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**DISADVANTAGE AND SOCIAL RELATIONS:
SHORT- AND LONG-TERM EFFECTS OF STRATIFICATION IN SOCIAL
RELATIONS DURING ADOLESCENCE**

A Dissertation in
Criminology
by
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ABSTRACT

Disadvantage has received much attention within the fields of criminology and education as scholars have sought to understand why individuals from lower socioeconomic backgrounds have poorer outcomes (Cohen 1955; Hagan 1992; Coleman 1959). It is well documented that social ties during adolescence are important for the development of human and social capital, have important consequences for adolescent behavior, and can affect adjustment in young adulthood. This dissertation seeks to advance our understanding of this topic by examining social relations among adolescents as a potential mediator of the effects of disadvantage, despite adolescent social relations being regarded as a critical in adolescents' daily lives and important contributor to their future success.

Using longitudinal social network data from the PROSPER Peers project, I find that disadvantage has an effect on four measures of social relations: in-degree, Bonacich centrality, reciprocity, and stability. The results from this dissertation indicate support that among the reasons for this disparity in social relations are three types of factors: school, family, and individual.

Additionally, this dissertation empirically examines the consequences of the disparity in social relations between financially disadvantaged adolescents and non-disadvantaged adolescents. The results demonstrate that financially disadvantaged adolescents are more likely than non-disadvantaged adolescents to have peers who are more disadvantaged and to have peers who engage in higher amounts of delinquency, and that popularity mediates these relationships. Next, I find that the disparity in social

relations, and the disadvantage and delinquency of friends, mediates the relationships of disadvantage and delinquency and school instability.

Finally, a growing field of research is examining the *long-term* effects of adolescent friendships, such as how the development of socioemotional traits during adolescence may help to explain adulthood economic, educational, and health behaviors (Bowles, Herbert, and Osborne 2001; Cunha et al. 2006). I extend this area of research by demonstrating that popularity is a significant mediator of the relationship between disadvantage and educational attainment in young adulthood.

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Chapter 1

Social Class, Social Relations, and Delinquency

Disadvantage has received much attention within criminology as scholars have sought to understand the class-crime/delinquency relationship (Shaw and McKay 1942; Cohen 1955; Merton 1968; Hagan 1992). However, there has been little empirical research devoted to exploring the indirect effects of disadvantage. Specifically, I seek to advance our understanding of this topic by examining social relations among adolescents as a potential mediator of the effects of disadvantage, despite adolescent social relations being regarded as a critical in adolescents' daily lives and important contributor to their future success. This dissertation builds on existing knowledge by examining how one's social class background indirectly affects adolescent delinquency and young adulthood adjustment through one's adolescent social relations.

Criminology has historically places a great deal of emphasis on the influence of friends on delinquency (Warr, 2002). Differential association theory argues that one's involvement in delinquency/crime depends on the balance of one's associations, and that individuals who associate more with delinquent individuals than non-delinquent individuals will tend to be delinquent (Sutherland 1947). Subculture theory argues that adolescents, specifically financially disadvantaged adolescents, who fail to gain conventional status will create alternative norms and values to measure themselves and join a group of peers who share those standards (Cohen 1955). Rather than attempting to achieve the middle-class ideals, they determine their sense of worth and status by

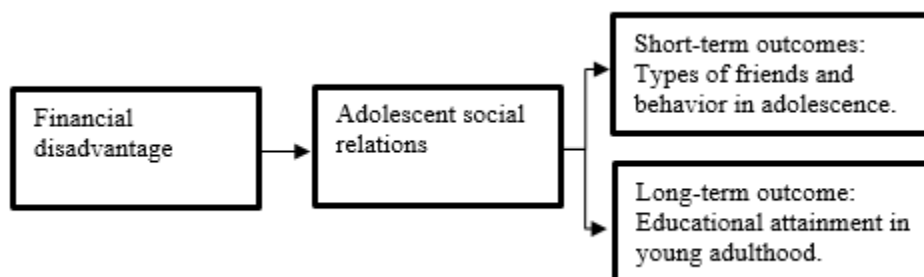
delinquent actions, such as engaging in property crime and/or violence. Thus, according to both differential association and subculture theory, one's involvement in delinquency/crime is largely shaped by the peers that one associates with. In other words, the type of friends matter for whether an adolescent engages in delinquency, in that, if an adolescent is friends with other delinquents he/she is more likely to engage in delinquency.

This dissertation also draws insights from the literature on education and adolescent development, which has examined how adolescent friendships contribute to the cognitive and emotional development of adolescents. Such research has also considered how adolescent social relations matter for young adulthood outcomes, such as income. This dissertation examines whether adolescent social networks are pushing financially disadvantaged adolescents to the periphery of the social networks, and, if so, how this network structure may have a detrimental impact upon these disadvantaged adolescents.

Figure 1.1 presents a path diagram of the empirical aims of this dissertation. At the beginning of each empirical chapter, I will present a detailed version of Figure 1.1 to demonstrate how that chapter fits into the overall dissertation. Drawing from criminological and educational theories, I focus on three primary research questions. First, what is the relationship between disadvantage and social relations, and what potential mediators might account for that relationship? Second, does the disparity in social success between adolescents from a disadvantaged background and those from a non-disadvantaged background partially mediate the relationship between social class and short-term consequences of delinquency and school instability? Third, does the

disparity in social success between disadvantaged adolescents and non-disadvantaged adolescents partially mediate the relationship between disadvantage and adjustment in young adulthood?

Figure 1.1: Path Diagram of this Dissertation.



This chapter is organized in the following manner. The first section reviews the class-crime/delinquency relationship within criminology and discusses the need to consider indirect effects of disadvantage. The second section discusses the theoretical perspectives and existing knowledge on stratification and adolescent outcomes within both criminology and education. This section elaborates on the type of factors that are potential mediators of the class-delinquency relationship, as examined in this dissertation. Specifically, this section reviews research on the school, family, and individual attributes that may be related to adolescent social relations and behavior. The third section covers the importance of and research on adolescent friendships and social relations. Specifically, this section describes the short- and long-term effects of adolescent social ties. The fourth section discusses how longitudinal social network data are uniquely equipped to answer this dissertation's research questions. This chapter ends with an overview of the current project.

Disadvantage within Criminology

In the early years of criminology, the discipline was heavily focused on social class, with many theories proposing an inverse relationship between class and criminality (Shaw and McKay 1942; Cohen 1955; Merton 1968; Wolfgang and Ferracuti 1967; Willis 1977). Many of these theoretical arguments seemed to be supported when relying on official crime statistics. However, with the rise of self-report data, the class-crime relationship became murky, with studies using self-report data failing to demonstrate the expected relationship between social class and criminality. Tittle et al. (1978:645) questioned the actual evidence of a class-crime relationship and argued that there are issues of representativeness within the studies and that, due to the various methodologies, it is difficult to reach any meaningful conclusions. Tittle et al. (1978) concluded that either there never was an inverse relationship between social class and crime, or that the class-crime relationship has become less important in the decades following the rise of criminology.

However, Braithwaite (1981) questioned the work by Tittle and colleagues (1978), and claimed that neglected evidence suggests that criminology should not be so fast to call the class-crime relationship a myth. Braithwaite (1981:47) argued that the operationalization of a class-crime relationship used among the studies reviewed by Tittle and colleagues (1978) led to a biased conclusion, and that there is evidence that self-report studies tend to exaggerate the proportion of middle-class delinquency. Similarly, challenging the conclusion of Tittle and colleagues (1978), Clelland and Carter (1980:331) argued that the existing research on the class-crime relationship is bound by

several empirical limitations and that future research “need[s] more careful thinking about crime and more insightful thinking about class.” As criminology became more systematic and precise, Hagan (1992:11-12) urged researchers to “acknowledge the variety and the complexity of the relationship between class and crime.”

Dunaway, Cullen, Burton, and Evans (2000:625) stated, in line with Hagan’s (1992) arguments, “...that criminologists should continue to refine the conceptualizations, measures, and research techniques used, and perhaps [the] indirect ways that class affects crime.” This dissertation seeks to advance research on the class-crime relationship by examining the indirect effects of class on short- and long-term outcomes via social relations during adolescence. In other words, does social class background indirectly affect adolescent delinquency and young adulthood adjustment through adolescent social relations?

Theoretical and Empirical Background from Criminology and Education

To answer the research questions in this dissertation, I integrate insights from both the criminology and education literatures. Within criminology, the relationship between class and crime is most relevant to subcultural theories. Specifically, subculture theories argue that financially disadvantaged adolescents are differentially equipped to gain status in educational institutions as compared to adolescents from families of higher socioeconomic backgrounds (Cohen 1955). Cohen’s ideas were clearly evident in Willis’ (1978) ethnography of British working-class boys. The boys created their own counterculture that celebrated fighting and conflict with the law, mocked other students

who did well in school, and rebelled against teachers. Several of the working-class ‘lads’ dropped out of school and took manual-labor jobs. Despite easily finding a first job, many of the ‘lads’ soon left their working class positions and were unable to find new employment. Hagan (1997) observed similar educational and employment difficulties among Canadian youth. Adolescents from working-class backgrounds were more likely to engage in delinquency, have contact with the police, and drop out of school. The former delinquents were often unemployed years later, and reported more feelings of hopelessness and despair. Hagan (1997:133) described the delayed feelings of despair as a “sleeper effect,” resulting from “subcultural involvement in delinquency with the structural consequences of prematurely leaving school and unemployment.”

A key component of subcultural theories is how working-class youth act in school, and especially whether or not they drop out. Cohen (1955) argued that relationships with teachers, getting into trouble, and educational aspirations may affect how adolescents succeed. Within schools, adolescents are held to and measured by middle-class standards, making it unlikely that disadvantaged adolescents will be able to succeed. However, though these theories specify educational achievement, it is important to clarify here that there is more to adolescent status than just academic success. Specifically, social relations among students are a critical aspect of success that has not received enough empirical attention within criminology.

The importance of the number of friends and the type of friendships one has during adolescence plays multiple causal roles for social competence (Parker and Asher 1987). Friendships contribute greatly to the development of adolescents both cognitively and emotionally, helping them learn cooperative skills while also providing sources of

comfort in times of stress. “Student-student relationships are an absolute necessity for healthy cognitive and social development and socialization” (Johnson 1980:125).

Adolescents self-report that they spend more time talking to their peers than any other single activity and that they are happiest when doing so (Csikszentmihalyi, Larson, and Prescott 1977). Additionally, research has demonstrated that social support helps adolescents deal with life stress (Cassell 1973; Caplan 1974; Dean and Lin 1977). From a social capital perspective, having in-school friends allows adolescents to access additional resources, such as study groups, and receive help navigating the school context (Crosnoe, Cavanagh, and Elder 2003).

It is evident in the literature that adolescent friendships are non-randomly formed, based on individual characteristics and guided by opportunities and attractiveness (Rivera, Soderstrom, and Uzzi 2010; Crosnoe 2000). One of these individual characteristics is the socioeconomic background of the adolescent. My first task will be to determine a baseline association between disadvantage and friendship formation. Next, I go further to advance understanding of the nature of this relationship in terms of the mediators that contribute to it. To understand how socioeconomic background may be influencing friendship formation, it is important to discuss potential mediators the type of factors that may contribute to the social component of adolescent status. The formation of, and the consequences of, these social ties is the focus of the current dissertation.

Researchers have identified a number of factors that matter for the social relations of adolescents. Coleman (1959) explained that adolescents take academic factors into account in choosing their friends, but place priority on topics outside of academics as

well. The academic component includes factors such as school performance and attitudes towards school.

In addition to school-related attributes, family characteristics such as family relations, parental communication, family home condition and location, and parental school involvement may have important roles in the selection of friends. Socioeconomic status is also an important predictor of family relations, parental communication, family home condition, family location, and parental school involvement. Further each of these variables can influence adolescent friendship formation, therefore may be mediating the relationship between disadvantage and social success. Parents influence friendship formation by monitoring youth activities and the type of peer-interactions that they have (Crosnoe 2000; Parke and Bhavnagri 1989), and communicating the traits of positive peer relations to their children. Even as adolescents increasingly spend time outside of their parents' monitoring, children often learn from their parents' judgments about who they should spend time with (Cohen 1955). Related to this, economic disadvantage alters how parents interact with and monitor their children (Crosnoe, Mistry, and Elder 2002; Thomson, Hanson, and McLanahan 1994; Elder, Nguyen, and Caspi 1985; Elder et al. 1992). Home condition and location may also play an important role in the selection of friends. Even as young as sixth grade, adolescents are able to distinguish peers' class by characteristics of their family and the home that they had (Cohen 1955). Additionally, parental involvement in the child's school and community can help positively shape children's social competence (Parke and Bhavnagri 1989; Hill and Craft 2003; Hill and Taylor 2004). However, parents of a lower socioeconomic status are less likely to be

involved in school-related activities than parents of a higher socioeconomic status (Hill and Taylor 2004:162).

Finally, individual attributes, such as mental and physical health, attractiveness, bullying, and confidence/nervousness may play important mediating roles in the relationship between disadvantage and social success. Physical and mental health are important when considering how adolescent friendships develop (Bronfenbrenner and Morris 2006; Simpkins Schaefer, Price, and Vest 2013), and health in adolescence has been shown to be associated with one's social class (Starfield, Riley, Witt, and Robertson 2002). Additionally, research has demonstrated that adolescent culture places high importance on attractiveness (Coleman 1959; Alder and Alder 1998), which also may be associated with disadvantage.

In sum, many of the factors that affect adolescent friendships (Crosnoe 2000:381) are related to an adolescent's socioeconomic background and, thus, may be constraining financially disadvantaged adolescents' ability to socially succeed. It is clear that three categories of potential mediators emerge within the literature: school factors, family factors, and other individual attributes. The current project will examine five variables from each of these three groups to determine how each grouping of variables may mediate the relationship between disadvantage and social relations. This is an important area of research that deserves further empirical attention as decades of research has demonstrated how important friendships are during adolescence.

Adolescent Friendships and Social Relations

Friendships and social success can be considered in a number of ways. I am going to distinguish between two main aspects of adolescents' position or status in their schools' friendship networks: popularity and quality of friendships. Popularity is their prominence in terms of the extensiveness of their connections. I am going to look at that in two ways. First, I am going to examine how many friendship choices they attract from other students. Second, I am going to use an indicator, called Bonacich centrality, which weights the friendship connections by the prominence of the friends who choose them. The second index gives a richer sense of their standing in the larger hierarchy of the schools' friendship networks.

Beyond popularity, the quality of the friendships should also be considered as they have been shown to impact feelings of belonging (Hartup 1996). Berndt (2002:7) described friendship quality as "high levels of prosocial behavior, intimacy, and other positive features, and low levels of conflicts, rivalry, and other negative features." Researchers have examined the consequences of a number of indicators of friendship quality. Giordano et al. (1998) found greater levels of intimacy with adolescent friends to be related to a number of adulthood outcomes, including higher self-esteem and marital satisfaction. Allen, Schad, Oudekerk, and Chango (2014) found adolescent pseudomature behaviors (e.g. delinquent acts and precocious romantic activity) to be inversely related to quality of adolescent peer relationships as well as young adulthood adjustment. The authors suggest that "pseudomature behaviors might lead to future difficulties because these pseudomature behaviors replace efforts to develop positive

social skills and meaningful friendships and thus leave teens less developmentally mature and socially competent over time” (Allen et al. 2014:11). Also, “[e]stablishing oneself as a socially desirable companion with one’s adolescent peers appear[s] most strongly predictive of qualities of relationship functioning in adulthood” (Allen, Chango, and Szewedo 2014:11).

Additionally, friendship mutuality and friendship stability are important protective factors against behavioral, emotional, and/or social problems in adolescence (Bukowski, Hoza, and Boivin 1994; Waldrip et al. 2008). “Close friendships provide adolescents with developmentally salient opportunities to improve their social skills and social competence” (Smetana, Campione-Barr, Metzger 2006; Collins and Steinberg 2005). Thus, due to the importance of reciprocity and stability upon one’s self-esteem and belonging, qualitative features of friendships should be considered in addition to number of friends and overall popularity.

Reciprocity is an important aspect of friendship quality to consider because mutual friendships have greater importance for the development of adolescents (Bukowski et al. 1994), while failed one-way ties (i.e. non-mutual friendships) may lead to adverse effects, such as lower self-esteem, embarrassment, and/or depression (Rivera, Soderstrom, and Uzzi 2010). Vaquera and Kao (2008) argued that friendship reciprocity is especially important when considering one’s social support during adolescence, concluding that friendship reciprocity has strong effects on feelings of school belonging and educational outcomes. Cauce (1986) found that the number of reciprocated friends in one’s social group has an effect on school and peer competence.

The stability of friendships is another important aspect of friendship quality. Stable friendships during adolescence have important ramifications for self-esteem and altruism (Berndt 1982). Additionally, stable friendships can offer feelings of closeness, validation, and acceptance ((Bukowski et al. 1994). Bukowski and colleagues (1994) went on to explain that there is a strong association between friendship stability and quality, and that a high turn-over in friendships will also mean friendships of lower quality. Similarly, transitory friendships are going to be less meaningful and helpful than enduring ones.

Adolescent Friendships and Short-Term Behavior

The second topic I address in this dissertation is the role of adolescent social relations on near-term outcomes, including delinquency and school instability. This section covers the relationship between friendships and delinquency, and the next section will discuss school instability. Friendships and social success may have important ramifications for antisocial behavior, such as delinquency, increased interaction with delinquent peers, and school instability. Crosnoe (2000) explained that the structure of one's social network can influence and impact the individuals beyond the characteristics of the network members. Similarly, studies of "...conformity to group pressure suggest that children's social networks might increasingly influence their attitudes and behaviors, as well" (Crosnoe 2000:380; Berndt 1979; Costanzo and Shaw 1966). If adolescent social networks are pushing financially disadvantaged adolescents to the periphery of the social networks, then this network structure may have a detrimental impact upon these

disadvantaged adolescents. Indeed, the field of criminology has multiple theoretical arguments as to how patterns of social network structure and individual social relations may influence delinquency.

According to theorists such as Merton (1938), Cohen (1955), and Cloward and Ohlin (1960), disadvantaged adolescents who fail to gain conventional status will instead create alternative norms and values to measure themselves (Davies 1999). Rather than attempting to achieve the middle-class ideals, they determine their sense of worth and status by delinquent actions, such as engaging in property crime and/or violence. “[Y]outh form oppositional groupings built around delinquent behavior as a means of counteracting status anxieties and frustrations” (Hagan 1997:120). In other words, disadvantaged adolescents who struggle to socially succeed may be more likely to turn to delinquency and delinquent peers as a response.

“According to [differential association], youth learn criminality in primary groups, such as groups of friends, but these groups are shaped by social organization” (Crosnoe 2000:381; Sutherland 1947). Thus, based on the stratification of adolescent social networks that is evident in the literature, and drawing from the two criminological theories discussed above, it is likely that social status is an important mediator of the relationship between disadvantage and individual delinquency, as well as disadvantage and having delinquent peers. Also, it is rather clear how differential association theory would argue that one’s social relations may lead to delinquent involvement. First, differential association theory specifies that one’s involvement in delinquency/crime depends on the balance of one’s associations, and that individuals who associate more with delinquent individuals than non-delinquent individuals will tend to be delinquent.

Thus, according to the theory, one's involvement in delinquency/crime is largely shaped by the peers that one associates with. In other words, the type of friends matter for whether an adolescent engages in delinquency, in that, if an adolescent is friends with other delinquents he/she is more likely to engage in delinquency.

Within research of adolescent social networks, it is evident that aggressive and/or delinquent children tend to be on the periphery of their social networks (Coie, Dodge, and Coppotelli 1982; McGuire 1973). Thus, if adolescents from disadvantaged backgrounds are forced to withdraw to the periphery of their social networks, then they are likely to be restricted in what individuals they are able to select as friends, while arguably are more likely to come into contact with other rejected adolescents (Light and Dishion 2007). In other words, they are more likely to associate with violent and/or maladjusted peers than adolescents who are central within their social network. So, because disadvantaged adolescents will be less likely to socially succeed than advantaged adolescents, disadvantaged adolescents should be more likely to be in contact with delinquent and/or violent peers. Furthermore, due to their restricted pool of friends to choose from, disadvantaged adolescents should be more likely to form their primary friendships with these delinquent and maladjusted peers.

Adolescent Friendships and School Instability

Next, I address another important consequence of one's social ties, school instability. Elements of social integration are at the forefront of theoretical research of student mobility and dropout within the field of education. Wehlage et al. (1989)

highlighted the importance of the social dimension of school belonging, arguing that social ties, in addition to academic performance, affect one's likelihood of dropping out of school. Parker and Asher (1987) had a similar argument, concluding that social success during adolescence increased the likelihood of graduating from high school. Wehlage et al (1989) went on to explain that disadvantaged students, specifically, may need additional help in both social engagement and academic engagement to succeed in school. Therefore, as financially disadvantaged adolescents are unlikely to succeed socially, and are more likely than non-disadvantaged adolescents to experience school instability, it seems that social relations may be an important mediator of the relationship between disadvantage and school instability.

While most research examining school withdrawal, especially in criminology, focuses solely on school dropout as an outcome, Rumberger and Larson (1998) stated that school mobility is important to consider, as well. In fact, Rumberger and Larson (1998) concluded that school mobility may be considered a risk factor for future dropout, as students in their sample who transferred schools just once between 8th and 12th grade were twice as likely as students who did not transfer schools to experience future dropout. Thus, rather than only considering school dropout as a consequence of educational disengagement, school dropout *and* school mobility (i.e., school instability) should be considered.

Adolescent Social Relations and Adulthood Adjustment

The final topic I address in this dissertation is how adolescent social relations are related to educational attainment in young adulthood. While school grades are an obvious and well documented mediator, recent research has suggested that adolescent social relations may also help explain the relationship between disadvantage and young adulthood adjustment. As discussed previously, adolescents from a disadvantaged background are less likely to succeed socially within school. Additionally, it is evident in research that disadvantaged adolescents are less likely to attain a college degree (Sewell and Shah 1967). Thus, adolescent social relations may be partially mediating the relationship between disadvantage and college attainment. “If peers contribute substantially to the socialization of social competence, it follows that low-accepted children might become more vulnerable to later life problems” (Parker and Asher 1987:358).

A growing field of research is examining the *long-term* effects of adolescent friendships, such as how the development of socioemotional traits during adolescence may help to explain adulthood economic, educational, and health behaviors (Bowles, Herbert, and Osborne 2001; Cunha et al. 2006). Several studies have shown that popularity and friendships during adolescence are connected to outcomes in young adulthood, such as life adjustment (Bagwell, Newcomb, and Bukowski 2008) and income (Shi and Moody 2017). Shi and Moody (2017) found that each additional friendship nomination during adolescence yields an earnings increase of 1.7% fifteen years later. This “popularity effect” is after accounting for numerous factors that might drive both

popularity and adult workplace success, such as educational success and personality traits (Shi and Moody 2017).

This finding is consistent with labor market research indicating that employers are valuing socioemotional traits like collaboration and creativity beyond standard measures of cognitive ability (Shi and Moody 2017). Sawyer (2017) discussed that “group genius” has become widely valued in today’s labor market; that while previously individual creativity and intelligence were most valued, recent research is concluding that collaboration is what drives innovation and success.

Connecting this back to this popularity effect, having more adolescent friendships may help individuals develop skills useful for workplace collaboration. Navigating between numerous friendships may help an individual later in life when interacting with various workgroups. Also, easing tensions between friends may help one in the future when navigating tensions between colleagues (Shi and Moody 2017). “Interactions with friends can serve as a foundation for egalitarian relationships with colleagues, neighbors, or spouses in adulthood” (Berndt 1982:1448; see Piaget 1932; Youniss 1980). Because of consistent similarities between labor market practices and educational practices (Seltzer and Bentley 1999; Craft, Jeffrey, and Leibling 2001), it seems likely, then, that adolescent social relations may have important ramifications for success in the university setting. So, similar to the findings for income (Shi and Moody 2017), popular adolescents and/or adolescents with higher quality friendships may be provided with an advantage in succeeding in college due to the development of socioemotional traits.

Though definitions of student success in college can vary, “[m]any consider degree attainment to be the definitive measure of student success” (Kuh and colleagues

2006:5). While I am not arguing that this definition of student success is better or worse than other definitions (e.g., college persistence, degree satisfaction), I will use degree attainment as the sole measure of educational success in my dissertation. Understanding the factors that contribute to educational attainment is an important area of research that has received a lot of attention.

