological literature on adolescent experiences with violence and health regards schools as one of the primary social contexts within which teens develop their behaviors and expectations. Both of which affect their individual outcomes in health and delinquency. One of the goals of this dissertation was to provide evidence for the possibility that racial groups may require differential policy to reap the benefits of programs meant to decrease health disparities. I began by identifying school environments and adolescence as a critical period in the life course. This research explores a myriad of ways that network interventions may contribute to securing safer and healthier outcomes for all teens. Together, these three studies build a case for policy makers to consider more individualized approaches to delinquency, victimization, and depression while continuing to support school level initiatives as the concurrent implementation interventions at both the school and individual level will lead to the greatest returns on health and victimization outcomes.

Social Network literature has long identified integration as an important dimension of network analysis that contributes to the formation of respondents' perceptions of support, self-esteem, and their behavioral norms. Social control theory argues that social integration is a powerful determinant of both delinquent behavior and mental health disorders. Research focused on the prevention of crime and delinquency in particular looks to control theory to provide theoretical support for their claims that delinquency can be reduced via control mechanism such as developing self-control or reducing impulsivity as well as fostering positive connections with institutions such as schools or family. Missing from much of this literature are policy recommendations that appropriately capture the full scope of victimization during adolescence. In other words, most policy initiatives regarding crime and victimization in adolescence only focus

on a single dimension of the issue at a time and that dimension is typically some form of delinquent behavior.

In my first study I find that network characteristics determine the probability of victimization in adolescence, specifically network degree and peer delinquency. As the number of friendship nominations increases the probability of victimization decreases but the rate of decline in moderated by peer delinquency such that highly delinquent friendship groups remain at a greater risk of victimization regardless of the number of nominations they receive. Contrary to the predictions made in social learning theory, the results in chapter 1 showed that being embedded in a highly delinquent friendship group does not increase the risk of victimization above and beyond the independent contributions of peer delinquency. In other words, the protective effect of social integration supersedes the deleterious effects of delinquent involvement on the probability of victimization. Policy initiatives geared towards reducing victimization can construct effective strategies around increasing the opportunities for contact for adolescents as well as developing expectations for more prosocial behaviors despite the normative nature of delinquency during adolescence. In the past policy makers have focused on preventing delinquency with initiatives like the functional family therapy program. While these programs are effective at reducing delinquency and thus the probability of victimization, they leave out the population of non-delinquent teens who are victimized, albeit at a lower rate than their delinquent counterparts. Rather than focusing solely on the most at risk, school policy that approaches the issue of violence from multiple angles has the greatest chance of reducing victimization. Evidence in chapter 1 strongly suggests that increasing student social integration via administrative policy as well as reducing delinquency in schools will be the most effective way to reduce victimization in schools.

In the chapter that follows, I look away from the ways social integration might contribute to the prevention of such outcomes and instead consider how race and experiences with violence may forecast stress trajectories from adolescence into young adulthood. Medical sociological scholarship on health disparities often takes a life course approach because this perspective asserts that age-patterned exposure, sensitive periods, and stress proliferation over time affects inequality in health. These studies, however, rarely consider that the heath processes surrounding stress might differ by race. One of the most robust findings in medical sociology is the presence of black-white health disparities. In chapter 2 I show that the stress trajectories of black respondents are not meaningfully impacted by victimization. This is counter intuitive as stress should continue to appear in biomarker data as stress-induced inflammation drives up blood pressure, etc. This is the concept of cumulative disadvantage. However, the data supports predictions made by both fundamental cause theory and the attenuation hypothesis. Together these theories suggest that there is a critical mass of stress our bodies can efficiently process before losing the ability to handle new sources of stress such as victimization and that discrimination is a chronic stress that contributes to people of color arriving at this critical threshold incredibly early in the life course. The evidence produced in chapter 2 suggests that black respondents are well past the point of attenuation by the time they reach adolescence because the probability that they will have risky levels of stress into adulthood is not impacted by something as traumatic as violent victimization. This coupled with the fact that victimization does change stress for other racial groups suggests a unique stress process for black respondents. Racial minorities who are chronically exposed to racial discrimination may become inured to new sources of stress, on a biological level.

In my second study I explore the stress trajectories of adolescents as they enter young adulthood and how victimization affects stress processing. I found that black individuals are

much less impacted by the negative stress victimization generates than any other racial group. Victimization in general greatly increased respondent's allostatic loads into adulthood. However, I find that black respondents are likely to have high allostatic loads regardless of whether they experience victimization or not. These findings contribute to the fields of race and ethnicity and medical sociology by illuminating the unique stress processes that exist between racial groups. The findings also suggest that racially conscious care and prevention strategies are necessary to effectively address the health consequences of victimization and possibly other forms of violence.

In this dissertation I investigated several relationships between race, stress, and both physical and mental health outcomes. I apply social control theory to show that social integration into institutions and friendship networks is a strong deterrent to delinquency and a stimulant for better health outcomes. In my third and final chapter I explore the relationship between racial homophily, social cohesion and depression during adolescence. The model predicts that fragmented and heterogeneous groups will have the highest level of depression while fragmented homogeneous groups will have the lowest levels of depression. Considering the nature of the group's adolescents are embedding themselves provides considerable insights into avenues of intervention for preventing depression. Theories of social control, for example, expect that integration will lead to better health outcomes and lower depression. However, when that integration is the result of inherently segregating policies such as academic tracking that filter students into particular groups especially along the lines of race (Lewis and Diamond 2015) it is unlikely to provide any kind of protection for the adolescence involved. Chapter 3 suggests that social cohesion and racial homophily have functionally separate mechanisms of support that can lend themselves to reducing.

Given the importance of research concerned with reducing violence and depression in adolescence, it is critical to address limitations to such scholarship so that policy

recommendations can be as successful as possible. To start, the Add Health study data from wave 1 is nearly 30 years old meaning it encompasses a generation of former adolescents that may no longer be representative of the social experiences of modern teens. For example, many social relationships for today's youth happen across online platforms, sometimes without ever meeting face to face. The unique social processes occurring in online platforms and in person interactions are not distinguished in the Add Health data. In addition to the study's age, it lacks important information about respondents' experiences with discrimination. Fundamental cause theory argues that discrimination is at the root of racial health disparities however in add health it does not specifically ask if respondents were discriminated against because of their race, only if they felt they had ever been discriminated against, which most people answer yes to. A more parsimonious variable would have built a stronger case for fundamental causes and racial differences in health outcomes presented in this dissertation.

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