Interest in attending college is near universal (Kuh and colleagues 2006), but adjustment to and succeeding within college is dependent on numerous factors. Though academic ability is important, less than 25% of the students who start college and fail to complete their degree are dismissed for poor academic performance (Kuh and colleagues 2006), indicating that most of the students leave for reasons other than grades. Tinto's (1975) theoretical framework argues that both academic and social integration is important for college success. While Tinto's (1975) propositions are among the most cited and most prominent theoretical arguments in this area of research (Braxton, Sullivan, and Johnson 1997), only a few of them have received empirical support (Braxton, Milem, and Sullivan 2000). One of the supported propositions is that students' entry characteristics (e.g., family background and academic ability) affect their initial commitment to college, which influences subsequent levels of commitment (Braxton, Milem, and Sullivan 2000).

However, Braxton and colleagues (2000) explained that additional empirical attention is needed for the construct of social integration. Relatedly, there is some empirical evidence that social integration is a stronger predictor of college persistence than academic integration (Braxton, Sullivan, and Johnson 1997). "The most important criterion for staying in college is the student's social support network" (Skahill 2002:39;

Rosenthal 1995). Additionally, many researchers argue that in order for students to be successful in college, they must learn to negotiate new environments and interact with unfamiliar people (Kuh and Love 2000). Empirical research in this area has focused on one's social networks while in college, demonstrating that friendships with other students and with faculty members matter for college success (Skahill 2002). However, as mentioned above, friendships and social acceptance during adolescence pave the way for one's ability to successfully socialize in adulthood (Berndt 1982). Therefore, I argue that additional empirical attention that links adolescent social acceptance to young-adulthood educational attainment is needed. This is especially true for the relationship between disadvantage, adolescent social status, and educational attainment. If most college students that leave school are doing so for reasons other than academic performance, and the ability to socialize is one of these factors, then adolescent social acceptance may be an important mediator of disadvantage and educational attainment.

Additionally, it is unclear if peer acceptance is the only aspect of social relations that affects future adjustment, or if other social measures (e.g., stability, reciprocity), as well as the type of friends (e.g., levels of disadvantage and/or delinquency) also have an impact. Staff and Kreager (2008) highlighted the importance of considering the type of friends one has when examining the effects of friendships. Staff and Kreager (2008) explained that friendships are generally linked to positive outcomes, such as an increase in the likelihood of completing high school. However, drawing from subcultural theories of juvenile delinquency, they argued that examining the *types* of friendships that one has may have important consequences, especially for disadvantaged adolescents. Staff and Kreager (2008) demonstrated that disadvantaged adolescents with high status in violent

groups are at a greater risk of dropping out of high school, and that status within violent groups during adolescence reduces the likelihood of college completion. In other words, it is evident that the type of friends one is socially accepted by may be important when considering the overall effects of friendships. Therefore, my research will not only examine social ties, but also the *type* of social ties disadvantaged and non-disadvantaged adolescents are forming.

However, there are very few studies examining these relationships. The limited amount of research on this topic may be a result of prior methodological or data limitations; the longitudinal social network data used in this research is uniquely equipped to address the relationship between adolescent social relations obtaining a university degree.

Longitudinal Social Network Approach

Longitudinal social network data are necessary to effectively examine if financially disadvantaged adolescents are differentially equipped to compete socially in school. Social network data involve a theoretically or conceptually defined group of individuals and information on a relation between those individuals. “Networks are a way of thinking about social systems that focus our attention on the relationships among the entities that make up the system, which we call actors or nodes” (Borgatti 2013:1-2). *Longitudinal* social network data are especially important, as social networks are dynamic and consistently evolving over time. “One fascinating aspect of the social process is the continual realignment of groups, the migration of individuals from one

group to another...” (Cohen 1955:53). Thus, tracking social relations over time is necessary to determine what factors may be contributing to stratification within social networks. Utilizing longitudinal social network data allows me to assess all of the various aspects of social integration that the literature emphasizes: number of friends, popularity, the mutuality of friendships, and the stability of friendships. Using social network data, and being able to use social ties, also helps alleviate bias associated with self-reported popularity measures (Kreager 2007; Young, Barnes, Meldrun, and Weerman 2011). In other words, social network data provides directed friendship ties that identify which students are friends, and provide a direct method to measure friends’ characteristics and behavior.

The Current Project

As discussed above, it is well documented that social ties during adolescence are important for the development of human and social capital, have important consequences for adolescent behavior, and can affect adjustment in young adulthood. It is valuable, then, to consider theoretical arguments from subculture theories that adolescents from disadvantaged backgrounds are less likely than non-disadvantaged adolescents to be well integrated in their school-based social networks. If adolescent social success is important for both short- and long-term consequences, then it is important to ask, why are disadvantaged adolescents less likely to socially succeed? Thus, this is the first research question of my dissertation. My first task will be to determine a baseline association between disadvantage and friendship formation. Next, I go further to better understand

the nature of this relationship in terms of the mediators that contribute to it. The literature reviewed in Chapter 1 implies that the reasons for this lack of social success fall under three categories: school, family, and individual. In Chapter 3, I address this first research objective, examining the extent to which these three types of factors mediate the relationship between disadvantage and social relations.

Next, the second objective of this dissertation is to determine the effects of the stratification evident in adolescent social ties. Chapter 4 of this dissertation empirically examines these consequences in two parts. First, if financially disadvantaged adolescents tend to be less well integrated within their school-based social networks, then does this have an effect on the types of friends that they *do* have? Second, do these social patterns, and the types of friends gained, have a mediating impact on the relationships between disadvantage and delinquency and school instability? As previously discussed, subcultural theories of delinquency argue that disadvantaged adolescents who are poorly socially integrated will be more likely to become friends with other disadvantaged or maladjusted adolescents. Chapter 4 examines if financially disadvantaged adolescents have more disadvantaged and/or delinquent friends than non-disadvantaged adolescents. If so, I will then test if disparities in social measures mediate these relationships. Then, to address my second research question, I will examine if adolescent social relations, and types of friends, mediate the relationships of disadvantage and delinquency and school instability.

Finally, the third objective of this dissertation is to determine if adolescent social relations partially mediate the relationship between disadvantage and educational attainment. As discussed above, studies have shown that popularity and friendships

during adolescence are connected to outcomes in young adulthood, such as life adjustment (Bagwell, Newcomb, and Bukowski 2008) and income (Shi and Moody 2017). Additionally, there is a clear and persistent relationship between disadvantage and educational attainment. Though much of this relationship has been explained, I argue that another cause of this relationship is the lack of social integration of disadvantaged students during adolescence. Thus, Chapter 5 of this dissertation will empirically examine if adolescent social relations are partial mediators of the relationship between disadvantage and college attainment. Lastly, Chapter 6 will discuss the implications of this dissertation's main findings.

Chapter 2

Data and Measures

PROSPER Data

My dissertation will use social network data from the evaluation of the PROMoting School-community-university Partnerships to Enhance Resilience (PROSPER) longitudinal study (Spoth et al. 2007). This data set was collected using in-school surveys from two consecutive cohorts of adolescents in 28 rural and semi-rural communities in Pennsylvania and Iowa, with the populations of these communities, based on the 2000 census, ranging from 6,975 to 44,510 (Spoth et al. 2007). These communities were matched on school district size and location, and then half of the districts were randomly selected to receive an intervention program, with the other districts serving as the comparison condition. Eligible school districts that participated in the study contained between 1,300 and 5,200 students, with at least 15% of the students qualifying to receive free or reduced-cost school lunch, and at least 95% of the students in each school spoke English. Data collection began in the fall of the cohorts' sixth grade and continued in the spring of each year through twelfth grade, resulting in eight waves of data.

In-school data collection. Data was collected in classrooms by a member of the research staff during one class period without a teacher being present. The target sample was every student enrolled who spoke English and did not have severe cognitive

disabilities. Students who joined the participating school districts were added to the sample at the year of joining, while those leaving the school districts remained in the sample only for the waves that they were present. Students and their parents did have the option to opt out of the sample at each wave. The sample size consists of approximately 9,000 students at each wave, with participation rates averaging approximately 88% across all eight waves. The questionnaire asked students about a variety of topics, such as delinquency, substance use, family relations, and school bonding.

In addition to the importance of this being a longitudinal data set, this data source is well suited to my dissertation because it provides social network data. At each wave of data collection, students were asked to name up to two best friends and five additional close friends in their current grade and school. These friendship nominations were then matched to the student rosters, allowing researchers to create a full social network of the cohort, alleviating bias associated with self-reported popularity measures (Kreager 2007; Young, Barnes, Meldrum, and Weerman 2011). In other words, these questions produced directed friendship ties that identify which students are friends, and provide a direct method to measure friends' characteristics and behavior. Students, on average, named four friends per wave, and 82% of nominations were matched successfully to other students on class rosters. Friendship nominations could not be matched if nominations were not on the class roster or if there were multiple plausible names. One of the 28 communities did not allow collection of friendship data, so that community is excluded in my analyses.

In-Home Subsample. While collecting the in-school sample, a random subsample of 2,267 students from the first cohort were invited to participate in a longer interview

conducted at the student's home, which included interviews with the students and the students' parents. These in-depth interviews continued through grade nine (total of five waves of data). This in-home dataset is important for my dissertation because it includes additional variables of the students and the students' families, such as household location, household condition, and parental school involvement. Of the 2,267 students invited to participate, 980 (43%) participated in at least one wave (average of three waves per student). When using the in-home sample, I will be using waves 1 through 5. I compared mean disadvantage from the in-home sample to the in-school sample, and there are no statistically significant differences between the two samples.

Follow-up Subsample. Finally, the PROSPER Peers project includes follow-up interviews at approximately 24 years of age for a subsample of adolescents. These follow-up interviews are important for this dissertation as it allows for the examination of the long-term consequences of adolescent social relations, specifically related to educational attainment. The first empirical chapter of my dissertation will primarily use the in-home data set for the bulk of the analysis, as the in-home sample includes additional theoretically important variables that were not part of the in-school questionnaire. The second empirical chapter of my dissertation will primarily use the in-school sample as this chapter will be addressing type of friends and individual behavior across all eight waves of the sample. Finally, the third empirical chapter will use both the in-school sample and the follow-up sample. I will use the in-school data to create high school averages of popularity, stability, and reciprocity, as well as high school averages of control variables. Then, I will supplement this data with the follow-up data to use educational attainment as my dependent variable.

Measures

This section broadly describes the measurement of social and disadvantage variables used in this research. Drawing from the literature on how to best measure these concepts, detailed descriptions are included below and then descriptive statistics and brief descriptions are provided in each empirical chapter of the respective analyses.

Social Measures

In-Degree. In-degree centrality is the number of nodes (i.e., individuals) who nominated a respondent as a friend. In other words, when dealing with friendship data, in-degree centrality counts the number of friendship nominations that an individual receives from others (in-degree). In-degree centrality is an important indicator of an individual's standing within a social network, which has played a central role in research on adolescence social relations (Kreager and Staff 2009; Staff and Kreager 2008). Further, because it is based on other respondents' friendship choices, it is not subject to the biases of self-reported popularity measures. For this dissertation, I use in-degree centrality as an outcome variable in Chapter 3.

Bonacich Centrality. Bonacich centrality provides additional information that is relevant to one's overall popularity (Borgatti 2013). Bonacich centrality is a function of the prestige of the nodes that a given node is connected to. In other words, each tie of a given node is weighted based on the centrality of the people that the node is tied to. For this dissertation, the Bonacich centrality calculations used a weight parameter of $0.75 \times \text{largest normed eigenvalue}$, as the weight parameter can be no larger than the largest

normed eigenvalue of the network. Bonacich centrality serves as an outcome variable in Chapter 3 and as a mediating variable in Chapters 4 and 5.

Reciprocity. Because complete social network data includes information from everyone within the network, I am able to assess the reciprocity (i.e., mutuality) of each individual's friendship nominations. Reciprocity is measured by counting the number of reciprocated nominations, relative to the number of nominations sent. At times in this dissertation, this is calculated as a proportion, computing as the number of reciprocated friendships divided by the number of sent nominations. For this dissertation, I use the number of reciprocated nominations as an outcome variable in Chapter 3, and then reciprocity rate as a mediating variable in Chapters 4 and 5.

Stability. Additionally, by using longitudinal social network data, friendship nominations can be tracked from one year to the next to determine the overall stability of each individual's friendships. Friendship stability is measured by counting the number of received nominations that repeat from T1 to T2, while accounting for the total number of nominations received in T1. At times in this dissertation, friendship stability is converted to proportion, dividing the number of repeated nominations received in T2 by the number of nominations received in T1. Similar to reciprocity, I use the number of stable friendships as an outcome variable in Chapter 3, and the rate of stable friendships as a mediating variable in Chapters 4 and 5.

Disadvantage

In addition to the importance of the longitudinal social network data that the PROSPER project contains, the PROSPER data set allows me to examine different aspects of disadvantage. Research examining a child's socioeconomic status argues that there is more to measure than just economic problems, concluding that there are three elements of a child's socioeconomic background that should be considered: financial capital, social capital, and human capital. Each of these elements can have important consequences for a child's adjustment. "For children, what parents do and what parents afford by way of physical, social, and material resources both internal and external to the family are presumed to be among the major paths connecting SES to adaptive functioning" (Bornstein and Bradley 2014:3). When operationalizing the socioeconomic status of an adolescent, Entwisle and Astone (1994) explain that it is most effective to use household income (financial capital), mother's education (human capital), and if the child lives in a two-parent household (social capital). In addition to these three measures of disadvantage, a fourth method to operationalize disadvantage is to use a measure of free or reduced-price lunch (FRL), though the effectiveness of this measure has been questioned (Hauser 1994; Entwisle and Astone 1994). More specifically, Sirin (2005) argued that adolescents are less likely to receive FRL as they get older, even if they qualify for it, due to worries of stigma. A second reason this variable is criticized is because of using a binary variable to measure such a complex concept (Harwell and LeBeau 2010).

Osgood, Baals, and Ramirez (unpublished) use the PROSPER data to compare the effectiveness of using FRL as a measure of disadvantage to three other measures of an adolescent's socioeconomic background: household income, mother's education, and household composition. In the PROSPER study, at each in-school wave, students were asked what they did for lunch on school days. Adolescents who indicated that they receive a free or reduced-price lunch (FRL) were coded as 1 for that wave, with everyone else being coded as 0. Additionally, to account for the non-response patterns and obtain a more differentiated rather than binary measure, they use the longitudinal aspect of the PROSPER data to create an aggregate measure of FRL using empirical Bayes shrinkage estimates from HLM. This continuous measure uses all available data for the adolescents to capture their disadvantage. Osgood et al. (unpublished) place a greater emphasis on students who are eligible for FRL across multiple waves, and on students receiving FRL in later waves of the study (when it is less common). Each student is given a constant empirical Bayes FRL score of disadvantage across all eight waves of the sample. Osgood, Baals, and Ramirez (unpublished) compare the empirical Bayes estimate of FRL to three other measures of an adolescent's socioeconomic background and conclude that it operates rather similarly to measures of household income, mother's education, and household composition. Additionally, Osgood et al. (unpublished) demonstrate that the empirical Bayes FRL measure is more strongly related to outcomes and correlates than the current wave dichotomous FRL measure.

For the purposes of this dissertation, I will use this empirical Bayes FRL measure as my primary measure of disadvantage. Though the in-home surveys collected information regarding parental educational and family income, Chapters 4 and 5 of this

dissertation use the in-school sample and the follow-up sample, respectively. In these samples, many respondents were not part of the in-home sample, so Bayes FRL is the best available measure of disadvantage. Therefore, to maintain a consistent measure of disadvantage throughout this dissertation, I use the Bayes FRL as the primary measure of disadvantage throughout.

When feasible, I also completed supplemental analyses using the three other indicators of disadvantage to alleviate any potential concerns that relying on the Bayes FRL measure distorted results. The first of these three is my indicator of financial capital, which is household income before taxes for a given year, as reported by a parent during the in-home interview. To account for the skewed distribution, I take the natural logarithm of the income variable for my analyses. I measure human capital as the mother's highest level of education, as reported by a parent during the in-home interview. Mother's education is coded as 1 = less than H.S. diploma, 2 = high school diploma, 3 = some college/associate's degree, 4 = B.S., B.A., or some education beyond a Bachelor's degree, and 5 = Graduate degree. Social capital is measured by whether or not the adolescent lives with both biological parents, as reported by the student at each wave, and is coded as 1 if the child lives with both biological parents and 0 if not. In addition to using each of these variables separately, I standardized these three variables and used them to create a composite variable of SES. The analyses in Chapter 3 were repeated using these three disadvantage variables, as well as with the composite variable of SES, and are presented as supplemental analyses at the end of Chapter 3.

Chapter 3

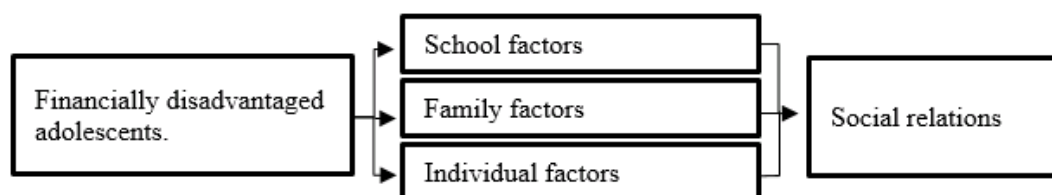
Disadvantage and Social Relations

Social ties during adolescence are important for the development of human and social capital, have importance consequences for adolescent behavior, and can affect adjustment in young adulthood. Therefore, it is important to consider that adolescents from disadvantaged backgrounds are less likely than non-disadvantaged adolescents to be well integrated in their school-based social networks. This chapter addresses my first research question: why are disadvantaged adolescents less likely than non-disadvantaged adolescents to socially succeed? This is the first link for the mediation effects of disadvantage that I will explore in the other empirical chapters. To reiterate, subcultural theories of delinquency argue that disadvantaged adolescents are less likely to socially integrate into school-based social networks (Cohen 1955; Willis 1978). Though these theories speculate on why this might be, this area of research has received little, if any, empirical attention.

The literature reviewed in Chapter 1 implies that the reasons for this lack of social success fall under three categories: school, family, and individual. In the current chapter, I explore the extent to which these three types of factors mediate the relationship between disadvantage and adolescent social relations. In addition to popularity, research has also demonstrated the importance of examining qualitative features of friendships. Therefore, this chapter focuses on in-degree, Bonacich centrality, reciprocity, and stability. Figure

3.1 displays a path diagram illustrating the focus of this chapter, which is an elaboration of the path diagram presented in Chapter 1.

Figure 3-1: Path diagram demonstrating the focus of this chapter.



I hypothesize that financially disadvantaged adolescents will have weaker social relations, and that this relationship can be partially explained by three broad types of mechanisms. The first category I include consists of school variables, such as school performance and attitudes towards school. Second, family factors, including characteristics such as family relations, parental communication, family home condition and location, and parental school involvement may have important roles in the selection of friends. Third, individual factors that may be relevant include characteristics such as mental and physical health, attractiveness, bullying, and confidence/nervousness. As discussed in detail in Chapter 1, I chose these specific measures based on research that demonstrates that these variables are associated with socioeconomic status, while also being associated with adolescent friendships. For example, previous research has demonstrated that physical and mental health are important when considering how adolescent friendships develop (Bronfenbrenner and Morris 2006; Simpkins Schaefer, Price, and Vest 2013), while separate research has also demonstrated that health in adolescence is associated with one's social class (Starfield, Riley, Witt, and Robertson

2002). Therefore, it seems likely that health is a mediator of the relationship between financial disadvantage and adolescent social relations.

Methodology

PROSPER Data

The current chapter will primarily use the in-home sample from the PROSPER Peers project. As discussed previously (see Chapter 2: Data of this dissertation), the in-home survey began in wave 1 and continued through wave 5 (ninth grade), consisting of 980 individuals (43% response rate). The in-home survey collected more in-depth information of the various factors that may be mediating the relationship between disadvantage and social relations. When estimating multivariate analyses, I will use individuals who participated in the in-home sample (n=908) so that I am able to include the additional measures that the in-home survey offers when examining the relationship between disadvantage and the four social relations.

Measures

Table 3.1 provides a description and descriptive statistics for all of my measures used in this chapter. The measures of disadvantage and the four social relations use both the in-school and in-home sample. I use the in-school sample (n=73,018) for bivariate analyses so that I am able to examine the social relations across all eight waves of data, which I discuss in more detail below in my analytic strategy. Thus, these measures are

listed twice in the table, listing the descriptive statistics for the in-home sample and the in-school sample.

Table 3-1: Descriptive Statistics

Variable	Description	Mean	S.D.	Min	Max
Emp. Bayes FRL, In-Home	Empirical Bayes aggregate of student-reported receiving of free/reduced price lunch.	-0.15	1.70	-1.70	3.43
Emp. Bayes FRL, In-School		-0.17	1.62	-1.75	3.43
<i>Social Network Measures</i>					
In-Degree, In-Home	Number of friendship nominations received.	3.88	2.85	0	16
In-Degree, In-School		3.35	2.67	0	20
Bonacich Cen., In-Home	Function of the prestige of the nodes that a given actor is connected to.	0.83	0.56	0	3.45
Bonacich Cen., In-School		0.77	0.58	0	4.54
Reciprocity Rate, In-Home	Proportion of mutual to non-mutual friendships.	0.53	0.33	0	1
Reciprocity Rate, In-School		0.51	0.34	0	1
Stability Rate, In-Home	Proportion of friends from T1 that overlap to T2.	0.45	0.29	0	1
Stability Rate, In-School		0.41	0.30	0	1
<i>School Measures (In-Home)</i>					
Grades	Student-reported school grades.	4.23	0.82	1	5
School Bonding	Average of eight items about feelings towards school and teachers.	3.96	0.72	1	5
Getting into Trouble	Self-reported. Scale consisting of seven items regarding frequency of getting into trouble at school.	1.68	0.73	1	5
Educational Asp.	Student-reported on how much education he/she would like to have.	2.76	0.60	0	3
Absent	Student-approximation on amount of unexcused absences from school in past year.	2.82	0.98	1	5
<i>Family Measures (In-Home)</i>					
Family Relations	Mean of standardized subscales assessing family relations.	0.05	0.40	-1.39	0.82

Family Home Cond.	Interviewer rated home based on cleanliness, organization, and maintenance.	3.89	1.01	1	5
Family Location	If family lives on a farm, rural area but not farm, or in town/city.	2.69	0.57	1	3
Parental Comm.	Mother reported. Scale of 7 items assessing open communication between mother and child about various items, such as peer substance use, behavior, and activities.	1.68	0.46	1	5
Parental Sch. Involv.	Mother-reported number of school events/functions mother attends.	4.15	1.03	1	5
<i>Individual Measures (In-Home)</i>					
Poor Mental Health	Self-reported, scale assessing happiness, interest, depression, and anxiety.	0.60	0.61	0	3
Poor Physical Health	Self-reported overall condition of physical health.	2.06	0.99	1	5
Attractiveness	Interviewer-rated overall attractiveness of respondent.	3.25	0.61	1	4
Bullies Others	Mother-reported on the frequency that her child bullies other children.	0.17	0.42	0	2
Nervous	Mother-reported how nervous, high-strung, or tense her child is.	0.23	0.49	0	2
<i>Controls</i>					
Sex	Whether respondent is male or female. 1=Male; 0=Female.	0.47		0	1
Race	Whether respondent is white or non-white. 1=White; 0=Non-white.	0.86		0	1
Treatment	Whether or not the given school received the treatment intervention.	0.48		0	1

Social Relations. As discussed previously, I will be examining in-degree, Bonacich centrality, reciprocity, and stability. In-degree centrality is calculated by counting the number of friendship nominations that an individual receives from others. The average number of received nominations for the in-home sample is 3.88 with a standard deviation of 2.85, compared to mean of 3.35 with a standard deviation of 2.67

for the in-school sample. Bonacich centrality is calculated by weighting each node's centrality by the centrality of the actors that they are connected to. The average score for Bonacich centrality is 0.83 and standard deviation of 0.56 in the in-home sample, compared to a mean score of 0.77 with a standard deviation of 0.58 in the in-school sample. Reciprocity is measured by counting the number of reciprocated nominations, while accounting for the number of nominations sent. In the descriptive analyses, this is calculated as a proportion, or the number of reciprocated friendships divided by the number of sent nominations. The average reciprocity rate in the in-home sample is 0.53 with a standard deviation of 0.33, compared to a mean of 0.51 and standard deviation of 0.34 in the in-school sample. Friendship stability is measured by counting the number of received nominations that repeat from T1 to T2, while accounting for the total number of nominations received in T1. In the descriptive analyses, this is converted to a proportion, dividing the number of repeated nominations received in T2 by the number of nominations received in T1. The average stability rate in the in-home sample is 0.45 with a standard deviation of 0.29, compared to an average stability rate of 0.41 with a standard deviation of 0.30 in the in-school sample.

Financial Disadvantage. I will use the empirical Bayes estimate of FRL as the main measure for disadvantage. The empirical Bayes measure of disadvantage has a mean of -0.15 and a standard deviation of 1.70 in the in-home sample, compared to a mean of -0.17 and standard deviation of 1.62 in the in-school sample. The values of this measure are scaled using the log odds of receiving free or reduced-price lunch.

Potential Mediators. I have divided the potential mediators into three distinct groups: school variables, family variables, and individual variables. The school variables

include five variables: student grades, school bonding, getting into trouble, educational aspirations, and absences. Student grades is student-reported, and ranges from 1 indicating mostly lower than D's to 5 indicating mostly A's 90-100. The mean of student grades is 4.23, with a standard deviation of 0.82. School bonding ($\alpha=0.81$) is the average of eight items that asked students about their feelings towards school and to their teachers, with higher scores indicating more positive feelings on a one to five scale. School bonding has a mean of 3.96 and a standard deviation of 0.72. Getting into trouble ($\alpha=0.82$) is the average of seven items that asked students how many times they have been in trouble at school for various reasons (e.g., disrupting class, talking back to teachers), with higher scores indicating more trouble. The mean for getting into trouble is 1.68 with a standard deviation of 0.73. Educational aspirations is measured from a question that asked students how much education would they like to have if they could go as far as they wanted in school. Most students (80%) reported wanting to receive at least a Bachelor's degree. Absences are measured by asking the student to approximate how many days he/she had an unexcused absence from school in the last year. The average student reported 2.68 unexcused absences, and the measure has a standard deviation of 0.98.

Family variables include family relations, family home condition, family location, parental communication, and parental school involvement. Family relations ($\alpha=0.81$) is a mean of standardized subscales that assessed affective quality between parents and children, joint activities of family members, parenting supervision and discipline, and family cohesion. Family relations had an average score of 0.05, with a standard deviation of 0.40, with higher scores indicating stronger family relations. Family home condition is

a scale ($\alpha=0.95$) operationalized from the opinion of the interviewer, in which the interviewer rated the home on a scale of 1 to 5 based on cleanliness, whether or not the home was cluttered and not organized, and whether or not the home was run down and not maintained. The average home scored a 3.89 on this scale, and this measure has a standard deviation of 1.01. Higher scores indicate better condition of the home. Family location measures if the family lives on a farm, in a rural area but not on a farm, or in a town or city. Most students lived in a town/city. Parental communication is a scale ($\alpha=0.78$) that assesses how much the mother agreed/disagreed regarding open communication with her child about various subjects, such as substance use, peer substance use, behavior, and activities¹. The mean of the parental communication scale is 1.68 with a standard deviation of 0.46, with higher scores indicating poorer communication between the mother and child. Parental school involvement is measured from a question that asks the mother how many school events or functions put on by her child's school does she attend. The average mother reported attending 4.15 school events/functions within the past year, with a standard deviation of 1.03.

The individual variables that serve as potential mediators consist of: poor mental health, poor physical health, attractiveness, bullying, and nervousness. Poor mental health is student-reported and is a scale ($\alpha=0.88$) consisting of ten items that assessed numerous aspects of mental health, such as happiness, anxiety, depression, and interest. This scale has a mean of 0.60 and a standard deviation of 0.61. Higher scores indicate poorer overall mental health, with a minimum of 0 and a maximum value of 3. Poor

¹ I use the mother's response for all measures that stem from parental questions as the mothers had a higher response rate than the fathers.

physical health is student-reported and assesses overall physical health. Higher scores indicate poorer overall physical health, with a 1 indicating very good overall physical health, and a 5 indicating very poor overall physical health. The average student responded as having very good overall physical health. Attractiveness is measured from a question that asked the interviewer to rate the overall attractiveness of the student. Attractiveness has a range of 1-4, with a score of 1 indicating very unattractive and a score of 4 indicating very attractive. The mean of attractiveness is 3.25, with a standard deviation of 0.61. The measure of bullying comes from a question that asked the child's mother how true it is that the child is cruel, bullies, or is mean to others. Most mothers (83%) reported that their child did not bully others within the past six months. Nervousness is operationalized from a question that asked the mother to rate how nervous, high-strung, or tense her child is. Most mothers (77%) did not describe their child as nervous, high-strung, or tense.

Control Variables. All models control for sex, race, wave, and treatment condition. Sex is a binary variable coded as 0 for female (53%) and 1 for male (47%). Race is a binary variable coded as 0 for non-white (14%) and 1 for white (86%)². Wave is an indicator of the timing of the data collection, with wave 1 taking place in the fall of the students' sixth grade, wave 2 in the spring of the students' sixth grade, and each

² Analyses were also completed using additional race categories, but due to most of the sample being white (about 86% of 908 students), breaking down the non-white category into specific racial categories of black, Hispanic, and other led to unreasonably large standard errors, indicating insufficient power to detect meaningful differences. Additionally, race is only statistically significant when predicting friendship stability, so further analyses were completed to see if expanding race from a binary variable to a categorical variable impacted these analyses in any meaningful way. Though the primary variables of the analysis were not impacted, it was evident that the "other" racial category is accountable for the statistical significance of the race variable when treating stability as the outcome. Race is not statistically significantly associated with the other outcomes, whether treating it as a binary variable or an expanded categorical variable that includes white, black, Hispanic, and other.

subsequent wave being in the spring of the following year. Treatment condition is included to control for whether or not each school received a substance use intervention as part of the larger PROSPER study (see Spoth et al. 2007 for more information)³.

Analytic Strategy

Due to the longitudinal nature of the data set, I will rely upon hierarchical linear modeling using HLM software (Bryk and Raudenbush 2002) to address my research questions. The multiple observations for each individual are not statistically independent, as within-person measures over time are more similar than those between persons. Additionally, because my data are clustered within communities, I must be sure to control for within-community dependence, as well. By using three-level, multilevel models, I am able to nest time (level-1) within students (level-2) within communities (level-3). The multilevel analysis then uses residual terms at levels two and three to allow for within-person and within-community dependence. I use listwise deletion to handle missing data in this chapter. When predicting in-degree, Bonacich centrality, and reciprocity, the sample remains similar. However, friendship stability needs to consider two waves, thus wave one is excluded in the analyses when predicting friendship stability.

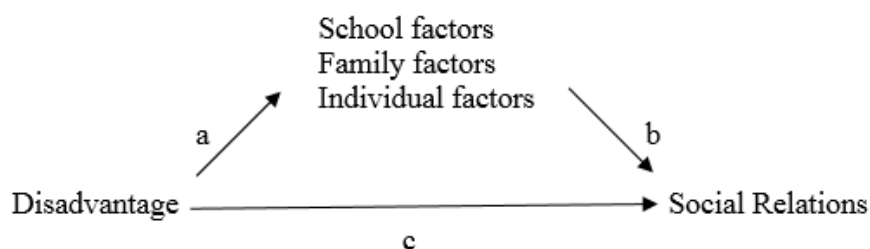
I will start with bivariate comparisons between financially disadvantaged adolescents and non-disadvantaged adolescents on four different aspects of social integration: in-degree, Bonacich centrality, reciprocity, and friendship stability. This will

³ The treatment condition is not statistically significant in any of my analyses for this chapter, indicating that the intervention program did not have a significant effect on individual-level social relations, when controlling for the other variables in the model.

provide a baseline assessment of the association between disadvantage and the four social measures over the full eight waves of data. These analyses will use the in-school sample and examine grades sixth through twelve. Then, using the in-home sample that includes waves one through five, I will estimate three-level, multilevel models to further assess the relationship between financial disadvantage and social integration. This will provide the reference point for the mediation analyses. Based on the varying distributions of my outcome variables, I will estimate three different kinds of three-level, multilevel regression models. I will use the Poisson model specification that accounts for over-dispersion to predict in-degree, as in-degree is a count variable. When treating Bonacich centrality as my outcome variable, I will estimate a regression model with a normal distribution. Finally, I will estimate binomial regression models to predict reciprocity and friendship stability. Utilizing the binomial model specification in HLM allows me to consider the number of friends one has when examining reciprocity and friendship stability. In other words, there is a substantive difference between an individual who has one reciprocal friendship and two out-degree nominations, as compared to someone who has three reciprocal friendships and six out-degree nominations. Both have a 50% reciprocation rate, but there is much more precision for the second example than the first. The binomial model specification takes into account the number of nominations when examining the number of reciprocal and stable friendships. For each outcome, I will start with a model that only includes disadvantage with the primary controls (sex, race, treatment, and wave) to establish the total relationship between disadvantage and the corresponding friendship outcome, prior to any mediation. Next, I will conduct mediation analyses to further understand what is contributing to each relationship.

In order to determine whether the variables of interest are mediating the relationship between disadvantage and the friendship outcomes, I use the Baron-Kenny framework (Baron and Kenny 1986; Zhao, Lynch, and Chen 2010). This mediation perspective is presented in Figure 3.2. First, I will treat each of my potential mediating variables as an outcome, with disadvantage as the primary predictor variable. This will allow me to examine the relationship between disadvantage and each mediating variable separately, which will assess path *a* from the Baron and Kenny's (1986) standard conception of mediation shown in figure 3.2. Then, I will separately add each group of mediating variables into each model with disadvantage predicting each social relation. This will allow me to understand how each group of variables contributes to the relationship between disadvantage and the given social relation. In other words, this portion of my analysis is broken up into three sections based on each group of mediating variables: school variables, family variables, and individual variables. Then, after assessing the mediating impact of each grouping of variables, I will estimate models that include all of the groups of mediating variables, together with the measure of disadvantage, predicting each social outcome.

Figure 3-2: Analytical Path Diagram based on Baron and Kenny's (1986) Mediation Method.



Additionally, to test the statistical significance and specific effects of each mediating variable, I will calculate the indirect effects and percentage-mediated of each of the mediating variables. The indirect effects of each mediating variable is calculated by multiplying paths a (mediator regressed on disadvantage) and b (social relation regressed on mediator) of the mediation model. Then, I will use the RMediation software to obtain the 95% confidence interval of each indirect effect. To determine the percentage of mediation, I will use $(ab / (\sum ab + c')) * 100$, where $\sum ab$ = the sum of the indirect effects and c' is the path from disadvantage to the social relation from each model that includes the grouped mediating variables (Rulison, Feinberg, Gest, and Osgood 2015; MacKinnon 2012; Tofighi and MacKinnon 2011). The percentage explained by each of the mediating variables is presented in a second table in each section of the results, with asterisks to indicate significance values.

Results

Bivariate Analyses

Table 3.2 and Figure 3.3 present the results from t-tests to determine a base relationship between disadvantage and the four friendship outcomes. The table presents results when using all eight waves of data, while the figure presents the results wave-by-wave. The empirical Bayes FRL continuous variable was recoded into a binary variable

for this bivariate analysis, with those adolescents scoring in the top 15%⁴ of the empirical Bayes FRL variable being coded as disadvantaged, and everyone else being coded as non-disadvantaged. Disadvantage significantly and negatively affects all four of the friendship outcomes. Disadvantaged students, on average, receive about one fewer friendship nomination, score approximately 30% lower in Bonacich centrality, have lower reciprocity rates, and lower friendship stability rates as compared to non-disadvantaged students. I also included a column in Table 3.2 with the differences in standard deviation units (Cohen's *d*) for each of the effect sizes to determine which of the social measures disadvantage has the strongest/weakest effect upon. It is evident that disadvantage has a stronger effect upon in-degree and Bonacich centrality as compared to reciprocity and stability. It is also noteworthy that the relationship between disadvantage and the friendship outcomes is relatively stable from sixth through twelfth grade. Though most of the measures do begin to converge in eleventh and twelfth grade, this may arise because students are able to begin dropping out of high school beginning at age 16 (approximately between waves 6 and 7).

Dropout might contribute to the convergence in these measures because it seems likely that disadvantaged students scoring the lowest on these friendship outcomes are arguably the most likely to drop out of school (Rumberger and Larson 1998; Wehlage et al. 1989). To test whether differential dropout might account for this convergence, I completed some additional tests. Since disadvantage is negatively associated with the social measures (Table 3.2), it seems likely that the most disadvantaged adolescents are

⁴ The top 15% was chosen as the cut-off because communities must have had at least 15% of the students receiving FRL to be selected as a part of the PROSPER sample. Thus, I use this percentage as the cut-off to determine who is selected as “disadvantaged” for the bivariate analyses.

the least likely to be popular and have stable/reciprocated friendships. Therefore, if the most disadvantaged of the adolescents begin to leave the sample, then there should be some convergence in the social measures. Based on this, I completed an additional check on whether this is a likely explanation for these results. In general, there is some attrition in the PROSPER sample as the adolescents age, especially in the later waves of the study. Tracking the average disadvantage of the sample from wave-to-wave indicates whether the students leaving the sample are more or less disadvantaged than average. The empirical Bayes FRL measure of disadvantage is constant for each individual across all waves of the sample. Therefore, the average score of disadvantage for the sample should remain relatively constant over time if the sample remains similar across all eight waves of data, or if leaving the sample is not correlated with disadvantage. If disadvantaged adolescents disproportionately leave the sample, then the mean of disadvantage for the sample should decrease.

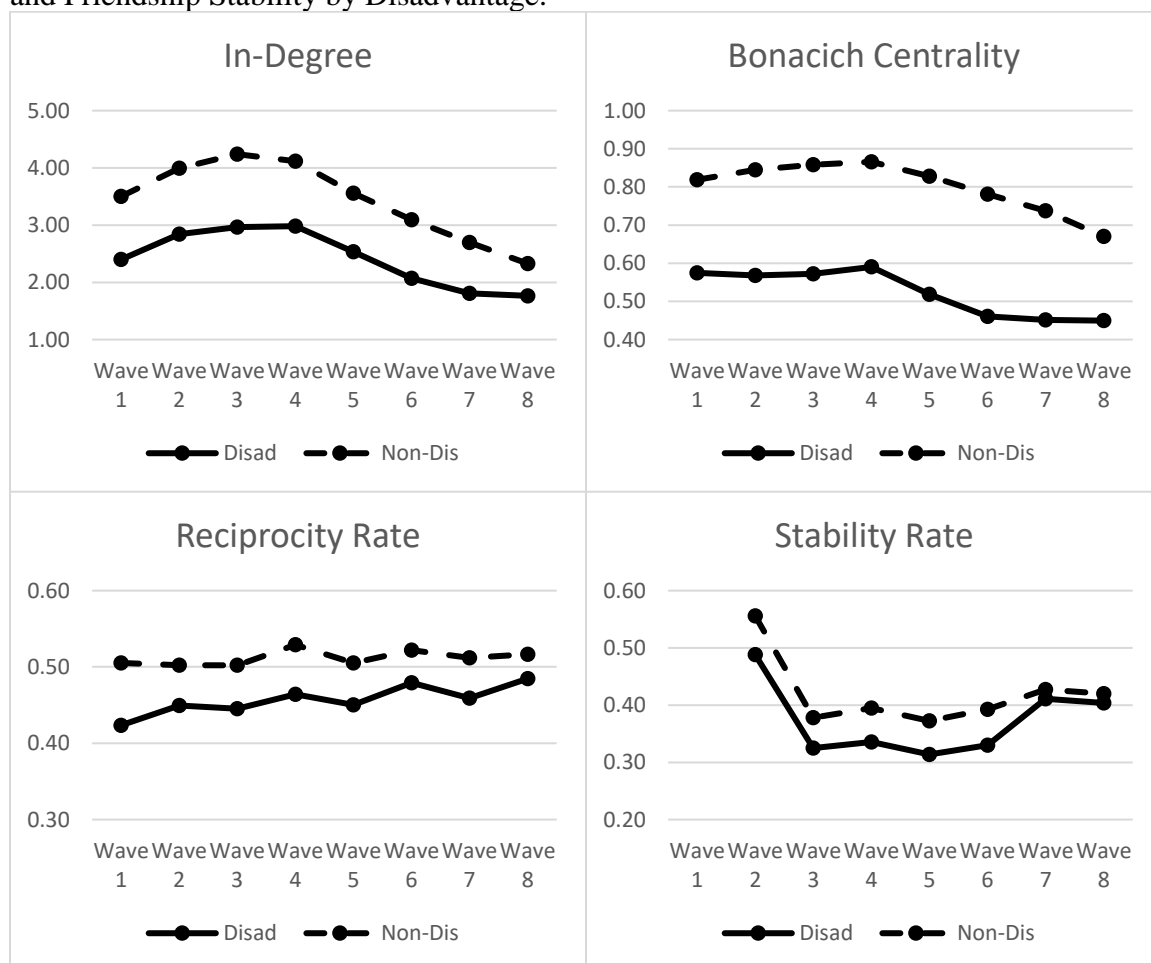
The average of disadvantage remains relatively stable from waves 1 to 5, fluctuating between -0.12 and -0.15, indicating little change in the sample, or at least that any sample change is not correlated with disadvantage. However, disadvantage begins to sharply decline in wave 6, dropping to -0.21, then -0.25 in wave 7, to -0.30 in wave 8. In other words, leaving the sample in the later waves of the study is correlated with disadvantage. Thus, it seems likely that the convergence evident in waves 6 through 8 is because of the most disadvantaged adolescents dropping out of school.

Table 3-2: Comparison of Means Tests for In-Degree, Bonacich Centrality, Reciprocity and Friendship Stability by Disadvantage, combining all eight waves of data.

	Disad.	Non-Dis	Total	Cohen's <i>d</i>
In-Degree	2.49	3.49	3.35	0.38
Bonacich Cent.	0.53	0.81	0.77	0.48
Reciprocity Rate	0.46	0.51	0.50	0.17
Stability Rate	0.37	0.42	0.41	0.17

Notes: T-Tests combined all 8 waves of data for in-degree, Bonacich, and reciprocity. For stability, these results combined waves 2 through 8. All results statistically significant at $p < 0.001$ level. "Disadvantage" binary variable consists of top 15% of continuous variable coded as disadvantage, remainder of sample coded as non-disadvantage.

Figure 3-3: Comparison of Means Tests for In-Degree, Bonacich Centrality, Reciprocity, and Friendship Stability by Disadvantage.



Multi-level Results

Disadvantage and Social Relations

Table 3.3 presents the results from multilevel models in which disadvantage is predicting the four separate social relations when controlling for sex, race, treatment condition, and wave. Model I is an overdispersed Poisson multilevel model predicting In-Degree. Bonacich centrality is the outcome in Model II, which is a normal HLM equation. Models III and IV are both binomial models that predict reciprocity and stability, respectively. Disadvantage has a significant and negative relationship with each of the four outcomes. To reiterate, the measure of disadvantage was created using empirical Bayes shrinkage estimates in HLM, aggregating together each student's responses to a question assessing whether or not that student received free/reduced-priced lunch, with higher scores indicating disadvantage. Disadvantage reduces the likelihood of receiving friendship nominations. This net effect is equivalent to approximately a 17% decrease in the number of friendship nominations when comparing students who differ in disadvantage by one standard deviation. Adolescents that are more disadvantaged also tend to score lower in Bonacich centrality as compared to their peers. For each sent nomination, increases in disadvantage decreases the odds of receiving a reciprocated friendship nomination. For each received friendship nomination at T1, the odds of maintaining that friendship to T2 decreases as disadvantage increases. All of these results indicate that the relationship between disadvantage and the four social relations should be explored further to determine what factors are mediating these relationships.

[Table 3.3 about here]

Relationship between Disadvantage and Mediators

The next section of analysis assesses the relationship of disadvantage to each of the potential mediators. This is path *a* of the Baron-Kenny mediation model, and is one of the two relationships that must come together to create mediation: the stronger this relationship, the greater the potential for that variable to mediate its impact on the outcome. Each of my mediating variables was regressed on disadvantage in a 3-level, multilevel model while controlling for sex, race, wave, and treatment condition.

Presented in Table 3.4, these results demonstrate that disadvantage is a statistically significant predictor of all of the mediating variables, with the exception of parental communication. Disadvantage is most-strongly related to student grades and family home condition, giving them special potential to mediate its relationships with the outcomes of interest. Each one-unit increase in disadvantage results in an expected decrease of 0.142 in grades, while controlling for sex, race, wave, and treatment condition. The condition of the family home (i.e., the cleanliness, organization, upkeep) is expected to decrease as the disadvantage of the adolescent increases. Additionally, disadvantage is a moderately-strong predictor of getting into trouble at school, unexcused absences, parental school involvement, poor mental health, poor physical health, and attractiveness.

[Table 3.4: Disadvantage Predicting Mediating Variables, about here]

School Variables as Mediators

Table 3.5 presents the results when including the school measures in the analysis as mediating variables. Each Model treats a different social relation as an outcome, and controls for sex, race, wave, and treatment condition. Also, the coefficient for disadvantage from the previous set of analyses is included as an easy-reference to approximate the amount of mediation that is occurring. In other words, the previous set of analyses that included only disadvantage (and the control variables) predicting in-degree demonstrated that each one-unit increase in disadvantage results in approximately a 10% decrease in the number of friendship nominations received, which is included at the top of Table 3.5. Additionally, Table 3.6 presents the mediation results in terms of the percentage of the total relationship of disadvantage to the outcome that each school variable mediates, or accounts for. To reiterate, the percentage of mediation is calculated by computing the indirect effects of each mediating variable and using $(ab / (\sum ab + c')) * 100$. Then, RMediation was used to obtain the 95% confidence interval of each indirect effect. The significance of each effect is indicated with asterisks in the table.

[Table 3.5: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability with the School Mediating Variables, about here]

[Table 3.6: Percentage of Mediation explained by School Variables, about here]

After including the school variables, disadvantage remains a negative predictor of in-degree, Bonacich centrality, reciprocity, and stability. Student grades is a statistically significant predictor of in-degree, Bonacich centrality, and friendship stability, though it appears to be more strongly related to in-degree and Bonacich centrality. Educational

aspirations is also significantly related to popularity, with each one-unit increase in educational aspirations resulting in a 0.036 increase in Bonacich centrality. Getting into trouble at school is significantly related to the qualitative elements of friendships (reciprocity and stability), but not to the measures more indicative of popularity (in-degree and Bonacich centrality). Interestingly, the relationship between school bonding and reciprocity is negative, and this is the only model when school bonding is a statistically significant predictor. Each one-unit increase in the measure of school bonding results in almost a 10% decrease in the odds of receiving a reciprocal friendship nomination, when controlling for the other variables in the model. Keeping in mind that this is a binomial model that accounts for the number of sent friendship nominations, this is a surprising finding. It could be that as students feel more bonded to school, it results in less time to spend balancing friendships.

The school measures mediate the relationship between disadvantage and in-degree by about 13%. When Bonacich centrality is the outcome, the coefficient for disadvantage changes from -0.077 to -0.064 with the inclusion of the school variables, approximately a 17% change. The relationship between disadvantage and reciprocity is mediated by approximately 13% by the school variables. The biggest change occurs when predicting friendship stability, with the school attributes mediating approximately 40% of the effect of disadvantage. However, this is most likely in part because disadvantage is less related to stability than the other three outcomes. This means that this is a bigger percentage of a smaller relationship, so it is really not a very different effect size.

Student grades is the most influential, and the only statistically significant, mediator from the school attributes, accounting for between 9 and 22% of the relationship between disadvantage and the four social relations. This makes sense based on the previous analysis that demonstrated the strong relationship between disadvantage and student grades (path a), making grades especially likely to be a significant mediator. Though the mediating effect of grades is relatively consistent in the models predicting in-degree, Bonacich centrality, and reciprocity (9%, 13%, and 12%, respectively), grades has the strongest mediating impact on friendship stability (22.78%). However, as mentioned above, this should be considered relative to the results that demonstrated that disadvantage is less related to stability than the other three outcomes. None of the remaining variables were as consistently associated with the measures of peer relations. Educational aspirations account for almost 3% of the relationship with in-degree and Bonacich centrality, but then has a suppressor effect when predicting reciprocity and stability. Conversely, getting into trouble does not seem to have a mediating impact when predicting in-degree and Bonacich centrality, but accounts for 5 and 10% mediation when predicting reciprocity and stability. However, none of the other measures are significant mediators of the relationship between disadvantage and the four social relations.

In sum, the school attributes partially mediated the relationship between disadvantage and each of the four social relations. The relationship between in-degree and Bonacich centrality was mediated by approximately 13% and 17%, respectively. Upon calculating the indirect effects and p-values for each of the mediating variables, only student grades is a statistically significant mediator of the relationship between

disadvantage and the four social relations. Additionally, school grades is the strongest predictor of in-degree and Bonacich centrality within the school attributes. When treating the qualitative elements of friendships as outcomes, getting into trouble at school has the strongest relationship with friendship reciprocity and stability of the school attributes.

Family Variables as Mediators

Next, I replace the school variables with the family mediating variables. Presented in Table 3.7, each model treats one of the four social relations as an outcome and each model is a 3-level, multilevel model that controls for sex, race, wave, and treatment condition. Also, as before, the coefficient for disadvantage from the first set of analyses is included at the top of the table to reference. Additionally, Table 3.8 presents the percentage of mediation explained by each of the variables, along with asterisks to indicate which of the indirect effects are statistically significant.

[Table 3.7: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability with the Family Mediating Variables, about here]

[Table 3.8: Percentage of Mediation explained by Family Variables, about here]

Disadvantage remains a significant predictor of in-degree, Bonacich centrality, and reciprocity. However, after the inclusion of the family variables, disadvantage is no longer a significant predictor of stability. Family home condition has a significant effect on all four of the social relations. Parental communication also has a relatively strong effect on both in-degree and Bonacich centrality, though previous analyses made it

known that this is not a mediator of disadvantage. Additionally, family relations is a significant predictor of friendship stability, with each one-unit increase in family relations increasing the odds of having a stable friendship from T1 to T2 by about 18%.

Overall, the relationship between disadvantage and each of the four social relations is partially mediated by the family variables, with the largest mediation occurring, once again, when friendship stability is the outcome. Family home condition is the only variable of the family measures to have a statistically significant mediating impact on the relationship between disadvantage and all four of the social relations. To reiterate, family home condition is an interviewer-reported scale, with a range of 1 to 5, which is based on the cleanliness, upkeep, and organization of the home. Family home condition accounts for 21% of the relationship between disadvantage and in-degree, 17% of relationship between disadvantage and Bonacich centrality, 32% of relationship between disadvantage and reciprocity, and almost 49% of relationship between disadvantage and friendship stability. Additionally, parental school involvement is a significant mediator of the relationship between disadvantage and in-degree, and disadvantage and Bonacich centrality, accounting for approximately 3% mediation of each relationship. Also, family relations significantly accounts for almost 7% of the relationship between disadvantage and friendship stability.

In sum, the family variables partially mediated the relationship between disadvantage and each of the four social relations, and seemed to have a slightly larger mediating-impact than the school variables. Family home condition stood out from the other family attributes by having a significant relationship with each of the four social relations. Parental school involvement is a significant mediator of the relationship

between disadvantage and both in-degree (2.45%) and Bonacich centrality (3%). Family relations is a significant mediator of the relationship between disadvantage and friendship stability, accounting for over 6%. Parental school involvement has a significant and positive relationship with both in-degree and Bonacich centrality, though not with reciprocity and stability. Family relations is a significant predictor of friendship stability, but is not significantly related with any of the other social relations.

Other Individual Variables as Mediators

Next, I replaced the family variables with the other individual mediating variables. To reiterate, the individual variables assess traits and characteristics of the respondent, and include measures of mental health, physical health, attractiveness, bullying, and nervousness. Table 3.9 presents the results of the 3-level, multilevel models that include the individual mediating variables with disadvantage as the primary predictor, while controlling for sex, race, wave, and treatment condition. Additionally, at the top of the table I include the coefficients for disadvantage from the original analysis as a reference for mediation. Table 3.10 presents the percentages of mediation that each individual measure accounts for, with asterisks to indicate statistical significance.

[Table 3.9: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability with the Individual Mediating Variables, about here]

[Table 3.10: Percentage of Mediation explained by Individual Variables, about here]

All of the individual measures, except for bullying, have a significant relationship with in-degree. Each one-unit increase in the scale assessing poor mental health

decreases friendship nominations by about 14%. The next strongest predictor of in-degree is nervousness, with each one-unit increase in nervousness decreasing friendship nominations by about 7%. Attractiveness, which was interviewer-reported at each in-home interview, is significantly and positively related to in-degree. Each one-unit increase in attractiveness increases receiving friendship nominations by approximately 5%. Poor physical health is significantly and negatively related to in-degree.

Poor mental health, poor physical health, and attractiveness are all significantly related to Bonacich centrality. Each one-unit increase in the scale measuring poor mental health results in a 0.084 decrease in Bonacich centrality. Poor physical health is inversely related to Bonacich centrality, in that each one-unit increase in poor physical health decreases Bonacich centrality by 0.045. And, similar to in-degree, attractiveness is positively related to Bonacich centrality. Unlike in-degree, however, bullying is significantly related to Bonacich centrality while nervousness is not. Each one-unit increase in the measure of bullying results in an expected decrease of 0.043 in Bonacich centrality.

Poor mental health is the strongest predictor of both friendship reciprocity and friendship stability. Additionally, poor physical health is inversely related to friendship stability. Each one-unit increase in poor physical health decreases the odds of a friendship from T1 repeating in T2 by almost 6%. Interestingly, none of the other individual variables are significantly related to either reciprocity or stability.

The individual variables partially mediate the relationship between disadvantage and each of the four social relations, with varying magnitude. When examining Model I, the coefficient for disadvantage decreases in magnitude from -0.105 to -0.085 (almost a

20% change) with the inclusion of the individual measures. The inclusion of the individual variables mediates the relationship between disadvantage and Bonacich centrality by approximately 15%. Meanwhile, the relationship between disadvantage and reciprocity is mediated by 16% from the inclusion of the individual variables (Model III). Finally, the largest percentage change occurs in with friendship stability as the outcome, but this is also where disadvantage has the weakest relationship.

For each of the models, poor mental health has the strongest mediating impact. Poor mental health accounts for between 7% and almost 25% of the relationship between disadvantage and the four social relations: 10% for in-degree, 7% for Bonacich centrality, 14% for reciprocity, and 25% for stability. Poor physical health is a significant mediator in the models predicting in-degree, Bonacich centrality, and stability accounting for approximately 2%, 3%, and 6% of each relationship, respectively. Attractiveness is a significant mediator in the models predicting in-degree and Bonacich centrality, accounting for almost 3% of those relationships

In sum, the individual variables partially mediate the relationship between disadvantage and each of the four social relations. The strongest mediator of the individual variables in all four models is poor mental health, accounting for between 7 and 25% mediation between the outcomes. Poor physical health is a significant mediator when in-degree, Bonacich centrality, and stability are the outcomes. Also, attractiveness is a significant mediator when predicting in-degree and Bonacich centrality. Poor physical health is also an important predictor of all four social relations, except for reciprocity. Additionally, attractiveness is positively related to both in-degree and

Bonacich centrality. Finally, nervousness is negatively related to in-degree, while bullying is negatively related to Bonacich centrality.

Inclusion of all Mediating Variables

The next stage of analysis includes all three groups of mediating variables in the models. Again, each model is a 3-level, multilevel model that controls for sex, race, wave, and treatment condition. These results are presented in Table 3.11. For the purposes of space, I did not include the results for the control variables in the table. The percentage of mediation that each measure accounts for is included in Table 3.12.

[Table 3.11: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability with All Mediating Variables, about here]

[Table 3.12: Percentage of Mediation explained by All Mediating Variables, about here]

In the final models, disadvantage remains a negative predictor of in-degree and Bonacich centrality, but is no longer significantly related to reciprocity or stability. Grades, family home condition, poor mental health, poor physical health, and nervousness are all significantly related to in-degree in the full analysis. Similarly, grades, family home condition, poor mental health, and poor physical health are all significant predictors of Bonacich centrality. However, getting into trouble at school, educational aspirations, parental school involvement, and attractiveness are also all significant predictors of Bonacich centrality in the full analysis. Interestingly, school bonding is still negatively related to friendship reciprocity. Family home condition and

poor mental health remain significantly related to friendship reciprocity, as well. Grades and family home condition are both significantly related to friendship stability.

The relationships between disadvantage and in-degree, Bonacich centrality, and reciprocity were all mediated by just over 40% (41.8%, 40.6%, and 43.1%, respectively). Meanwhile, the greatest percentage mediation occurred in Model IV, where the relationship between disadvantage and friendship stability was almost completely mediated (92.5%). With the inclusion of all of the mediating variables, each one-unit increase in disadvantage decreases the odds of receiving a friendship nomination by about 6%, decreases Bonacich centrality by about 0.046 (about 1.5%), the odds of receiving a reciprocal friendship nomination by about 5%, and maintaining a friendship from T1 to T2 by about a 0.5%. Interestingly, it is evident that no one group (i.e., school, family, individual) of mediating variables can take all of the credit for the partial mediation in the final models. Rather, specific variables from each of the groups had the most impact on mediating the relationship between disadvantage and the four social relations.

School grades is a significant mediator of the relationship between disadvantage and in-degree (8%), Bonacich centrality (10%), and friendship stability (24%). None of the other indirect effects of the school attributes were statistically significant. The condition of the family home is always the strongest mediator in each of the four models, accounting for almost 19% mediation of the relationship between disadvantage and in-degree, 14% when predicting Bonacich centrality, 28% in when predicting reciprocity, and approximately 42% when predicting stability. Parental school involvement is a significant mediator of the relationship between disadvantage and Bonacich centrality,

accounting for almost 3%. Poor mental health accounted for approximately 9% of the relationship between disadvantage and in-degree, and almost 7% of the relationship between disadvantage and Bonacich centrality. Poor physical health accounted for just over 3% mediation when predicting in-degree and Bonacich centrality. Attractiveness accounted for almost 3% of the relationship between disadvantage and Bonacich centrality, but was not a significant mediator in any of the other final models. Though grades and mental health accounted for a moderate amount of mediation when predicting reciprocity, neither of these effects were statistically significant. This may be because that, while these variables are explaining a moderate percentage of the relationship, the relationship between disadvantage and reciprocity is weaker than that of in-degree and Bonacich centrality. Thus, these variables are explaining a large percent of a smaller relationship.

In sum, the relationships between disadvantage and in-degree, Bonacich centrality, and reciprocity were each mediated by just over 40% with the inclusion of all of the mediating variables. Meanwhile, the relationship between disadvantage and friendship stability was almost completely mediated (92.5%). Family home condition is the strongest mediator in each of the models. Grades is a significant mediator of the relationships between disadvantage and in-degree, Bonacich centrality, and stability. Poor mental health accounts for 9% and 6% when predicting in-degree and Bonacich centrality, respectively. Poor physical health is also a significant mediator when predicting in-degree and Bonacich centrality, accounting for just over 3% mediation in each model. Parental school involvement and attractiveness are significant mediators of

the relationship between disadvantage and Bonacich centrality, with each variable accounting for almost 3% mediation of the relationship.

Sensitivity Analyses

As discussed in Chapter 1, there is a chance that the bounds of the available social network data (i.e., being limited to in-grade and in-school friendships) may be influencing the given study. To help alleviate this concern, I completed additional analyses that examined out-of-school and out-of-grade friends. Beginning in wave 4, respondents were asked to report the number of out-of-school friends they have, as well as the number of out-of-grade friends they have. I conducted comparison of means tests examining the relationship between disadvantage and the number of friends one has in other schools and in other grades. On average, when aggregating waves four through eight, there is not a statistically significant relationship between disadvantage and having friends in other grades. Disadvantaged adolescents have, on average, 5.65 friends in other grades, while non-disadvantaged adolescents have, on average, 5.62 friends in other grades ($t = -0.745$, $p = 0.456$). When examining the number of friends in other schools, disadvantaged adolescents have a higher amount, on average, of out-of-school friends than non-disadvantaged adolescents, but the difference is rather small (4.97 compared to 4.72; $t = -4.549$, $p = 0.000$).

Additionally, I re-estimated some of the primary analyses of this chapter that included the out-of-grade and out-of-school friends as control variables. More specifically, I re-estimated the full models predicting Bonacich centrality, friendship

reciprocity, and friendship stability. In general, none of my primary results were impacted when including these measures as control variables. For example, when re-estimating my full model that predicted Bonacich centrality, the significance values of all of the school, family, and individual variables did not change. School grades, getting into trouble, educational aspirations, family home condition, parental school involvement, poor mental health, poor physical health, and attractiveness are all still significant predictors of Bonacich centrality, and none of the other variables in the model are significant. Further, the measures for out-of-grade friends (coef. = 0.007, se = 0.005) and out-of-school friends (coef. = -0.006, se = 0.006) are not statistically significant in this model. Additionally, the measures for out-of-grade friends and out-of-school friends were not significant mediators in any of these supplemental analyses. Taken together, these bivariate and multivariate supplemental analyses indicate that out-of-school friendships and/or out-of-grade friendships are not significantly impacting this chapter of my dissertation. In other words, these analyses alleviate concerns of the in-school, in-grade network bounding of the dataset.

Supplemental Analyses

I also estimated multilevel models separately predicting the four social measures using other forms of disadvantage as the primary predictor variables. These results are presented in Tables 3.13-3.16. For these supplemental analyses, each model included a different measure for disadvantage, either household income, parental education, whether or not the respondent lives with both biological parents, or a composite SES variable.

For more information about these four disadvantage measures, please see Chapter 2.

While there are some differences between the models, most of the results are similar to the results when using the empirical Bayes FRL measure for disadvantage. The biggest change seems to be when predicting friendship stability, in that household income, both biological parents, and the SES composite variable are all significant predictors of friendship stability, while parental education and empirical Bayes FRL are not.

Discussion

Subcultural theories of juvenile delinquency argue that adolescents from disadvantaged backgrounds are less likely to socially succeed in school as compared to adolescents from non-disadvantaged backgrounds. It is evident within social network research that this argument is supported, though there is very little empirical research dedicated to determining why this relationship exists. Thus, the first objective of my dissertation is to better understand the extent to which disadvantaged adolescents' social relations are impacted by their background.

I found that disadvantage does have a consistent effect on all four of the social relations examined in this study: in-degree, Bonacich centrality, reciprocity, and stability. On average, disadvantaged adolescents have one fewer friend than non-disadvantaged adolescents. In the context that the average number of friends for adolescents in this study is 3.35, this is a substantial difference. Subtracting one friend is about a 33% decrease, on average. Similarly, disadvantaged adolescents, on average, score about 35% lower in their Bonacich centrality rates as compared to non-disadvantaged adolescents.

Though disadvantaged adolescents also score significantly less than non-disadvantaged adolescents in qualitative aspects of friendships (i.e., reciprocity and stability rates), these effects are not as extreme as the measures assessing popularity.

Next, this chapter of my dissertation aimed to improve our understanding of the primary factors that mediate the relationship between disadvantage and social relations. Previous research suggested that this relationship may be due to academic ability. Cohen (1955) specified that disadvantaged adolescents will be less likely to succeed academically, and this may have an influence upon an adolescent's social standing. However, it is important to consider that there may be more to adolescent status than just academic ability (Coleman 1959). After reviewing previous research on adolescent social relations and on disadvantage, three overarching groups of factors emerged: school, family, and individual. The results from this chapter indicate support for considering all these types of factors. I found that variables of all three types contribute to the relationship between disadvantage and social success.

First, consistent with Cohen's (1955) perspective, academic grades is a significant mediator of the relationship between disadvantage and all four of the social measures. Though school bonding and educational aspirations are significant predictors in some of the models, none of the other school variables were significant mediators of the relationship between disadvantage and social relations.

Next, family variables also play an interesting role in this relationship. The condition of the adolescent's family home is the strongest mediator of the fifteen mediators included in the models. To reiterate, this measure comes from in-home interviews at the families' homes. The interviewer rated the inside of the home based on

cleanliness, organization, and maintenance. The effect of this variable on social relations could be operating through one of several mechanisms.

First, as discussed previously, parents influence friendship formation by monitoring the type of peer-interactions that they have (Crosnoe 2000; Parke and Bhaynagri 1989). Thus, if parents are dropping their child off at a friend's house and notice that the house is not very-well maintained or is not very clean, then the parents may restrict their child from going back over to that house. I would argue that this is the essence of this measure because it arises from an adult (the interviewer) visiting a home for the first time and making snap judgements regarding the cleanliness, organization, and upkeep of the home.

Second, the impact of family home condition on social relations may be because of the judgment of one's peers. As discussed previously, adolescents, even as young as sixth grade, are able to make judgments on the characteristics of the family home (Cohen 1955). Children may be self-selecting not to go over a friend's house if it is unclean or disorganized. A third mechanism that the condition of the family home may operate through is from the viewpoint of the child living in the home. In other words, if a child recognizes that his/her own house is disorganized, ill maintained, and/or unclean, especially in comparison to other children's homes, then the child may be hesitant to invite other children over out of embarrassment. This may cause a detrimental effect on one's ability to make friends because of a lack of initiation and/or reciprocation.

Finally, this finding may be related to research that focuses on chaotic environments and the impact that this may have on psychological and social outcomes. "Applied to the social and psychological reality of family life, chaos refers to high levels

of confusion and agitation in the home, as well as to a sense of rush, disorganization, and pressure of time in daily routines” (Dumas et al. 2005:93). Home chaos has been linked to numerous negative outcomes for both adults and children living in the home, such as parenting difficulties, child behavior problems, and cognitive development (Petrill et al. 2004; Johnson et al. 2008; Bradley 2004). Further, Dumas and colleagues (2005:101) demonstrated that, though the CHAOS construct is correlated with measures such as socioeconomic status and neighborhood attributes, home chaos is not a proxy but is a useful construct in its own right. Though my measure of family home condition is not nearly as comprehensive as the CHAOS scale used in this area of research, it appears to capture similar themes, and which may account for the similar results. Future research may be able to further explain the nature of this mechanism.

Two other family variables have a significant mediating impact on the relationship between disadvantage and social relations. First, the family relations composite measure is a significant mediator between disadvantage and stability of one’s friendships. Again, the mechanism(s) that this operates through is unclear, but it is interesting that this variable only affects the stability of friendships, but not the other three social relations. It may be that, when children have poor relationships in the many ways captured by this measure, then other children do not want to continue spending time in that less than pleasant environment. Conversely, this could also be because the child may not be learning specific social skills from his/her relationships with his/her parents that would be valuable for maintaining friendships. Much of the family relations measure is based on spending quality time with one’s parents (i.e., engaging in activities that both the child and parents enjoy; do something active together; talk about future plans; express

appreciation towards one another). If the child does not actively engage in these types of activities with one's parents, then maybe the child is not learning how to effectively engage in some of these activities with friends, thus limiting one's ability to maintain friendships. This is an interesting relationship that deserves additional attention in future research.

Next, parental school involvement plays a small mediating role in the relationship between disadvantage and popularity (i.e., in-degree and Bonacich centrality). As discussed previously, this may be because such parental involvement brings an increase in parental social capital that can in turn increase opportunities for adolescents to socialize. In other words, parents actively involved in school functions will get to know one another and, potentially, befriend one another, thus increasing the opportunities that their children will get to know one another. However, parents of a lower socioeconomic status are less likely to be involved in school-related activities than parents of a higher socioeconomic status (Hill and Taylor 2004), which may limit children from a disadvantaged background's access to this avenue of friendship formation.

Finally, my results indicated that specific individual characteristics also play a mediating role in the relationship between disadvantage and social relations. As discussed in the background chapter of this dissertation, previous research has demonstrated that health in adolescence is associated with one's social class (Starfield, Riley, Witt, and Robertson 2002) and that health can have important ramifications for social relations (Bronfenbrenner and Morris 2006; Simpkins, Schaefer, Price, and Vest 2013). Results in this chapter demonstrate that poor mental health and poor physical health are significant mediators of the relationship between disadvantage and the two

popularity measures, but not of the two qualitative measures. A similar effect is also evident with attractiveness. Attractiveness is a significant mediator of the relationship between disadvantage and popularity, but not of disadvantage and qualitative aspects of friendships.

In sum, I found that disadvantage does have a consistent effect on all four of the social relations examined in this study: in-degree, Bonacich centrality, reciprocity, and stability. Additionally, this chapter of my dissertation improved our understanding of the primary factors that mediate the relationship between disadvantage and social relations, demonstrating support that all three (i.e., school, family, and individual) types of factors should be considered.

Table 3-3: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability.

	Model I: In-Degree			Model II: Bonacich			Model III: Reciprocity			Model IV: Stability					
	R.R.	Coef.	RSE	Coef.	RSE		O.R.	Coef.	RSE	O.R.	Coef.	RSE			
<i>Disadvantage</i>															
Emp. Bayes FRL	0.900	-0.105	0.012	***	-0.077	0.009	***	0.919	-0.084	0.022	***	0.946	-0.056	0.015	***
<i>Controls</i>															
Intercept	3.478	1.246	0.070	***	0.861	0.054	***	1.533	0.427	0.097	***	0.955	-0.046	0.097	
Male	0.805	-0.216	0.027	***	-0.161	0.031	***	0.828	-0.189	0.052	**	0.963	-0.038	0.050	
White	0.971	-0.029	0.062		-0.010	0.049		1.070	0.068	0.086		1.257	0.229	0.071	**
Treatment	0.962	-0.038	0.049		-0.008	0.031		0.924	-0.079	0.074		1.071	0.068	0.089	
Wave 2	1.189	0.173	0.043	***	0.053	0.022	*	0.912	-0.092	0.057		--	--	--	
Wave 3	1.207	0.188	0.059	**	0.035	0.032		0.953	-0.048	0.080		0.508	-0.678	0.078	***
Wave 4	1.165	0.153	0.060	*	0.049	0.034		0.950	-0.052	0.090		0.586	-0.053	0.061	***
Wave 5	0.993	-0.007	0.056		0.033	0.031		0.876	-0.133	0.098		0.553	-0.593	0.056	***
Var. Comp.		VC	SD		VC	SD		VC	SD			VC	SD		
Level 3		0.006	0.077	*	0.001	0.028		0.015	0.123	**		0.034	0.186	***	
Level 2		0.278	0.527	***	0.154	0.392	***	0.244	0.494	***		0.195	0.442	***	
Level 1		0.919	0.959		0.135	0.368		--	--			--	--		

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio, Emp. = Empirical, VC = Variance Component, and SD = Standard Deviation. Wave 1 is the reference variable in Models I-III. Wave 2 is the reference variable in Model IV. Female is the reference variable to male. Non-white is the reference variable to white.

Table 3-4: Disadvantage Predicting Mediating Variables.

Predictor	Mediator as Outcome	Coef.	RSE	
Disadvantage	<i>School Measures</i>			
	Grades	-0.142	0.012	***
	School Bonding	-0.046	0.014	**
	Getting into Trouble	0.054	0.014	***
	Educ. Aspirations	-0.055	0.010	***
	Absences	0.082	0.018	***
	<i>Family Measures</i>			
	Family Relations	-0.024	0.007	**
	Family Home Condition	-0.262	0.019	***
	Family Location	0.044	0.009	***
	Parental Comm.	-0.008	0.007	
	Parental Sch. Involv.	-0.061	0.018	**
	<i>Individual Measures</i>			
	Poor Mental Health	0.072	0.010	***
	Poor Physical Health	0.059	0.015	***
	Attractiveness	-0.059	0.008	***
	Bullies Others	0.035	0.007	***
Nervous	0.022	0.007	**	

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: Coef. = Coefficient; RSE = Robust Standard Error. All models controlled for sex, race, wave, and treatment condition.

Table 3-5: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability with the School Variables.

	Model I: In-Degree			Model II: Bonacich			Model III: Reciprocity			Model IV: Stability					
	R.R.	Coef.	RSE	Coef.	RSE	O.R.	Coef.	RSE	O.R.	Coef.	RSE				
<i>Disadvantage</i>															
Empirical Bayes FRL	0.900	-0.105	0.012	***	-0.077	0.009	***	0.919	-0.084	0.022	***	0.946	-0.056	0.015	***
Empirical Bayes FRL	0.913	-0.091	0.013	***	-0.064	0.009	***	0.930	-0.073	0.021	**	0.967	-0.033	0.014	*
<i>School Measures</i>															
Grades	1.071	0.069	0.025	**	0.069	0.014	***	1.075	0.072	0.037		1.091	0.087	0.041	*
School Bonding	0.980	-0.020	0.022		0.027	0.019		0.901	-0.105	0.046	*	1.068	0.066	0.050	
Getting into Trouble	0.992	-0.008	0.028		0.022	0.015		0.923	-0.080	0.038	*	0.904	-0.101	0.047	*
Educ. Aspirations	1.055	0.054	0.031		0.036	0.017	*	0.974	-0.026	0.044		0.932	-0.071	0.048	
Absent	0.983	-0.017	0.014		-0.004	0.010		0.960	-0.040	0.025		0.952	-0.050	0.025	
<i>Controls</i>															
Intercept	2.586	0.950	0.181	***	0.327	0.097	**	2.347	0.853	0.273	**	0.817	-0.202	0.327	
Male	0.813	-0.207	0.029	***	-0.139	0.033	***	0.804	-0.219	0.053	***	1.012	0.012	0.054	
White	0.980	-0.020	0.061		-0.012	0.050		1.071	0.069	0.086		1.239	0.215	0.071	**
Treatment	0.951	-0.051	0.052		-0.018	0.033		0.933	-0.070	0.074		1.054	0.052	0.087	
Wave 2	1.198	0.181	0.043	***	0.069	0.024	**	0.918	-0.085	0.053		--	--	--	
Wave 3	1.212	0.193	0.059	**	0.042	0.036		0.968	-0.032	0.075		0.533	-0.629	0.083	***
Wave 4	1.176	0.162	0.060	**	0.068	0.037		0.955	-0.046	0.091		0.618	-0.482	0.064	***
Wave 5	1.014	0.014	0.055		0.065	0.031	*	0.901	-0.104	0.094		0.600	-0.510	0.064	***
Var. Comp.		VC	SD		VC	SD		VC	SD			VC	SD		
Level 3		0.007	0.083	*	0.002	0.040		0.015	0.124	**		0.034	0.184	***	
Level 2		0.260	0.510	***	0.145	0.381	***	0.229	0.479	***		0.163	0.403	***	
Level 1		0.935	0.967		0.136	0.369		--	--			--	--		

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio, VC = Variance Component, and SD = Standard Deviation. Wave 1 is the reference variable in Models I-III. Wave 2 is the reference variable in Model IV. Female is the reference variable to male. Non-white is the reference variable to white.

Table 3-6: Percentage of Mediation explained by School Variables.

Mediator	Percent Explained			
	Deg	Bon	Rec	Sta
<i>School Measures</i>	13.53	17.91	13.31	40.10
Grades	9.32 **	12.98 ***	12.11 **	22.78 *
School Bonding	-0.88	1.62	-5.64	5.51
Getting into Trouble	0.42	-1.60	5.12	10.10
Educ. Aspirations	2.82	2.65	-1.69	-7.20
Absences	1.34	0.43	3.93	7.52

Note: *p<0.05, **p<0.01, ***p<0.001.

Table 3-7: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability with the Family Variables.

	Model I: In-Degree			Model II: Bonacich			Model III: Reciprocity			Model IV: Stability					
	R.R.	Coef.	RSE	Coef.	RSE	O.R.	Coef.	RSE	O.R.	Coef.	RSE				
<i>Disadvantage</i>															
Empirical Bayes FRL	0.900	-0.105	0.012	***	-0.077	0.009	***	0.919	-0.084	0.022	***	0.946	-0.056	0.015	***
Empirical Bayes FRL	0.920	-0.084	0.011	***	-0.062	0.008	***	0.939	-0.063	0.026	*	0.976	-0.024	0.016	
<i>Family Measures</i>															
Family Relations	0.963	-0.037	0.033		-0.019	0.028		1.022	0.022	0.044		1.184	0.169	0.049	**
Family Home Cond.	1.089	0.086	0.019	***	0.051	0.012	***	1.114	0.108	0.036	**	1.115	0.109	0.023	***
Family Location	1.036	0.035	0.029		-0.015	0.025		1.062	0.060	0.045		1.011	0.011	0.038	
Parental Comm.	0.932	-0.070	0.036		-0.042	0.020	*	0.977	-0.023	0.072		1.017	0.017	0.050	
Parental Sch. Involv.	1.043	0.042	0.015	**	0.039	0.009	***	0.999	-0.001	0.028		1.033	0.032	0.022	
<i>Controls</i>															
Intercept	2.121	0.752	0.141	***	0.624	0.110	***	0.828	-0.189	0.272		0.503	-0.688	0.161	***
Male	0.822	-0.196	0.025	***	-0.146	0.031	***	0.842	-0.173	0.053	**	0.938	-0.064	0.047	
White	0.980	-0.020	0.059		-0.020	0.045		1.092	0.088	0.088		1.291	0.255	0.089	**
Treatment	0.966	-0.034	0.050		-0.012	0.031		0.947	-0.054	0.075		1.071	0.068	0.085	
Wave 2	1.174	0.161	0.043	***	0.044	0.024		0.928	-0.074	0.056		--	--	--	
Wave 3	1.216	0.196	0.060	**	0.036	0.036		0.989	-0.011	0.085		0.502	-0.689	0.079	***
Wave 4	1.158	0.147	0.059	*	0.054	0.035		0.972	-0.029	0.086		0.601	-0.510	0.066	***
Wave 5	0.993	-0.007	0.060		0.044	0.033		0.880	-0.127	0.105		0.565	-0.570	0.060	***
Var. Comp.		VC	SD		VC	SD		VC	SD			VC	SD		
Level 3		0.007	0.082	*	0.001	0.032		0.015	0.124	**		0.029	0.171	***	
Level 2		0.251	0.501	***	0.141	0.375	***	0.236	0.485	***		0.175	0.418	***	
Level 1		0.932	0.966		0.135	0.368		--	--			--	--		

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio, VC = Variance Component, and SD = Standard Deviation. Wave 1 is the reference variable in Models I-III. Wave 2 is the reference variable in Model IV. Female is the reference variable to male. Non-white is the reference variable to white.

Table 3-8: Percentage of Mediation explained by Family Variables.

Mediator	Percent Explained			
	Deg	Bon	Rec	Sta
<i>Family Measures</i>	20.75	19.61	25.13	56.31
Family Relations	-0.84	-0.56	0.57	6.86 *
Family Home				
Condition	21.21 ***	17.09 ***	31.80 **	48.67 ***
Family Location	-1.44	0.84	-2.95	-0.85
Parental Comm.	-0.53	-0.43	-0.21	0.23
Parental Sch. Involv.	2.45 *	3.04 *	-0.07	3.40

Table 3-9: 3-Level, Multilevel Models of Disadvantage Predicting In-Degree, Bonacich, Reciprocity, and Stability with the Other Individual Variables.

	Model I: In-Degree				Model II: Bonacich			Model III: Reciprocity				Model IV: Stability			
	R.R.	Coef.	RSE		Coef.	RSE		O.R.	Coef.	RSE		O.R.	Coef.	RSE	
<i>Disadvantage</i>															
Empirical Bayes FRL	0.900	-0.105	0.012	***	-0.077	0.009	***	0.919	-0.084	0.022	***	0.946	-0.056	0.015	***
Empirical Bayes FRL	0.919	-0.085	0.011	***	-0.065	0.008	***	0.932	-0.070	0.023	**	0.965	-0.036	0.016	*
<i>Individual Measures</i>															
Poor Mental Health	0.861	-0.150	0.034	***	-0.084	0.016	***	0.844	-0.169	0.057	**	0.825	-0.192	0.056	**
Poor Physical Health	0.950	-0.051	0.014	**	-0.046	0.010	***	0.971	-0.030	0.029		0.943	-0.058	0.022	**
Attractiveness	1.051	0.049	0.021	*	0.036	0.012	**	1.017	0.017	0.045		1.054	0.052	0.042	
Bullies Others	0.953	-0.049	0.046		-0.043	0.020	*	0.958	-0.043	0.060		0.993	-0.008	0.050	
Nervous	0.925	-0.078	0.036	*	-0.035	0.018		0.957	-0.044	0.061		1.031	0.031	0.072	
<i>Controls</i>															
Intercept	3.531	1.262	0.095	***	0.881	0.058	***	1.580	0.457	0.217	*	0.979	-0.021	0.176	
Male	0.831	-0.186	0.028	***	-0.140	0.033	***	0.856	-0.156	0.055	**	0.973	-0.027	0.047	
White	1.014	0.014	0.055		0.007	0.043		1.119	0.113	0.081		1.291	0.256	0.076	**
Treatment	0.963	-0.038	0.050		-0.008	0.033		0.935	-0.067	0.079		1.075	0.073	0.089	
Wave 2	1.165	0.153	0.044	**	0.047	0.024		0.923	-0.081	0.053		--	--	--	
Wave 3	1.196	0.179	0.057	**	0.030	0.034		0.981	-0.019	0.078		0.504	-0.684	0.080	***
Wave 4	1.160	0.148	0.060	*	0.058	0.037		0.962	-0.038	0.088		0.592	-0.524	0.066	***
Wave 5	0.994	-0.006	0.061		0.044	0.035		0.881	-0.122	0.105		0.558	-0.583	0.062	***
Var. Comp.		VC	SD		VC	SD		VC	SD			VC	SD		
Level 3		0.008	0.087	**	0.002	0.044		0.017	0.130	*		0.036	0.189	***	
Level 2		0.236	0.486	***	0.133	0.036	***	0.220	0.469	***		0.172	0.415	***	
Level 1		0.924	0.961		0.135	0.367		--	--			--	--		

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio, VC = Variance Component, and SD = Standard Deviation. Wave 1 is the reference variable in Models I-III. Wave 2 is the reference variable in Model IV. Female is the reference variable to male. Non-white is the reference variable to white.

Table 3-10: Percentage of Mediation explained by Other Individual Variables.

Mediator	Percent Explained			
	Deg	Bon	Rec	Sta
<i>Individual Measures</i>	19.71	15.60	16.32	36.01
Poor Mental Health	10.36 ***	7.74 ***	13.93 **	24.97 **
Poor Physical Health	2.88 **	3.46 **	1.98	6.16 *
Attractiveness	2.79 *	2.74 **	1.17	5.58
Bullies Others	1.61	1.92	1.68	0.47
Nervous	1.65	0.98	1.10	-1.23

Note: *p<0.05, **p<0.01, ***p<0.001.

Table 3-11: 3-Level, Multilevel Models of Disadvantage Predicting Four Social Relations with all Mediating Variables.

	Model I: In-Degree			Model II: Bonacich			Model III: Reciprocity			Model IV: Stability					
	R.R.	Coef.	RSE	Coef.	RSE		O.R.	Coef.	RSE	O.R.	Coef.	RSE			
<i>Disadvantage</i>															
Empirical Bayes FRL	0.900	-0.105	0.012	***	-0.077	0.009	***	0.919	-0.084	0.022	***	0.946	-0.056	0.015	***
Empirical Bayes FRL	0.940	-0.061	0.013	***	-0.046	0.008	***	0.953	-0.048	0.026		0.995	-0.005	0.017	
<i>School Measures</i>															
Grades	1.058	0.057	0.027	*	0.056	0.016	**	1.076	0.073	0.040		1.101	0.096	0.035	**
School Bonding	0.954	-0.047	0.025		0.006	0.017		0.876	-0.132	0.059	*	1.002	0.002	0.062	
Getting into Trouble	1.018	0.018	0.028		0.045	0.016	**	0.951	-0.051	0.037		0.958	-0.043	0.052	
Educ. Aspirations	1.044	0.043	0.034		0.032	0.016	*	0.974	-0.026	0.055		0.932	-0.070	0.046	
Absent	0.988	-0.012	0.015		-0.001	0.011		0.963	-0.038	0.025		0.967	-0.034	0.027	
<i>Family Measures</i>															
Family Relations	0.946	-0.055	0.045		-0.052	0.036		1.067	0.065	0.077		1.100	0.095	0.075	
Family Home Cond.	1.078	0.075	0.021	**	0.042	0.015	**	1.095	0.091	0.038	*	1.090	0.086	0.026	**
Family Location	1.038	0.037	0.026		-0.012	0.024		1.080	0.076	0.041		1.015	0.015	0.045	
Parental Comm.	0.933	-0.069	0.039		-0.039	0.022		0.987	-0.013	0.077		1.030	0.030	0.042	
Parental Sch. Involv.	1.037	-0.069	0.039		0.035	0.008	***	0.983	-0.017	0.031		1.023	0.023	0.022	
<i>Individual Measures</i>															
Poor Mental Health	0.879	-0.129	0.037	**	-0.070	0.020	**	0.882	-0.125	0.064	*	0.898	-0.108	0.064	
Poor Physical Health	0.946	-0.055	0.013	***	-0.047	0.009	***	0.974	-0.026	0.025		0.968	-0.032	0.024	
Attractiveness	1.042	0.042	0.022		0.034	0.013	*	0.991	-0.009	0.043		1.016	0.016	0.043	
Bullies Others	0.968	-0.033	0.043		-0.035	0.019		0.949	-0.053	0.056		0.996	-0.004	0.048	
Nervous	0.929	-0.074	0.037	*	-0.032	0.019		0.957	-0.044	0.063		1.025	0.025	0.073	
Intercept	2.019	0.703	0.224	**	0.256	0.087	**	1.713	0.538	0.457		0.527	-0.640	0.361	

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio. All Models are three-level and are controlling for Male, White, Treatment Condition, and Wave.

Table 3-12: Percentage of Mediation explained by all Variables.

Mediator	Percent Explained			
	InDeg	Bonac	Recip	Stab
Total % Mediated	41.80	40.56	43.06	92.54
<i>School Measures</i>				
Grades	8.12 *	10.30 **	11.49	24.49 **
School Bonding	-2.15	0.36	-6.66	0.19
Getting into Trouble	-1.00	-3.15	3.04	4.18
Educ. Aspirations	2.40	2.30	-1.59	-6.94
Absences	1.00	0.14	3.47	4.93
<i>Family Measures</i>				
Family Relations	-1.32	-1.57	1.70	4.02
Family Home Condition	19.80 **	14.27 **	26.32 *	41.77 **
Family Location	-1.63	0.65	-3.68	-1.18
Parental Comm.	-0.55	-0.40	-0.12	0.42
Parental Sch. Involv.	-4.25	2.72 **	-1.17	2.50
<i>Individual Measures</i>				
Poor Mental Health	9.35 **	6.52 **	10.05	13.91
Poor Physical Health	3.26 **	3.55 **	1.69	3.36
Attractiveness	2.49	2.59 *	-0.62	1.67
Bullies Others	1.15	1.58	2.02	0.25
Nervous	1.64	0.92	1.08	-0.98

Note: *p<0.05, **p<0.01, ***p<0.001.

Table 3-13: 3-Level Overdispersed Poisson Predicting In-Degree

In-Degree	Income		P.Educ		Both Bio Par.		SES Comp.		
	Coef.	RSE	Coef.	RSE	Coef.	RSE	Coef.	RSE	
<i>Disadvantage</i>									
Household Income (log)	0.096	0.023	***						
Mother's Education				0.034	0.015	*			
Both Parents						0.093	0.032	**	
Empirical Bayes FRL									
Low SES Scale								-0.108 0.023 ***	
<i>School Measures</i>									
Grades	0.048	0.026		0.066	0.026	*	0.067	0.025 **	0.045 0.026
School Bonding	-0.048	0.028		-0.050	0.025	*	-0.054	0.025 *	-0.047 0.028
Getting into Trouble	0.014	0.029		0.017	0.028		0.019	0.027	0.014 0.029
Educ. Aspirations	0.049	0.035		0.047	0.034		0.060	0.034	0.056 0.034
Absent	-0.012	0.015		-0.016	0.016		-0.014	0.015	-0.011 0.015
<i>Family Measures</i>									
Family Relations	-0.055	0.047		-0.048	0.045		-0.068	0.047	-0.069 0.048
Family Home Condition	0.080	0.022	**	0.096	0.020	***	0.095	0.020 ***	0.085 0.021 ***
Family Location	0.031	0.029		0.026	0.027		0.033	0.026	0.034 0.030
Parental Comm.	-0.063	0.041		-0.062	0.040		-0.068	0.039	-0.068 0.041
Parental Sch. Involv.	0.043	0.014	**	0.036	0.015	*	0.035	0.015 *	0.040 0.014 **
<i>Individual Measures</i>									
Mental Health Problems	-0.142	0.036	***	-0.136	0.037	***	-0.139	0.036 ***	-0.140 0.036 ***
Physical Health Problems	-0.056	0.012	***	-0.056	0.020	***	-0.058	0.012 ***	-0.055 0.011 ***
Attractiveness	0.049	0.024	*	0.044	0.022		0.043	0.022	0.045 0.024
Bullies others	-0.035	0.047		-0.037	0.043		-0.029	0.043	-0.033 0.046
Nervous	-0.081	0.037	*	-0.074	0.037	*	-0.077	0.037 *	-0.083 0.038 *
Intercept	-0.333	0.289		0.498	0.231	*	0.510	0.228 *	0.999 0.291 **

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio. All Models are three-level and are controlling for Male, White, Treatment Condition, and Wave.

Table 3-14: 3-Level HLM Predicting Bonacich Centrality

Bonacich Centrality	Income			P.Educ			Both Bio Par.			SES Comp.		
	Coef.	RSE		Coef.	RSE		Coef.	RSE		Coef.	RSE	
<i>Disadvantage</i>												
Household Income (log)	0.080	0.017	***									
Mother's Education				0.042	0.012	**						
Both Parents							0.062	0.030	*			
Empirical Bayes FRL												
Low SES Scale										-0.097	0.021	***
<i>School Measures</i>												
Grades	0.056	0.017	**	0.061	0.016	***	0.063	0.016	***	0.052	0.017	**
School Bonding	0.006	0.020		0.003	0.018		0.002	0.017		0.006	0.019	
Getting into Trouble	0.046	0.016	**	0.044	0.016	**	0.046	0.016	**	0.046	0.017	**
Educ. Aspirations	0.041	0.018	*	0.033	0.016	*	0.039	0.017	*	0.040	0.018	*
Absent	-0.002	0.012		-0.004	0.011		-0.003	0.011		-0.001	0.012	
<i>Family Measures</i>												
Family Relations	-0.060	0.037		-0.046	0.036		-0.059	0.036		-0.070	0.038	
Family Home Condition	0.049	0.016	**	0.057	0.015	***	0.057	0.014	***	0.052	0.015	**
Family Location	-0.008	0.023		-0.019	0.024		-0.018	0.023		-0.005	0.024	
Parental Comm.	-0.031	0.024		-0.034	0.022		-0.037	0.021		-0.035	0.023	
Parental Sch. Involv.	0.036	0.009	***	0.033	0.008	***	0.035	0.009	***	0.036	0.009	***
<i>Individual Measures</i>												
Mental Health Problems	-0.081	0.022	***	-0.075	0.019	***	-0.077	0.020	***	-0.081	0.022	***
Physical Health Problems	-0.050	0.010	***	-0.047	0.009	***	-0.048	0.009	***	-0.049	0.009	***
Attractiveness	0.039	0.014	**	0.035	0.013	**	0.036	0.014	**	0.038	0.014	**
Bullies others	-0.046	0.019	*	-0.039	0.018	*	-0.035	0.017	*	-0.045	0.018	*
Nervous	-0.032	0.020		-0.033	0.019		-0.031	0.019		-0.030	0.020	
Intercept	-0.669	0.165	**	0.082	0.099		0.124	0.092		0.479	0.128	**

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio. All Models are three-level and are controlling for Male, White, Treatment Condition, and Wave.

Table 3-15: 3-Level Binomial Model Predicting Reciprocity based on Out-Degree

	Income		P.Educ		Both Bio Par.		SES Comp.		
	Coef.	RSE	Coef.	RSE	Coef.	RSE	Coef.	RSE	
<i>Disadvantage</i>									
Household Income (log)	0.103	0.046	*						
Mother's Education				0.017	0.037				
Both Parents						0.044	0.047		
Empirical Bayes FRL									
Low SES Scale								-0.069	0.055
<i>School Measures</i>									
Grades	0.074	0.043		0.082	0.041	*	0.081	0.043	
School Bonding	-0.137	0.063	*	-0.137	0.058	*	-0.135	0.058	*
Getting into Trouble	-0.042	0.037		-0.050	0.036		-0.047	0.035	
Educ. Aspirations	-0.012	0.051		-0.021	0.057		-0.013	0.055	
Absent	-0.051	0.025	*	-0.042	0.026		-0.042	0.026	*
<i>Family Measures</i>									
Family Relations	0.062	0.078		0.076	0.077		0.063	0.076	
Family Home Condition	0.094	0.040	*	0.113	0.032	**	0.113	0.032	**
Family Location	0.077	0.044		0.065	0.042		0.068	0.040	
Parental Comm.	-0.008	0.075		-0.005	0.078		-0.008	0.078	
Parental Sch. Involv.	-0.020	0.030		-0.017	0.032		-0.015	0.032	
<i>Individual Measures</i>									
Mental Health Problems	-0.113	0.064		-0.134	0.064	*	-0.131	0.065	*
Physical Health Problems	-0.018	0.025		-0.029	0.025		-0.030	0.026	
Attractiveness	-0.013	0.047		-0.007	0.044		-0.010	0.044	
Bullies others	-0.045	0.061		-0.052	0.056		-0.053	0.056	
Nervous	-0.018	0.065		-0.044	0.064		-0.045	0.064	
Intercept	-0.643	0.640		0.378	0.454		0.371	0.463	

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio. All Models are three-level and are controlling for Male, White, Treatment Condition, and Wave.

Table 3-16: 3-Level Binomial Model Predicting Stability based on Out-Degree at T1

	Income		P.Educ		Both Bio Par.		SES Comp.	
	Coef.	RSE	Coef.	RSE	Coef.	RSE	Coef.	RSE
<i>Disadvantage</i>								
Household Income (log)	0.073	0.03 0 *		0.03 2				
Mother's Education			0.024			0.07 5 *		
Both Parents Empirical Bayes FRL					0.155			
Low SES Scale							-0.107	0.04 4 *
<i>School Measures</i>								
Grades	0.093	0.03 4 **	0.094	0.03 4 **	0.093	0.03 6 *	0.085	0.03 5 *
School Bonding	-0.003	0.06 2	0.002	0.06 2	-0.004	0.06 3	-0.010	0.06 3
Getting into Trouble	-0.046	0.05 1	-0.045	0.05 2	-0.042	0.05 2	-0.044	0.05 2
Educ. Aspirations	-0.043	0.04 8	-0.073	0.04 9	-0.065	0.04 9	-0.040	0.05 0
Absent	-0.020	0.02 6	-0.034	0.02 6	-0.029	0.02 7	-0.018	0.02 6
<i>Family Measures</i>								
Family Relations	0.093	0.08 0	0.096	0.07 5	0.075	0.07 7	0.092	0.08 1
Family Home Condition	0.069	0.02 3 **	0.090	0.02 3 ***	0.082	0.02 1 ***	0.069	0.02 3 **
Family Location	0.025	0.04 5	0.016	0.04 2	0.034	0.04 3	0.034	0.04 5
Parental Comm.	0.054	0.04 3	0.031	0.04 3	0.033	0.04 3	0.054	0.04 2
Parental Sch. Involv.	0.024	0.02 4	0.021	0.02 2	0.022	0.02 4	0.021	0.02 5
<i>Individual Measures</i>								

		0.07		0.06		0.06		0.07	
Mental Health Problems	-0.118	1		-0.109	4	-0.106	4	-0.120	1
		0.02			0.02		0.02		0.02
Physical Health Problems	-0.024	5		-0.031	4	-0.032	4	-0.025	6
		0.04			0.04		0.04		0.04
Attractiveness	0.024	5		0.015	2	0.014	1	0.020	5
		0.04			0.04		0.04		0.04
Bullies others	0.035	8		-0.005	8	-0.009	9	0.034	8
		0.07			0.07		0.07		0.07
Nervous	-0.008	3		0.022	3	0.020	3	-0.007	4
		0.40			0.37		0.37		0.39
Intercept	-1.476	4	**	-0.671	4	-0.704	3	-0.318	8

Notes: Level 1 N=3500; Level 2 N= 908, Level 3 N=27. *p<0.05, **p<0.01, ***p<0.001. Abbreviations: R.R. = Risk Ratio, RSE = Robust Standard Error, O.R. = Odds Ratio. All Models are three-level and are controlling for Male, White, Treatment Condition, and Wave.

Chapter 4

Disadvantage, Social Relations, and Behavior

The previous chapter demonstrated that financially disadvantaged adolescents are less likely than non-disadvantaged adolescents to be popular, have stable friendships, or have reciprocal friendships. Crosnoe (2000) explained that the structure of one's social network can influence and impact the individuals beyond the characteristics of the network members. Because adolescent social networks are pushing financially disadvantaged adolescents to the periphery of the social networks, then this may have important consequences for those adolescents' friendship choices and individual behavior. I discuss and examine these consequences in two parts. First, if financially disadvantaged adolescents are less likely to be well integrated within their school-based social networks, then does this effect the types of friends that they *do* have? Second, do these social patterns, and the types of friends gained, have a mediating impact on the relationships of disadvantage and delinquency with school instability?

As previously discussed, subcultural theories of delinquency argue that disadvantaged adolescents who poorly socially integrated will be more likely to become friends with other disadvantaged or maladjusted adolescents. Research on adolescent social networks seems to support this theoretical argument, as it is evident that aggressive and/or delinquent children tend to be on the periphery of their social networks (Light and Dishion 2007). Therefore, based on findings from the previous chapter, it seems likely that disadvantaged adolescents will have more connections with violent and/or

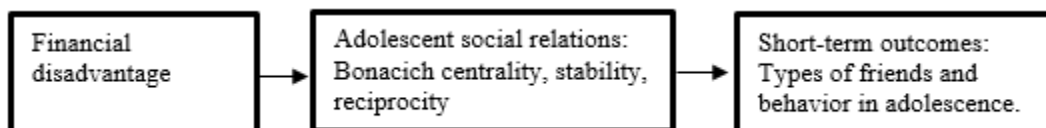
maladjusted peers than do non-disadvantaged adolescents, who tend to be central within their social network. The current chapter empirically examines this claim by determining if disadvantaged adolescents have more disadvantaged and/or delinquent friends than non-disadvantaged adolescents have. If so, I will also test if the social relations examined in the previous chapter, specifically popularity, stability, and reciprocity, mediate these relationships.

Next, I will examine the effects of the disparity in popularity, stability, and reciprocity, as well as the types of friends on the relationships of disadvantage and delinquency and school instability. Since financially disadvantaged adolescents tend to be less socially integrated, subcultural theories would argue that these adolescents would be more likely to seek out alternative forms of achieving status, such as by engaging in delinquency. Differential association theory would also argue that the disparity in social relations should result in individual delinquency because of the higher association with delinquent peers, who are also more likely to be on the periphery of social networks (Coie, Dodge, and Coppotelli 1982; McGuire 1973).

Meanwhile, Wehlage et al. (1989) highlighted the importance of the social dimension of school belonging, arguing that social ties, in addition to academic performance, affect one's likelihood of dropping out of school. While most research examining school withdrawal, especially in criminology, focuses solely on school dropout as an outcome, Rumberger and Larson (1998) stated that school mobility is important to consider, as well. Based on the above theoretical arguments, I empirically examine whether popularity, reciprocity, and stability mediate the relationships of disadvantage and delinquency and school instability. Figure 4.1 presents a path diagram

that demonstrates the focus of the current chapter. This is a more detailed version of a portion of the path diagram presented in Chapter 1.

Figure 4-1: Path diagram demonstrating the focus of this chapter.



Methodology

PROSPER Data

This chapter of my dissertation will primarily use data from the in-school sample (see Chapter 2: Data of this dissertation for more information about this sample). The sample size consists of approximately 9,000 students at each wave, with participation rates averaging approximately 88% across all eight waves. Because the measure of friendship stability requires two waves of network information, wave one is excluded from the analyses.

Measures

Table 4.1 provides descriptions and descriptive statistics for all of the measures used in this chapter.

Table 4-1: Descriptive Statistics

Measure	Description	Mean	SD	Min	Max
---------	-------------	------	----	-----	-----

Peer Disadvantage	The average of empirical Bayes FRL disadvantage across each of the friends of a given respondent.	0.25	0.30	0.00	1.00
Peer Delinquency	Average of friends' delinquency (IRT scale).	0.29	0.58	-0.34	3.94
Delinquency	12-item index of delinquency behavior (IRT scale).	0.32	0.82	-0.34	3.94
School Instability	Whether or not the adolescent leaves the sample between the current wave and the next wave.	0.10		0.00	1.00
Disadvantage	Empirical Bayes aggregate of student-reported receiving of free/reduced price lunch.	-0.26	1.63	-1.76	3.43
Bonacich Cent.	Indicator of the number and prestige of the friends that the actor is connected to.	0.77	0.59	0.00	4.54
Stability	Proportion of friends from T1 that overlap to T2.	0.41	0.26	0.00	1.00
Reciprocity	Proportion of mutual to non-mutual friendships.	0.50	0.34	0.00	1.00
Previous Isolates	Dummy variable capturing adolescents who did not receive a friendship nomination in T1, and thus could not have a friendship stability rate.	0.26		0.00	1.00
Current Isolates	Dummy variable capturing adolescents who did not make any friendship nominations in current wave, and thus could not have a reciprocity rate.	0.14		0.00	1.00
Grades	Student-reported school grades.	4.02	0.90	1.00	5.00
School Bonding	Average of eight items about feelings towards school and teachers.	3.69	0.74	1.00	5.00
Family Relations	Mean of standardized subscales assessing family relations.	-0.09	0.42	-1.40	0.83
Unstr. Socializing	Average of time spent with individuals nominated as friends.	2.93	1.13	0.00	5.00
Male	Whether respondent is male or female. 1=Male; 0=Female.	0.48		0.00	1.00
White	Whether respondent is white or non-white. 1=White; 0=Non-white.	0.85		0.00	1.00
Wave	The year the survey was administered.	4.83	1.92	2.00	8.00
Treatment	Whether or not the given school received the treatment intervention.	0.47		0.00	1.00

Outcome Variables.

Peer Disadvantage. Peer disadvantage is an average of the FRL measure from the respondents' friends. As previously discussed, the PROSPER Peers data set includes friendship nominations that were matched to the students, which allows researchers to create a full social network of the cohort. The peer disadvantage measure uses the scores of the friends on the empirical Bayes FRL variable to create an average disadvantage score for those friends. The average respondent has a mean peer disadvantage score of 0.25 with a standard deviation of 0.30.

Peer Delinquency. Peer delinquency is an average of the IRT delinquency measure from the respondents' friends. Again, this measure is created using the full social network of the cohort. This alleviates projection bias (Young et al. 2013), which is when students inaccurately project their own behavior when describing the behavior of their friends. Because the PROSPER Peers project provides matched nominations, I am able to employ an average peer delinquency measure based on a respondent's friends' own IRT delinquency scores. The average value of peer delinquency is 0.29 with a standard deviation 0.58 and a range of -0.34 to 3.94.

Delinquency. Delinquency is assessed using a twelve-item index of delinquent behavior. The delinquency measure accounts for skewed item probabilities using a graded response model from item response theory to convert the skewed distributions onto an equal interval scale for each measure (Osgood, McMorris, and Potenza 2002). Delinquency has a mean of 0.32, standard deviation of 0.82, and a range of -0.34 to 3.94.

School Instability. School instability is a binary variable that indicates whether the respondent is no longer listed on the school roster in the following wave, thus indicating that the respondent moved schools or dropped out of school entirely. Each student who was on the school roster for the given wave of data collection was given an ID number in the data set. In other words, if a student was enrolled in school, but did not fill out a survey questionnaire, he/she is still included in the data set but will have missing data for the questions. If the student is no longer enrolled in a given school (i.e., if he/she changed schools or if he/she dropped out of school entirely) then that individual is not included in the PROSPER data set for that wave. As discussed previously, school mobility of any kind should be considered a risk factor for adolescents. Thus, I operationalize school instability as any individual who leaves the PROSPER data set at the following wave. The school instability is a binary variable, with a one at the current wave indicating that the student will leave the data set in the following wave. 10% of the sample experienced school instability each wave, on average.

Independent Variables

Financial Disadvantage. This chapter uses the empirical Bayes FRL measure of disadvantage, the same measure for financial disadvantage as the previous chapter. For a more detailed description of this measure, please see Chapter 2 of this dissertation. Financial disadvantage has an average score of -0.26, with a standard deviation of 1.63.

Bonacich Centrality. In the previous chapter, I used both Bonacich centrality and in-degree to assess popularity and number of friends. Bonacich centrality is calculated by

weighting each node's centrality by the centrality of the actors that they are connected to. Please refer to Chapter 3 for a more-detailed description of Bonacich centrality. In-degree is calculated by summing the total number of friendship nominations each respondent receives. In this chapter, the social measures will be included in the same model, and preliminary analyses demonstrated that in-degree and Bonacich centrality are too correlated with one another to be included in the same model ($r = 0.78$). Because Bonacich centrality gives more information about an individual regarding his/her standing in the social network, I use Bonacich centrality as the sole measure of popularity for this chapter. The mean of Bonacich centrality is 0.77 with a standard deviation of 0.59.

Friendship Stability. As I described in the preceding chapter, friendship stability is a rate that is calculated by dividing the number of repeated nominations received in T2 by the number of total nominations received in T1. The average stability rate for the sample is 0.41, with a standard deviation of 0.26. Because this is a proportion, the range of the variable is 0 to 1.

Friendship Reciprocity. As I previously indicated, friendship reciprocity is a rate that is calculated as the number of reciprocated friendships divided by the number of sent nominations. The average reciprocity rate is 0.50 with a standard deviation of 0.34. Similar to stability, the range is 0 to 1.

Previous Isolates and Current Isolates. I created two separate dummy variables, previous isolates and current isolates, to ensure that individuals without friends are not excluded from the current analyses. In other words, respondents must have at least one friendship nomination to be included in the measures of friendship stability and

friendship reciprocity; individuals who are isolates in the previous wave and/or the current wave are coded as missing. So, if an individual did not name any friendships in the previous wave (i.e., he/she was previously an isolate) then he/she is given a missing value for friendship stability rate for the current wave. Similarly, isolates in the current wave receive a missing value in the current wave for friendship reciprocity rate. Therefore, if not accounted for, isolates from the previous wave and from the current wave will be excluded from the analyses that use friendship stability and friendship reciprocity as predictor variables. Thus, I created the measures of previous isolates and current isolates to account for this issue and to ensure that the isolates are still included in my analyses. For each of these dummy variables, isolates are coded as a one and everyone else is coded as a zero. Because I use listwise deletion in this chapter to handle missing data, I also have to give the isolates a value for the measures of stability and reciprocity rates or they would still be excluded from the analyses. Thus, each isolate is given the mean value of the whole sample for friendship stability rate and friendship reciprocity rate. 27% of the sample qualify as previous isolates, while 15% of the sample are coded as current isolates. There is a higher percentage of previous isolates than current isolates because previous isolates includes individuals who did not nominate any friends in the previous wave as well as those with missing data in the previous wave, whereas current isolates only includes those that did not nominate any friends in the current wave.

Control Variables

For each set of analysis, I will control for student grades, school bonding, family relations, unstructured socializing, sex, race, wave, and treatment condition. Student grades, school bonding, family relations, sex, race, wave, and treatment condition were described in detail in the previous chapter, so please refer to Chapter 3, or Table 4.1, for a description for each of those measures. However, the sample in this chapter is different than Chapter 3, so I will discuss the mean and standard deviations. The mean of student grades is 4.02, with a standard deviation of 0.90. School bonding has a mean of 3.69 and a standard deviation of 0.74. Family relations has an average score of -0.09, a standard deviation of 0.42, and a range of -1.40 to 0.83, with higher scores indicating stronger family relations. Unstructured socializing is an indicator of how much time the respondent spends time with his/her nominated friends outside of school. For each individual a respondent nominated as a friend, the respondent was asked how often he/she spends time with that individual outside of school without adults around. For each respondent, I averaged together the responses to these questions to create the measure of unstructured socializing. Unstructured socializing has a range of 0 to 5, with a mean score of 2.93 and a standard deviation of 1.13. Respondents coded as current isolates have a missing value for unstructured socializing so they are given the average value of the sample so that they are not excluded from the analyses. Sex is a binary variable coded as 0 for female (52%) and 1 for male (48%). Race is a binary variable coded as 0 for non-white (15%) and 1 for white (85%).

Analytic Strategy

To reiterate, this chapter seeks to determine the consequences of the disparity in social relations between financially disadvantaged adolescents and non-disadvantaged adolescents. First, if financially disadvantaged adolescents are less likely to socially integrate within their school-based social networks, then does this have an effect on the types of friends that they *do* have? Second, do these social patterns, and the types of friends gained, have a mediating impact on the relationships between disadvantage and delinquency and school instability?

To answer these research questions, I first will conduct bivariate analyses that compare financially disadvantaged adolescents to non-disadvantaged adolescents on the four outcome variables: peer disadvantage, peer delinquency, individual delinquency, and school instability. Next, I will estimate multivariate, multilevel regression models to explore the relationships between disadvantage and the four outcomes, providing a baseline association. Then, I will conduct mediation analyses (discussed in more detail below) to determine the extent to which the social measures mediate the relationships between disadvantage and peer disadvantage and peer delinquency, addressing research question one. Finally, I will conduct mediation analyses to examine the extent to which the social measures and the types of friends gained mediate the relationships of disadvantage with delinquency and school instability. For these analyses, I will also include peer disadvantage and peer delinquency as mediators.

Due to the longitudinal nature of the data set, I will rely upon hierarchical linear modeling using HLM software (Bryk and Raudenbush 2002) to address my research

questions. Please refer to Chapter 3 for a more detailed description of why hierarchical linear modeling applies to my data set. Similar to Chapter 3, time (level-1) is nested within students (level-2) within communities (level-3).

In order to effectively demonstrate that the social measures are mediating the relationship between disadvantage and the given outcome, I use the Baron-Kenny framework (Baron and Kenny 1986), which is discussed in more detail in Chapter 3. To assess path a , I will treat each of my three social variables, plus my two isolate variables, as a separate outcome, with disadvantage as the primary predictor variable.

Next, I will present two separate three-level, multilevel models for each of my four outcomes: peer disadvantage, peer delinquency, delinquency, and school instability. Model I for each set of analyses will include only disadvantage and my control variables. This model will allow for a baseline association between disadvantage and the given outcome. Model II in each set of analyses will include the mediating variables in addition to disadvantage and the control variables. For peer disadvantage and peer delinquency, the mediating variables include Bonacich centrality, friendship stability, and friendship reciprocity. When treating delinquency and school instability as outcomes, the mediating variables also include previous isolate, current isolate, peer disadvantage, and peer delinquency.

Additionally, to test the statistical significance and specific effects of each social measure, I will calculate the indirect effects and percentage-mediated of each of the social measures. This calculation method is described in detail in Chapter 3. The percentage explained by each of the social variables is presented in an additional column in the table in each section of the results, along with significance indicators.

I use listwise deletion to handle missing data in this chapter, which creates a different sample for each of the outcomes. By definition, the set of analyses examining peer disadvantage and peer delinquency cannot include isolates. In other words, if an individual does not have friends, then I cannot assess the disadvantage or the delinquency of his/her friends. Therefore, when treating peer disadvantage and peer delinquency as outcomes, the isolates are not included in this sample and, consequently, neither are the isolate measures. Additionally, when treating school instability as the outcome variable, wave 8 is excluded from the analyses as this variable measures school instability at the following wave, and wave 8 is the respondents' senior year of high school and, thus, is the final wave of in-school data. For all of the analyses in this chapter, wave one is excluded because calculating friendship stability requires two waves of data.

Results

Bivariate Analyses

Table 4.2 and Figure 4.3 present the results from t-tests and Pearson chi-square tests of association to determine a base relationship between disadvantage and the four outcomes. The table presents results when using all eight waves of data, while the figure presents the results wave-by-wave. As before, I recoded the empirical Bayes FRL continuous variable into a binary variable for these bivariate analyses, with those adolescents scoring in the top 15% of the empirical Bayes FRL variable being coded as disadvantaged, and everyone else being coded as non-disadvantaged. Disadvantaged

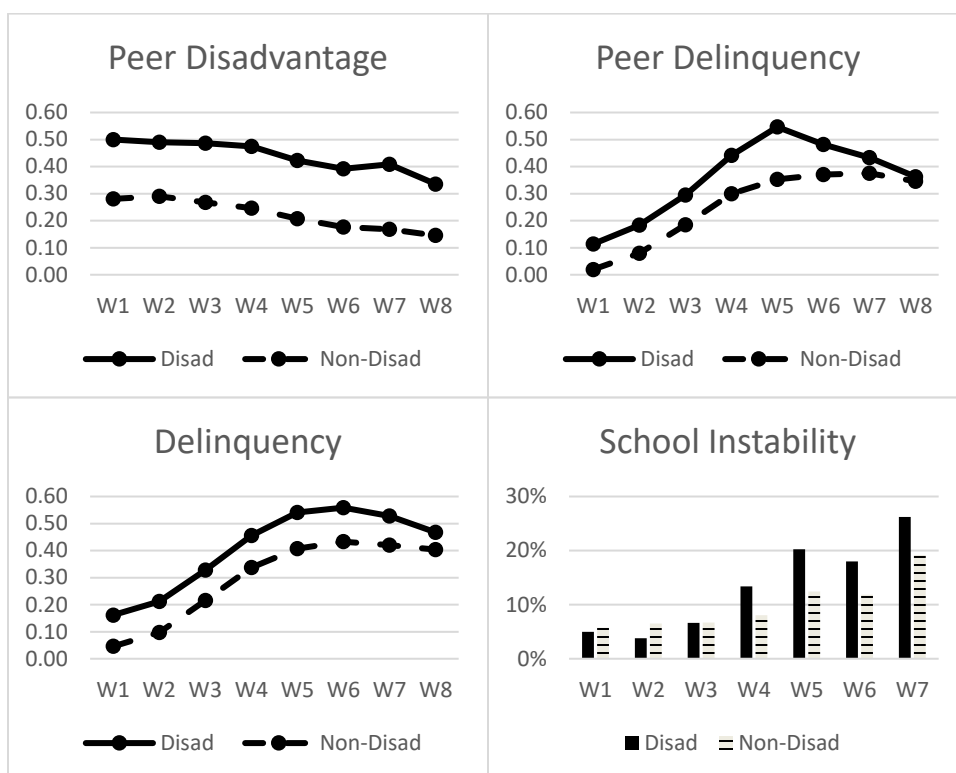
students, on average, score higher in peer disadvantage, peer delinquency, individual delinquency, and school instability as compared to non-disadvantaged students. The relationship between disadvantage and peer disadvantage is especially strong, with a Cohen's *d* value of -0.70. All of the results are significant at the $p < 0.001$ level. When I break these results down by wave, the differences in peer disadvantage, peer delinquency, and individual delinquency are relatively stable over time. School instability, however, is a bit different over time. In waves one, two, and three, disadvantaged and non-disadvantaged adolescents are similar in the percentages of adolescents experiencing school instability in the following year. In waves four through seven, however, once the sample is in high school, disadvantaged adolescents are much more likely than non-disadvantaged adolescents to experience school instability in the following year.

Table 4-2: Outcomes by Disadvantage

Outcome	Non-		Sig.	Cohen's <i>d</i> / Chi Sq.
	Dis.	Dis.		
Peer Disad.	0.45	0.23	***	-0.70
Peer Delinq.	0.36	0.25	***	-0.19
Delinquency	0.40	0.29	***	-0.13
Sch. Instability	13%	9%	***	97.42

Notes: T-Tests and chi-square test combine all 8 waves of data. All results statistically significant at $p < 0.001$ level. Abbreviations: Dis. = Disadvantage, Delinq. = Delinquency, Sig. = Significance.

Figure 4.3: Outcomes by Disadvantage, by Wave



Multivariate Analyses

Disadvantage Predicting Four Outcomes

I estimated four multivariate, multilevel regression models in which disadvantage separately predicts peer disadvantage, peer delinquency, individual delinquency, and school instability when controlling for grades, school bonding, family relations, unstructured socializing, sex, race, wave, treatment condition. This provides a baseline relationship between disadvantage and the four outcomes to determine if there is a

relationship to be explored further. Presented in Table 4.3, these results demonstrate that disadvantage is a significant predictor of each of the four outcomes. As disadvantage increases, levels of peer disadvantage, peer delinquency, individual delinquency, and likelihood of school instability are expected to increase, while controlling for grades, school bonding, family relations, unstructured socializing, sex, race, wave, and treatment condition.

[Table 4.3: Disadvantage Predicting Peer Disadvantage, Peer Delinquency, Delinquency, and School Instability about here]

Next, I will conduct mediation tests to determine if the social measures mediate the relationship between disadvantage and any of the four outcomes. To do so, I must first assess path *a* of the mediation diagram.

Path a: Mediation Measures as Outcomes

Table 4.4 presents the results when examining paths *a* of the mediation models. In other words, each of the social measures is treated as the outcome variable with disadvantage as the primary predictor. As noted in Chapter 3, this is one of two relationships that must come together to create mediation: the stronger this relationship, the greater potential for that variable to mediate its impact on the outcome. These relationships were also addressed in Chapter 3, but I return to them here in a version more closely matched to their role in this chapter. First, I include previous and current isolates in addition to Bonacich centrality, stability, and reciprocity. Additionally, in this chapter I use the in-school sample, whereas the previous chapter only used the in-home sample. Each three-level, multilevel model controls for school grades, school bonding,

family relations, unstructured socializing, sex, race, wave, and treatment condition. Consistent with the preceding analyses, disadvantage is a significant predictor of each of the social measures, and it has the strongest relationship with Bonacich centrality as compared to the other social measures, implying that Bonacich centrality has the most potential to be a mediating variable.

[Table 4.4: Path *a* of Mediation Analysis; Mediators as Outcomes about here]

Peer Disadvantage and Peer Delinquency

Next, I examine if the social measures mediate the relationships between disadvantage and peer disadvantage and peer delinquency. To reiterate, because peer disadvantage and peer delinquency are calculated by averaging the measures of one's friends, the isolates—previous and current—are excluded from this section of analysis. Therefore, the potential mediating social variables include Bonacich centrality, friendship stability, and friendship reciprocity. For each section of analysis, Model I presents the results from the earlier analysis of disadvantage predicting the outcome when controlling for school grades, school bonding, family relations, unstructured socializing, sex, race, wave, and treatment condition. Then, Model II presents the results when including the mediating variables.

Peer Disadvantage. Table 4.5 presents the results when treating peer disadvantage as the outcome variable. After including Bonacich centrality, friendship stability, and friendship reciprocity, the coefficient for individual disadvantage decreases by approximately 8%. Bonacich centrality and friendship reciprocity are both

significantly and negatively related to peer disadvantage. School grades and levels of peer disadvantage are negatively related, with each increase in the grades resulting in an expected decrease of 0.028 in levels of peer disadvantage. Males, on average, have lower levels of peer disadvantage than females. Whites, on average, have lower levels of peer disadvantage than non-whites. School bonding, family relations, unstructured socializing, and treatment condition are not significantly related to peer disadvantage, when controlling for everything else in the final model.

Bonacich centrality is a significant mediator of the relationship between individual disadvantage and peer disadvantage, accounting for about 6% of the relationship. Friendship reciprocity is also statistically significant, but accounts for less than 1% of mediation. Friendship stability is not a significant mediator of the relationship. In total, the effects from the three social measures account for almost 7% mediation, and are statistically significant at the $p < 0.001$ level.

[Table 4.5: Disadvantage Predicting Peer Disadvantage, about here]

Peer Delinquency. Table 4.6 presents the results when treating peer delinquency as the outcome variable. Model I presents the results from the earlier analysis of disadvantage predicting peer delinquency when controlling for grades, school bonding, family relations, unstructured socializing, sex, race, wave, and treatment condition. Upon including the three social measures, the coefficient for disadvantage decreases by about 9%, but remains significantly related to peer delinquency. Bonacich centrality and friendship stability are both negative predictors of peer delinquency. Friendship reciprocity is not a statistically significant predictor of peer delinquency. School grades, school bonding, and family relations are all negative predictors of peer delinquency,

while unstructured socializing is positively related to peer delinquency. Males are more likely to have delinquent friends as compared to females. Whites are less likely than non-whites to have delinquent friends. Treatment condition is not statistically significant in these analyses.

Next, I calculated the indirect effects and significance values for each of the three social measures. Bonacich centrality and friendship stability are both significant mediators of the relationship between disadvantage and peer delinquency. Bonacich centrality accounts for about 6% mediation, while friendship stability accounts for about 3.5%. Friendship reciprocity is not a statistically significant mediator. In total, the three social measures account for about 9% mediation, and the combined effects are statistically significant at the $p < 0.001$ level.

[Table 4.6: Disadvantage Predicting Peer Delinquency, about here]

Delinquency and School Instability

Next, I complete the mediation analyses when delinquency and school instability are the outcome variables. For this section of analysis, I include previous isolates and current isolates, as well as peer disadvantage and peer delinquency, as mediating variables in addition to Bonacich centrality, friendship stability, and friendship reciprocity. For each section of analysis, Model I presents the results from the earlier analysis of disadvantage predicting the outcome when controlling for school grades, school bonding, family relations, unstructured socializing, sex, race, wave, and treatment condition. Then, Model II presents the results when including the mediating variables.

Delinquency. Table 4.7 present the results when treating delinquency as the outcome variable. The coefficient for disadvantage decreases by about 17% after including the mediating variables, but disadvantage still remains significantly related to delinquency. Bonacich centrality is actually positively related to delinquent involvement. Having higher friendship stability rates is predictive of less delinquent involvement. Previous isolates are significantly more likely than non-previous isolates to engage in delinquent behavior. However, current isolates are not significantly more likely to be delinquent as compared to non-current isolates. Peer delinquency and individual delinquency are positively and significantly related. Friendship reciprocity and peer disadvantage are not significant predictors of individual delinquency. All of the control variables, with the exception of treatment condition, are significantly related to delinquency.

Next, I calculated the indirect effects and significance values for each of the mediating variables. Interestingly, Bonacich centrality is a significant mediator of the relationship between disadvantage and delinquency, but it is acting as a suppressor effect (more on this below). Friendship stability and previous isolates are both significant mediators of the relationship between disadvantage and delinquency, accounting for about 2% and 3% of the relationship, respectively. Peer delinquency is the strongest mediator of the relationship, accounting for almost 13% of the relationship between disadvantage and delinquency. Friendship reciprocity, current isolates, and peer disadvantage are not significant mediators. In total, the mediating variables account for about 14% mediation, and are statistically significant at the $p < 0.01$ level.

To help understand the suppressor effect with Bonacich centrality, I estimated additional models. First, I estimated a model that included disadvantage, the five social measures (including two isolates), and only the demographic measures as control variables. In other words, this model did *not* include peer disadvantage and peer delinquency as mediators, or grades, school bonding, family relations, and unstructured socializing as controls. In this model, Bonacich centrality was negatively related to delinquency, and was a significant mediator of the relationship between disadvantage and delinquency (Coef. = -0.018, RSE = 0.006; 2.4% mediation, $p < 0.01$). This demonstrates that the overall contribution of Bonacich centrality is in expected direction, even if further intervening relationships to other variables leave it with a direct effect in the unexpected direction.

Then, I wanted to separate the effects of peer disadvantage and peer delinquency to understand more how these measures are influencing individual delinquency. I estimated an additional model that included peer disadvantage, but left out peer delinquency. In this model, peer disadvantage is significantly related to delinquency (Coef. = 0.027, RSE = 0.009), and is a significant mediator of the relationship between disadvantage and delinquency (5.3%, $p < 0.01$), meaning that it matters by its association with peer delinquency (correlation between peer disadvantage and peer delinquency $r = 0.10$).

[Table 4.7: Disadvantage Predicting Delinquency, about here]

School Instability. Table 4.8 presents the results when treating school instability as the outcome variable. As a reminder, school instability is a binary variable so these are Bernoulli-specified multilevel models with logistic coefficients. Disadvantage

remains a significant predictor of school instability, with each one-unit increase in disadvantage increasing the odds of school instability by about 16%. Bonacich centrality, friendship stability, and friendship reciprocity are all negatively related to experiencing school instability. Each one-unit increase in Bonacich centrality decreases the odds of school instability by almost 50%. A one-unit increase in friendship stability decreases the odds of school instability by about 17%, while a one-unit increase in friendship reciprocity decreases the odds by about 36%. However, it is important to consider that a unit for stability and reciprocity is the difference between 0% and 100%, which are the two extremes for these variables. Previous isolates, current isolates, peer disadvantage, and peer delinquency are all positively related to school instability. All of the control variables, with the exception of treatment condition, are significantly related to school instability.

Next I calculated the indirect effects and confidence intervals for each of the mediating variables. All of the mediating variables are significant mediators of the relationship between disadvantage and school instability. The largest source of mediation comes from Bonacich centrality, which accounts for about 20% mediation. The next largest are previous isolates and peer disadvantage, which each account for about 4%. Friendship reciprocity accounts for about 2.5% mediation, while peer delinquency, current isolates, and friendship stability all hover around 1% mediation. In total, the mediating effects account for about 35% mediation, and are statistically significant at the $p < 0.001$ level.

[Table 4.8: Disadvantage Predicting School Instability, about here]

Discussion

This chapter empirically examined the consequences of the disparity in social relations between financially disadvantaged adolescents and non-disadvantaged adolescents. To start, it is evident from the results that financially disadvantaged adolescents are more likely than non-disadvantaged adolescents to have peers who are more disadvantaged and to have peers that engage in higher amounts of delinquency. Next, I determined that popularity is a significant mediator of both of these relationships. This finding is supportive of criminological theory, especially subcultural theory.

As discussed previously, subcultural theories of delinquency argue that financially disadvantaged adolescents are less likely to achieve status in the eyes of their peers, which in turn makes it more likely that they will become friends with other financially disadvantaged and maladjusted adolescents, especially delinquent peers. My findings are consistent with this sequence described in subcultural theory. Financially disadvantaged adolescents are less likely than non-disadvantaged adolescents to be popular within their social networks, and in turn they are more likely than non-disadvantaged adolescents to have peers with greater average disadvantage and greater average delinquency.

Criminological theory, as well as theories in education, argue that these relationships will have important consequences for individual behavior, specifically individual delinquency and school instability. Starting with theories about individual delinquency, subcultural theory would argue that increased interactions with disadvantaged and/or delinquent adolescents should lead to individual involvement in delinquency. Their low social status will motivate these disadvantaged adolescents

would to attempt to gain status with new friends, and the most likely candidates will also be disadvantaged and have a higher chance of engaging in delinquency. As discussed in detail in chapter 1, previous research has demonstrated that aggressive/or delinquent children tend to be on the periphery of their social networks (Coie et al. 1982; McGuire 1973). Thus, I argued that if disadvantaged adolescents are less likely to be popular, then this might cause an increase in the likelihood that they will come into contact with delinquent peers. Differential association theory, then, would argue that, because of this higher association with delinquent peers, this should lead to higher levels of individual delinquency.

The findings from this chapter and the previous chapter support these theoretical arguments. First, popularity is a significant mediator of the relationship between disadvantage and individual delinquency, prior to including peer disadvantage and peer delinquency. Then, after including peer disadvantage and peer delinquency, the mediating effect of popularity is accounted for, and even switches directions. In other words, disadvantaged adolescents are less likely to be popular, which in turn causes them to associate more with disadvantaged and delinquent peers. This higher association with disadvantaged and delinquent peers is causing the individual to engage in more delinquency, supporting expectations from both subcultural theories and differential association. Though these results support theoretical arguments, it should be noted that a limitation of my analyses is that there is a chance that the causal ordering may be reversed. In other words, it is possible that disadvantaged adolescents are engaging in delinquency, which in turn causes them to seek out other delinquent peers. This is an area that future research should address.

As discussed in chapter 1, Rumberger and Larson (1998) determine that students transferring schools just one time between 8th and 12th grade were twice as likely as students who did not transfer schools to experience future dropout. With research demonstrating clear links between disadvantage and school instability (Rumberger 1987; Kolstad and Owings 1986), understanding why this relationship exists is crucial. Rumberger (1987) explained that the reasons for students dropping out of school are varied, but can generally be grouped into several major categories, two of which are school-related and peer-related.

The findings from this chapter demonstrate that all five of the social measures, as well as peer disadvantage and peer delinquency, are significant mediators of the relationship between disadvantage and school instability. This pattern holds even after accounting for academic measures (e.g., school grades, school bonding). These findings support the theoretical arguments of Wehlage and colleagues (1989), specifically that researchers should focus on not only on the academic aspects of school belonging, but only on its social dimensions. This chapter expands on these theoretical arguments by demonstrating that social success is an important mediator of disadvantage and school instability. This dissertation extends this area of research by concluding that popularity, stable friendships, reciprocal friendships, social isolation, disadvantaged friends, and delinquent friends all have separate and significant mediating effects on the relationship between disadvantage and school instability.

Table 4-3: Baseline Multivariate Models of Disadvantage Predicting Four Outcomes.

	Peer Disad.			Peer Delinq			Delinquency			Sch. Instability			
	Coef.	RSE		Coef.	RSE		Coef.	RSE		O.R.	Coef.	RSE	
Disadvantage	0.051	0.001	***	0.021	0.002	***	0.023	0.003	***	1.313	0.272	0.015	***
Grades	-0.032	0.002	***	-0.068	0.004	***	-0.079	0.004	***	0.610	-0.494	0.024	***
School Bonding	-0.004	0.003	**	-0.094	0.005	***	-0.270	0.005	***	0.759	-0.276	0.031	***
Family Relations	-0.008	0.004		-0.065	0.008	***	-0.334	0.008	***	0.891	-0.115	0.049	*
Unstr.Socializing	0.000	0.001	*	0.036	0.003	***	0.046	0.003	***	1.076	0.073	0.017	***
Male	-0.028	0.004	***	0.114	0.007	***	0.112	0.010	***	0.915	-0.089	0.045	*
White	-0.077	0.006	***	-0.063	0.011	***	-0.089	0.013	***	0.709	-0.344	0.056	***
Wave	-0.023	0.001	***	0.045	0.001	***	0.027	0.001	***	1.404	0.340	0.016	***
Treatment	0.001	0.001		0.001	0.003		0.000	0.000		1.000	0.000	0.000	
Constant	0.592	0.014	***	0.599	0.026	***	1.389	0.027	***		-1.286	0.160	***

Notes: *p<0.05, **p<0.01, ***p<0.001. Level 1 N = 36,820/36,937/56,166/48,997, Level 2 N = 10,748/10,756/14,552/13,969, Level 3 N = 54.

Abbreviations: Coef. = Coefficient, RSE = Robust Standard error, O.R. = Odds Ratio, Disad. = Disadvantage, Delinq = Delinquency, Sch. = School. Female is the reference variable to male. Non-white is the reference variable to white.

Table 4-4: Path *a* of Mediation Analysis; Mediating Variables as Outcomes.

Predictor	Mediator as Outcome	Coef.	RSE.	
Disadvantage	Bonacich Centrality	-0.072	0.003	***
	Stability Rate	-0.010	0.001	***
	Reciprocity Rate	-0.015	0.001	***
	Previous Isolate	0.025	0.001	***
	Current Isolate	0.013	0.001	***

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Level 1 $N = 59,589$; Level 2 $N = 14,622$, Level 3 $N = 54$. Abbreviations: Coef. = Coefficient; RSE = Robust Standard Error. All models are 3-level, multilevel models that controlled for grades, school bonding, family relations, unstructured socializing, sex, race, wave, and treatment condition.

Table 4-5: Disadvantage Predicting Peer Disadvantage

Peer Disadvantage	Coef.	RSE		Coef.	RSE		% Med	
Disadvantage	0.051	0.001	***	0.047	0.002	***		
Bonacich Cent.				-0.044	0.003	***	6.09	***
Stability				-0.002	0.005		-0.05	
Reciprocity				-0.020	0.005	***	0.65	***
Grades	-0.032	0.002	***	-0.028	0.002	***		
School Bonding	-0.004	0.003	**	-0.003	0.003			
Family Relations	-0.008	0.004		-0.008	0.005			
Unstr.Socializing	0.000	0.001	*	0.002	0.002			
Male	-0.028	0.004	***	-0.031	0.004	***		
White	-0.077	0.006	***	-0.075	0.007	***		
Wave	-0.023	0.001	***	-0.023	0.001	***		
Treatment	0.001	0.001		0.001	0.001			
Constant	0.592	0.014	***	0.619	0.016	***		

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Level 1 $N = 36,820$, Level 2 $N = 10,748$, Level 3 $N = 54$. Abbreviations: Coef. = Coefficient, RSE = Robust Standard error, Med = Mediation. Female is the reference variable to male. Non-white is the reference variable to white. Total indirect effects account for 6.78% mediation, significant at the $p < 0.001$ level.

Table 4-6: Disadvantage Predicting Peer Delinquency

Peer Delinquency	Model I			Model II			% Med.	
	Coef.	RSE		Coef.	RSE			
Disadvantage	0.021	0.002	***	0.019	0.002	***		
Bonacich Cent.				-0.018	0.005	***	6.22	***
Stability				-0.078	0.010	***	3.67	***
Reciprocity				0.007	0.010		-0.58	
Grades	-0.068	0.004	***	-0.065	0.005	***		
School Bonding	-0.094	0.005	***	-0.092	0.006	***		
Family Relations	-0.065	0.008	***	-0.062	0.009	***		
Unstr.Socializing	0.036	0.003	***	0.035	0.003	***		
Male	0.114	0.007	***	0.116	0.007	***		
White	-0.063	0.011	***	-0.061	0.012	***		
Wave	0.045	0.001	***	0.045	0.002	***		
Treatment	0.001	0.003		0.021	0.090			
Constant	0.599	0.026	***	0.622	0.029	***		

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Level 1 $N = 36,937$ Level 2 $N = 10,756$ Level 3 $N = 54$. Abbreviations: Coef. = Coefficient, RSE = Robust Standard error, Med = Mediation. Female is the reference variable to male. Non-white is the reference variable to white. Total indirect effects account for 9.32% mediation, significant at the $p < 0.001$ level.

Table 4-7: Disadvantage Predicting Delinquency

Delinquency	Model I			Model II			% Med.
	Coef.	RSE		Coef.	RSE		
Disadvantage	0.023	0.003	***	0.019	0.003	***	
Bonacich Cent.				0.015	0.006	*	-5.65 *
Stability				-0.042	0.011	***	1.63 ***
Reciprocity				-0.005	0.010		0.36
Previous Isolate				0.024	0.007	***	3.07 ***
Current Isolate				0.004	0.011		0.28
Peer Disadvantage				0.008	0.010		1.90
Peer Delinquency				0.162	0.006	***	12.77 ***
Grades	-0.079	0.004	***	-0.072	0.005	***	
School Bonding	-0.270	0.005	***	-0.259	0.007	***	
Family Relations	-0.334	0.008	***	-0.328	0.011	***	
Unstr.Socializing	0.046	0.003	***	0.042	0.003	***	
Male	0.112	0.010	***	0.095	0.010	***	
White	-0.089	0.013	***	-0.078	0.014	***	
Wave	0.027	0.001	***	0.021	0.002	***	
Treatment	0.000	0.000		0.000	0.000		
Constant	1.389	0.027	***	1.308	0.034	***	

Notes: *p<0.05, **p<0.01, ***p<0.001. Level 1 N = 56,166, Level 2 N = 14,552, Level 3 N = 54.

Abbreviations: Coef. = Coefficient, RSE = Robust Standard error, Med = Mediation. Female is the reference variable to male. Non-white is the reference variable to white. Total indirect effects account for 14.30% mediation, significant at the p<0.001 level.

Table 4-8: Disadvantage Predicting School Instability

School Instability	Model I				Model II				% Med	
	O.R.	Coef.	RSE		O.R.	Coef.	RSE			
Disadvantage	1.313	0.272	0.015	***	1.162	0.150	0.013	***		
Bonacich Cent. Stability					0.508	-0.676	0.048	***	20.75	***
Reciprocity					0.824	-0.193	0.080	*	0.63	*
Previous Isolate					0.638	-0.449	0.060	***	2.59	***
Current Isolate					1.470	0.385	0.041	***	4.24	***
Peer Disadvantage					1.229	0.206	0.050	***	1.15	***
Peer Delinquency					1.229	0.206	0.056	***	4.01	***
Grades	0.610	-0.494	0.024	***	1.239	0.214	0.030	***	1.62	***
School Bonding	0.759	-0.276	0.031	***	0.697	-0.361	0.023	***		
Family Relations	0.891	-0.115	0.049	*	0.829	-0.187	0.029	***		
Unstr.Socializing	1.076	0.073	0.017	***	0.880	-0.128	0.047	**		
Male	0.915	-0.089	0.045	*	1.092	0.088	0.016	***		
White	0.709	-0.344	0.056	***	0.789	-0.236	0.040	***		
Wave	1.404	0.340	0.016	***	0.837	-0.178	0.050	***		
Treatment	1.000	0.000	0.000		1.266	0.236	0.014	***		
Constant		-1.286	0.160	***	1.000	0.000	0.000			
						-1.087	0.155	***		

Notes: *p<0.05, **p<0.01, ***p<0.001. Level 1 N = 48,997, Level 2 N = 13,969, Level 3 N = 54.

Abbreviations: O.R. = Odds Ratio, Coef. = Coefficient, RSE = Robust Standard error, Med = Mediation.

Female is the reference variable to male. Non-white is the reference variable to white. Total indirect effects account for 34.99% mediation, significant at the p<0.01 level.

Chapter 5

Adolescent Social Relations and Young Adulthood Adjustment

The previous chapters of this dissertation have demonstrated that financially disadvantaged adolescents are less likely than non-disadvantaged adolescents to be well integrated within their school-based social networks, and that this disparity in social relations has important short-term consequences. This chapter of my dissertation examines the extent to which the disparity in social relations affects young adult adjustment, specifically in regards to educational attainment. A growing field of research is examining the *long-term* effects of adolescent friendships, such as how the development of socioemotional traits during adolescence may help to explain adulthood economic, educational, and health behaviors (Bowles, Herbert, and Osborne 2001; Cunha et al. 2006). Studies have shown that popularity and friendships during adolescence are connected to outcomes in young adulthood, such as life adjustment (Bagwell, Newcomb, and Bukowski 2008) and income (Shi and Moody 2017).

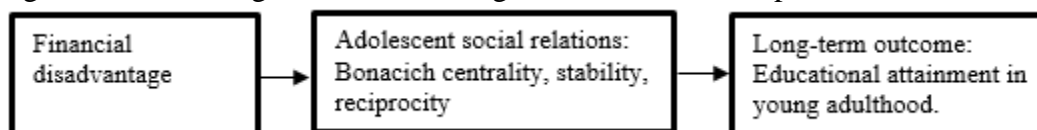
However, existing research has not explored the relationship between disadvantage, adolescent social status, and educational attainment. Interest in attending college is near universal (Kuh and colleagues 2006), but adjustment to and succeeding within college is dependent on numerous factors. One of these factors that is important to consider is social engagement. Relatedly, friendships and social acceptance during adolescence pave the way for one's ability to successfully socialize in adulthood (Berndt 1982). Therefore, I argue that adolescent social acceptance will be related to young-

adulthood educational attainment, and will mediate the relationship between family background and educational attainment. Additionally, it is unclear if peer acceptance is the only aspect of social relations that affects future adjustment, or if other social measures (e.g., stability, reciprocity) also have an impact. Thus, I will include measures of average high school stability and average high school reciprocity in my analyses.

Finally, subcultural theories of juvenile delinquency argue that, especially for disadvantaged adolescents, the type of friends one has during adolescence will have important consequences for individual behavior and adjustment. Staff and Kreager (2008) empirically supported this argument, concluding that gaining status in violent groups had a detrimental impact on high school completion, but only for disadvantaged males. Therefore, I will also consider the type of friends, relative to disadvantage and delinquent involvement, one is gaining when considering the impact of adolescent social relations. This chapter addresses my third research question: does the disparity in social success between disadvantaged adolescents and non-disadvantaged adolescents partially mediate the relationship between disadvantage and educational attainment?

In this chapter, I consider whether Bonacich centrality, friendship stability, and/or friendship reciprocity are partial mediators of the relationship between disadvantage and educational attainment. Additionally, I consider whether levels of disadvantage and delinquency among one's adolescent friendships impacts educational attainment. Figure 5.1 presents a path diagram that demonstrates the focus of the current chapter. I hypothesize that adolescent social relations will partially mediate the relationship between disadvantage and college attainment.

Figure 5-1: Path diagram demonstrating the focus of this chapter.



Methodology

PROSPER Data

In-School and Follow-up Sample. I use longitudinal social network data from the evaluation of the PROMoting School-community-university Partnerships to Enhance Resilience (PROSPER) longitudinal study (Spoth et al. 2007; please see Chapter 2 for more information about the sample). While I will use the in-school data to create an average of high school social relations for each individual, my analysis will be based on a subsample of the PROSPER data set that was asked to complete a follow-up survey at approximately age 24 to determine educational attainment (please see Chapter 2 for more information). The final sample size for this chapter is 727.

I conducted comparison of means tests on key measures that compared the follow-up sample to the main in-school sample and found some significant differences between the two samples. I argue that this is likely because it has been demonstrated in other studies that the likelihood of responding to surveys are correlated with specific variables, such as education and socioeconomic status (Kwak and Radler 2002; Dillman et al. 2009; Tolonen et al. 2006). Considering that the in-school surveys had higher response rates than the follow-up survey, it would be expected that the average

respondent in the follow-up survey may be a bit different than the average respondent of the in-school sample. The results of the comparison of means test indicate a similar pattern, in that the follow-up sample consists of young adults that were, on average, less disadvantaged adolescents than the average of the in-school sample. Similarly, those responding to the survey in young adulthood were higher, on average, than the in-school average in Bonacich centrality, in-degree, reciprocity, stability, and grades. The differences in rates of disadvantage and social integration are not so large that there is any reason to suspect they would introduce any in my results. Nevertheless, these differences may reduce variation on these key factors, which would have the potential to reduce statistical power somewhat.

Measures

Table 5.1 provides a description and descriptive statistics for all of my measures. High school variables are all mean measures that averaged values from ninth through twelfth grade.

Table 5-1: Descriptive Statistics.

Measure	Description	Mean	SD	Min	Max
Educational Attainment	Measured at the follow-up survey; indicates whether or not the respondent has attained a four-year degree.	0.44		0.00	1.00
Disadvantage	Empirical Bayes aggregate of student-reported receiving of free/reduced price lunch.	-0.55	1.55	-1.72	3.43
Bonacich Centrality	Indicator of the number and prestige of the friends that the actor is connected to; averaged from 9th through 12th grade.	0.86	0.52	0.00	2.78

Stability Rate	Proportion of friends from T1 that overlap to T2; averaged from 9th through 12th grade.	0.42	0.23	0.00	1.00
Reciprocity Rate	Proportion of mutual to non-mutual friendships; averaged from 9th through 12th grade.	0.54	0.27	0.00	1.00
Peer Disadvantage	The average of empirical Bayes FRL disadvantage across each of the friends of a given respondent	-0.54	1.01	-1.70	3.21
Peer Delinquency	Average of friends' delinquency (IRT scale).	0.38	0.48	-0.34	2.48
Grades	Student-reported school grades; averaged from 9th through 12th grade.	4.19	0.78	1.00	5.00
Absences	Number of absences for a given school year; averaged from 9th through 12th grade.	3.04	0.88	1.00	5.00
Family Relations	Mean of standardized subscales assessing family relations; averaged from 9th through 12th grade.	-0.18	0.37	-1.25	0.73
Mental Health	Composite measure assessing depression and anxiety; averaged from 9th through 12th grade.	0.36	0.41	0.00	2.00
Expresses Opinion	Self-reported ability of the respondent to express his/her opinion; averaged from 9th through 12th grade.	1.81	0.79	1.00	5.00
Delinquency	12-item index of delinquency behavior (IRT scale); averaged from 9th through 12th grade.	0.46	0.77	-0.34	3.94
Unstr. Socializing	Average of time spent with individuals nominated as friends; averaged from 9th through 12th grade.	2.78	0.97	0.00	5.00
Male	Whether respondent is male or female. 1=Male; 0=Female.	0.43	0.50	0.00	1.00
White	Whether respondent is white or non-white. 1=White; 0=Non-white.	0.88	0.33	0.00	1.00
Wave	The year the survey was administered.	22.95	0.46	22.00	25.00
Treatment	Whether or not the given school received the treatment intervention.	0.48		0.00	1.00

Educational Attainment. This measure indicates whether or not the respondent has attained a four-year degree. In the follow-up survey, respondents were asked, “what is the highest education degree or certificate you hold?” I have recoded educational attainment so that it is a binary measure of attaining a four-year college degree. I also completed sensitivity analyses using other versions of this measure. This binary measure is coded as 1 if the respondent has attained a four-year college degree, and a 0 if not. At the time of follow-up survey, 44% of the sample had attained a four-year degree.

Financial Disadvantage. This chapter uses the empirical Bayes FRL measure of disadvantage, the same measure for financial disadvantage as the previous two chapters. For a more detailed description of this measure, please see Chapter 2 of this dissertation. Financial disadvantage has an average score of -0.55, with a standard deviation of 1.55.

Average High School Bonacich Centrality. Using the PROSPER in-school social network data, I measure each respondent’s average high school Bonacich centrality by averaging together the Bonacich centrality scores across high school. Sensitivity analyses were also completed using in-degree as the social acceptance measure, and are presented after the main results. Bonacich centrality is calculated by weighting each node’s centrality by the centrality of the actors that they are connected to. In other words, an individual gets an increase in Bonacich centrality if he/she is tied to other individuals who are central within the network. Each student receives a Bonacich centrality score at each wave of data collection. By averaging together each respondent’s ninth through twelfth grade Bonacich centrality scores, I have a mean measure for high school popularity. Those individuals that did not have data for Bonacich centrality in any of the

waves were coded as missing and not included in the analyses. There was only limited variation in the number of waves and data available, as almost 80% of the sample had 3 or 4 waves of information to average from, and only 7% had only one wave of information. As discussed in the previous chapter, I also could have used in-degree as a measure of popularity. However, in-degree and Bonacich centrality are strongly correlated ($r=0.75$), and Bonacich centrality gives more information about an individual regarding his/her standing in the social network, so I use Bonacich centrality as the sole measure of popularity for this chapter. The mean of the average high school popularity measure is 0.86, with a standard deviation of 1.55.

Average High School Stability Rate. Friendship stability is a rate that is calculated by dividing the number of repeated nominations received in T2 by the number of total nominations received in T1. These rates were calculated at each wave of high school, and then averaged together to create an average high school stability rate for each respondent. The mean for average stability rate is 0.42, with a standard deviation of 0.23. Because this is a proportion, the range of the variable is 0 to 1. The mean of 0.42 indicates that, on average, about 42% of respondents' friendship nominations were stable from one year to the next during high school.

Average High School Reciprocity Rate. Friendship reciprocity is a rate that is calculated as the number of reciprocated friendships divided by the number of sent nominations. These rates were calculated at each wave of high school, and then averaged together to create an average high school reciprocity rate for each respondent. The mean for average reciprocity rate is 0.54 with a standard deviation of 0.27. Similar to stability,

the range is 0 to 1⁵. This mean score of 0.54 indicates that, on average, about 54% of respondents' friendship nominations were reciprocated during high school.

Average Peer Disadvantage. Average peer disadvantage is an average of the average Bayes FRL measure from the respondents' friends from each wave of high school. As previously discussed, the PROSPER Peers data set includes friendship nominations that were matched to the students, which allows researchers to create a full social network of the cohort. The peer disadvantage measure uses the scores of the friends on the empirical Bayes FRL variable to create an average disadvantage score for those friends. The average peer disadvantage measure then averages each of these scores together to create an average from high school. The average respondent has a mean peer disadvantage score of -0.54 with a standard deviation of 1.01.

Average Peer Delinquency. The Average Peer Delinquency measure is an average of the Average IRT delinquency measure from the respondents' friends that was calculated at each wave of high school. Again, this measure is created using the full social network of the cohort. This alleviates projection bias (Young et al. 2013), which is when students inaccurately project their own behavior when describing the behavior of their friends. Because the PROSPER Peers project provides matched nominations, I am able to employ an average peer delinquency measure based on a respondent's friends' own IRT delinquency scores. This was completed for each wave of high school, which were then averaged together across high school to create the average peer delinquency

⁵ As discussed in the previous chapter, isolates will be excluded from the analysis when using stability rate and reciprocity rate. However, in this chapter's sample, there are only 15 individuals who qualify as isolates when averaging information from all waves of data in high school. Therefore, there would be too few cases to include average isolates as another social measure in this analysis.

measure. The average value of average peer delinquency is 0.38 with a standard deviation 0.48 and a range of -0.34 to 2.48.

Controls. The control variables are high school grades, absences, family relations, mental health, ability to express opinions, delinquency, unstructured socializing, sex, race, and treatment condition. All of the control variables, with the exception of sex, race, and treatment condition, are means of data from ninth through twelfth grade. Sex, race, and treatment condition did not vary from year-to-year for any of the respondents in this sample. High school grades, absences, family relations, delinquency, and unstructured socializing are all measures used in previous chapters.

Mental health is a scale ($\alpha=0.91$) made up of 10 items that assesses anxiety and depression. This scale has a mean score of 0.36, standard deviation of 0.41, and a range of 0 to 2. At each wave of in-school data, the adolescents were asked the likelihood that they would express an opinion even though others may disagree with them. Responses ranged from definitely would, coded as 1, to definitely would not, coded as 5. The average score of expresses opinion is a 1.81, with a standard deviation of 0.79.

Sex is a binary variable coded as 0 for female and 1 for male. Race is a binary variable coded as 0 for non-white and 1 for white⁶. Age is the age of the respondent at the time of the follow-up survey. Treatment condition is a variable that is included to control for between-school differences of whether or not that school received a substance use intervention as part of the larger PROSPER study (see Spoth et al. 2007 for more information).

⁶ Similar to previous chapters, there are too few non-whites (10%) in this sample to break non-whites down into additional categories.

Analytic Strategy

In the previous chapters, the data structure had three levels: wave was nested within individuals that were nested within communities. The current chapter does not have multiple waves, but I still must account for the nesting of individuals within communities. Due to this clustering nature of my dataset, I will rely upon hierarchical linear modeling using HLM software (Bryk and Raudenbush 2002) to address my research questions. The data are clustered within communities, meaning that students that are from the same community are not statistically independent of one another, as these students may be more similar to one another as compared to students across communities. To control for within-community dependence, I will estimate two-level, multilevel models that nests individuals (level-1) within communities (level-2).

To determine a baseline association between disadvantage and educational attainment, I will start with a Pearson chi-square test of association. I will then estimate multivariate, multilevel model of disadvantage predicting educational attainment, inclusive of the control variables. Then, I will estimate mediation analyses to determine if the relationship between disadvantage and educational attainment is mediated by the three social measures. In order to effectively examine if the social measures are mediating the relationship between disadvantage and educational attainment, once again I will use the Baron-Kenny framework (Baron and Kenny 1986). First, I will treat the three social measures and the two types of friends measures as outcome variables, with disadvantage being the primary predictor variable. These two-level, multilevel models will include the control variables. This will allow me to assess the relationship between

disadvantage and the social measures separately, which will assess path a from the Baron and Kenny's (1986) standard conception of mediation. Though these analyses are similar to those performed in previous chapters, the mediators are averages across waves, the sample for this chapter is different from the previous chapters, and the control variables are different. Therefore, to complete the mediation analysis, I return to them here in a version more closely matched to their role in this chapter.

After assessing path a , I will estimate a two-level Bernoulli-specified model predicting educational attainment that includes disadvantage, the three social measures, and my control variables. Then, I will calculate the indirect effects, significance values, and proportion mediated of the social measures. The indirect effects of the social measures are calculated using the same method as the previous chapters. The percentage explained by each social measure is presented with asterisks to indicate significance values. I will then repeat this process after including peer disadvantage and peer delinquency into the model.

Results

Bivariate Analysis

My first goal is to document the relationship between an adolescent's background and his/her educational attainment. Only 22% of the individuals from a disadvantaged background have obtained a four-year degree by age 23. Conversely, 52% of individuals from a non-disadvantaged background have obtained a four-year degree by age 23. This

difference is statistically significant at the $p < 0.001$ level ($\chi^2 = 54.46$). Next, I estimate a multivariate, multilevel model of disadvantage predicting educational attainment that includes my control variables.

Multivariate Analyses

Disadvantage Predicting Educational Attainment

Table 5.2 presents the results from a two-level Bernoulli model predicting educational attainment. Disadvantage and educational attainment are significantly and negatively related. High school grades is the strongest predictor of educational attainment. High school absences, current mental health, high school church attendance, current smoking, white, and age are also all significantly related to educational attainment. Next, I will conduct mediation tests to determine if the social measures, and/or type of friends, mediate the relationship between disadvantage and educational attainment. To do-so, I must first assess path *a* of the mediation diagram.

[Table 5.2, about here]

Path a of Mediation Analysis

Table 5.3 presents the results when assessing path *a* of the mediation diagram. For this section, I estimated three separate two-level models that predicted high school Bonacich centrality, high school stability, and high school reciprocity. Interestingly,

disadvantage is only a significant predictor of high school Bonacich centrality, controlling for everything else in the models. This indicates that, of my three social relation measures, only high school Bonacich centrality can be a potential mediating variable. In other words, high school stability and high school reciprocity cannot be mediators of the relationship between disadvantage and educational attainment.

Disadvantage is a significant predictor of both peer disadvantage and peer delinquency, indicating that both of these variables can be potential mediating variables. However, the relationship between disadvantage and peer disadvantage is much stronger than the relationship between disadvantage and peer delinquency.

[Table 5.3 about here]

Mediation Variables

Social Relations. Table 5.4 presents the results from the two-level, Bernoulli model predicting educational attainment. The first set of results in the table is included as a reference to the previous analysis predicting educational attainment. The right-side of the table includes the results once the social measures were included in the analyses.

After including the three social measures, disadvantage remains negatively related to the odds of obtaining a four-year degree. High school Bonacich centrality is a significant predictor of educational attainment, but neither of the other two social measures are significantly related. High school grades remains the strongest predictor of educational attainment. High school absences is significantly and negatively related to educational

attainment. White respondents are less likely to obtain a four-year degree as compared to non-whites.

As discussed previously, only high school Bonacich centrality has the potential to be a significant mediator in these analyses. After calculating the indirect effects, significance values, and percent mediated of the social measures, high school Bonacich centrality is a significant mediator, accounting of almost 18% of the relationship between disadvantage and educational attainment.

[Table 5.4, about here]

Types of Friends. Next, I included peer disadvantage and peer delinquency in the model, in addition to the three social measures, to determine if the type of friends matter when examining the relationship of disadvantage and educational attainment. Table 5.5 presents these results. In this model, individual disadvantage is no longer significantly related to educational attainment, though it still has a substantial coefficient. Bonacich centrality is still a significant predictor of educational attainment, while stability and reciprocity are not significantly related. Peer disadvantage is a significant predictor of educational attainment, while peer delinquency is not. After calculating the indirect effects, significance values, and percent mediated of the effects of social measures, I determined that Bonacich centrality and peer disadvantage are both significant mediators of the relationship between disadvantage and educational attainment. Bonacich centrality still accounts for about 13% of the relationship, while peer disadvantage accounts for about 33%.

[Table 5.5 about here]

Sensitivity Analyses

I also completed additional analyses to further understand the results of this chapter. First, Staff and Kreager (2008) demonstrated in their study that the negative effects of gaining status in a delinquent peer group differentially affected disadvantaged adolescents. Thus, I split my sample by disadvantage to determine if the effects of the adolescent social relations and of type of friends varied for disadvantaged adolescents as compared to non-disadvantaged adolescents. As in previous chapters, I coded the top 15% of the Bayes FRL variable as disadvantaged, with the remaining 85% as non-disadvantaged.

The effect of Bonacich centrality remained statistically significant for non-disadvantaged adolescents (Coef. = 0.481; RSE = 0.243), but was not statistically significant for disadvantaged adolescents (Coef. = 0.431; RSE = 0.592). However, the magnitude of the effect was rather similar for both non-disadvantaged and disadvantaged adolescents, while the difference in standard errors accounted for the difference in statistical significance. This indicates that the difference in sample size is most likely responsible for the difference in statistical significance between the two samples. Taken together, it seems that the effect of Bonacich centrality on educational attainment is rather similar for both non-disadvantaged and disadvantaged adolescents.

A similar pattern is evident for the effect of peer disadvantage on educational attainment for non-disadvantaged adolescents and disadvantaged adolescents. Peer disadvantage was a significant predictor of educational attainment for non-disadvantaged adolescents (Coef. = -0.601; RSE = 0.193), but was not statistically significant for in the

model of only disadvantaged adolescents (Coef. = -0.603; RSE = 0.443). However, once again, the magnitude of the effect of peer disadvantage on educational attainment was similar for both disadvantaged and non-disadvantaged adolescents, indicating that the differences in statistical significance was most likely due to differences in sample size, as this increased the standard error in the model of disadvantaged adolescents. Similar to the primary results presented above for the full sample, peer delinquency was not a significant predictor in either of the models when the sample was split by disadvantage.

Next, I examined the interaction of Bonacich centrality with peer disadvantage. This interaction term will reflect the degree that the effect of social acceptance varies based on the type of friends that the adolescent is gaining status with (Staff and Kreager 2008). This interaction term was not a statistically significant predictor of educational attainment, nor a significant mediator of the relationship of disadvantage and educational attainment, when included in the models for the full sample. This result indicates that the long-term effect of adolescent social acceptance on educational attainment does not vary based on the levels of peer disadvantage of the social groups that the adolescent was gaining status within.

Then, I estimated the interaction of Bonacich centrality with peer delinquency. Even though peer delinquency was not a significant predictor in the model for the full sample, or when splitting the sample, I wanted to be sure that the effects of social acceptance are not dependent upon the delinquency of the adolescents' primary friends. This interaction term was not statistically significant for the full sample or for either subsample when the follow-up sample was split by adolescent disadvantage.

Additionally, subcultural theories of juvenile delinquency argue that the effects of social

ties and peer delinquency may have differential effects upon boys as compared to girls. I would have liked to further these analyses by splitting the sample to isolate disadvantaged boys, but the sample size was too small ($n=59$) to perform multivariate analyses (i.e., the estimates had very large standard errors).

Additionally, as I explain in the discussion section of this chapter, a limitation of this project is that I do not have a measure for adolescent educational aspirations for this follow-up sample. That is because the question asking about educational aspirations was only included in the adolescent in-home interviews, and none of the individuals interviewed at age 24 were included in the adolescent in-home interviews. However, there is a separate follow-up sample interviewed at age 19. This follow-up sample included 194 individuals that were also included in the adolescent in-home surveys. Because this survey was administered when the respondents were approximately 19 years old, I am not able to assess educational attainment. However, I do have a measure for educational enrollment. Therefore, I repeated the main analysis of this chapter using this small sub-sample of 194 individuals but treated college enrollment at age 19 as the outcome variable with the inclusion of 9th grade educational aspirations as a control variable. In this model, Bonacich centrality (Coef. = -0.334; RSE = 0.139) is significantly related to educational enrollment, when controlling for 9th grade educational aspirations, as well as high school grades, absences, family relations, mental health, delinquency, unstructured socializing, race, sex, age, and treatment condition. Meanwhile, 9th grade educational aspirations (coef. = 0.732; RSE = 0.591) was not significantly related to college enrollment at age 19. These results slightly alleviate the concern of not having a measure for educational aspirations in my main analyses.

I also completed a sensitivity check for the coding of educational attainment. For this chapter, educational attainment was coded as a binary outcome (i.e., 1 = attaining a four-year degree and 0 = not attaining a four-year degree). As a sensitivity check, I have estimated these analyses with educational attainment coded as 0 = none, H.S. graduate, G.E.D.; 1 = two year college degree or similar; 2 = four-year college degree/Advanced degree. I then completed the mediation analyses predicting this categorical version of educational attainment. The results remained similar to the results discussed below when completing the analyses with educational attainment as a binary variable. More specifically, in the final models, disadvantage is a significant and negative predictor of attaining a two-year college degree as compared to a high school degree, and a significant and negative predictor of attaining a four-year degree as compared to a high school degree. Of the social measures, Bonacich centrality remained a significant predictor of attaining a four-year degree as compared to a high school degree, but was not a significant predictor of attaining a two-year degree as compared to a high school degree. Bonacich centrality remained a significant mediator of the relationship between disadvantage and attaining a four-year degree. Neither stability nor reciprocity were significant predictors or mediators in the final model. These results are very similar to the main results presented above. In both analyses, Bonacich centrality remained a significant predictor of attaining a four-year degree. Additionally, in both sets of analyses, Bonacich centrality was a significant mediator of the relationship between disadvantage and attaining a four-year degree.

Additional sensitivity analyses treated in-degree as the social acceptance measure and the results, in general, remained similar to the results above that use Bonacich

centrality. More specifically, when assessing path *a* of the mediation framework, disadvantage is a significant and negative predictor of average in-degree (Coef. = -0.25, RSE = 0.05, $p = 0.000$). In the final model that included disadvantage and the three social measures predicting educational attainment, disadvantage remained a significant and negative predictor of educational attainment (Coef. = -0.222, RSE = 0.085, $p = 0.009$). These values are nearly identical to the values of disadvantage (Coef. = -0.215, RSE = 0.087, $p = 0.013$) in the current analyses that include Bonacich centrality. In-degree is significantly and positively related to educational attainment (Coef. = 0.305, RSE = 0.066, $p = 0.000$). Finally, similar to Bonacich centrality, in-degree is a significant ($p < 0.001$) mediator of the relationship of disadvantage and educational attainment. The results did differ in the final model in regards to stability and reciprocity. In the model using in-degree, stability is significant and positively related to educational attainment (Coef. = 1.069, RSE = 0.468), while reciprocity is significantly and negatively associated with educational attainment (Coef. = -1.486, RSE = 0.471). Neither of these two variables are significant mediators, however.

Discussion

This chapter of my dissertation focused on the relationship between disadvantage and educational attainment in early adulthood, specifically relative to the role of adolescent social relations. Previous research has demonstrated that disadvantaged adolescents are less likely to attain a college degree (Sewell and Shah 1967).

Additionally, adolescent social acceptance and friendships have important consequences

for adulthood outcomes, such as life adjustment (Bagwell, Newcomb, and Bukowski 2008) and income (Shi and Moody 2017). However, less is known regarding the relationship between adolescent social success and future educational attainment. It is possible that the “popularity effect” evident in Shi and Moody’s (2017) project has a similar role when predicting educational attainment. Specifically, this research suggests that certain adolescent socioemotional traits are an important for young adult outcomes. In other words, similar to the findings predicting income, socially accepted adolescents may have more highly developed socioemotional traits the provide advantage in adjusting to and navigating the university setting. This chapter explored this connection by examining the extent to which adolescent social relations and friendships mediate the relationship between disadvantage and educational attainment.

First, I found that social acceptance does have a similar effect on educational attainment as it did on income. Even controlling for numerous adolescent measures, such as high school grades, family relations, and behavior, high school Bonacich centrality was significantly associated with increased odds of attaining a four-year degree. Furthermore, this finding was robust to whether social acceptance was measured using Bonacich centrality or in-degree centrality. Interestingly, it seems that the quality of one’s friendships (in terms of reciprocity and stability) do not play as important of a role as social acceptance in regard to educational attainment, especially relative to mediating the relationship between disadvantage and educational attainment. However, the relative weakness of these results may be, at least in part, due to the relative weakness of my measures of friendship quality. As discussed in Chapter 1, friendship quality is rather complex and difficult to operationalize. Though reciprocity and stability are both

important features of friendships, neither of these are considered strong measures of friendship quality. Future research should continue exploring the relationships of adolescent friendship quality and adulthood outcomes.

To be clear, I am not arguing that adolescent social acceptance is the be-all and end-all to explaining the relationship between disadvantage and educational attainment. Obviously, plenty of other factors are important to consider. For example, in my final model, as would be expected, high school grades have the most effect on educational attainment. Further, in additional mediation analyses that include high school grades as a mediator, high school grades accounts for about 49% of the relationship between disadvantage and educational attainment. However, I do argue that adolescent social relations and friendships are important to consider when discussing educational attainment in young-adulthood. Previous theoretical and empirical research has demonstrated that social integration is vital for individuals' success in college (Tinto 1975; Kuh and colleagues 2006; Braxton, Sullivan, and Johnson 1997; Skahill 2002). Research has also proven that friendships and social acceptance during adolescence pave the way for one's ability to socialize in the future. I extend this research by establishing a clear link between adolescent social acceptance and educational attainment in young adulthood. Additionally, I demonstrate that social acceptance is a significant mediator of the relationship of disadvantage and educational attainment.

A limitation of this project is that I do not have a measure for adolescent educational aspirations for the individuals included in the follow-up wave at age 24, which is related to both disadvantage and educational attainment in young adulthood (Vaisey 2010). The in-home survey of the PROSPER study did ask adolescents about

their educational aspirations, but the follow-up survey completed at age 24 did not include the same subsample as the adolescent in-home survey, thus I am unable to use this measure in the models predicting educational attainment. However, in the current data set, the relationship between disadvantage and educational attainment is rather weak. When examining the frequency distribution of educational attainment, about 82% of the in-home sample indicated that they aspire to at least a four-year degree. Exploring educational aspirations by disadvantage, over 76% of financially disadvantaged adolescents indicated that they aspire to at least a four-year degree. Similarly, research has determined that interest in attending college among adolescents is near universal (Kuh and colleagues 2006). In addition to this, I also repeated my primary analysis on a different follow-up sample in the PROSPER study that predicted college enrollment at age 19, as this analysis could include a measure of 9th grade educational aspirations. In this model, Bonacich centrality was significantly related to educational attainment, even while controlling for 9th grade educational aspirations. Though all of this somewhat alleviates the concern of not having a measure of educational aspirations, future research is needed to determine how educational aspirations might affect the relationship of adolescent social acceptance and educational attainment.

As Shi and Moody (2017) discussed, popular adolescents gain a socioemotional advantage in adulthood over non-popular adolescents. Navigating between friendships may help an individual gain skills useful for navigating workgroups in the labor market. Similarly, my findings make clear that high school social acceptance increases the odds of attaining a college degree. Though, as Shi and Moody (2017) discussed, the specific mechanism through which this “popularity effect” occurs has yet to be established

empirically, labor market and education research suggests that that collaboration is a likely operating mechanism. The ability to collaborate is especially important in both the labor market and the academic world (Sawyer 2017; Lucas and Greany 2000; Baillie 2003), though future research is needed to determine the specific mechanism(s) that this “popularity effect” operates through. My findings in this chapter demonstrate that social acceptance is another factor that should be considered when discussing the success of, or lack thereof, financially disadvantaged adolescents as compared to non-disadvantaged adolescents relative to educational attainment.

Table 5-2: Disadvantage Predicting Educational Attainment.

Educational Attainment	O.R.	Coef.	RSE	
Disadvantage	0.759	-0.275	0.080	**
Grades	10.950	2.393	0.216	***
Absences	0.594	-0.521	0.114	***
Family relations	1.561	0.446	0.387	
Mental Health	0.976	-0.024	0.259	
Express Opinion	0.861	-0.150	0.146	
Delinquency	0.939	-0.063	0.161	
Unstr. Socializing	0.983	-0.017	0.123	
Male	1.081	0.078	0.189	
White	0.515	-0.664	0.320	*
Age	0.615	-0.486	0.274	
Treatment	1.026	0.026	0.246	
Constant		2.876	6.665	

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Level 1 $N = 727$, Level 2 $N = 27$. Abbreviations: Coef. = Coefficient, RSE = Robust Standard Error, Unstr. = Unstructured.

Table 5-3: Path *a* of Mediation Analysis: Social Measures as Outcomes.

	H.S. Bonacich			H.S. Stability			H.S. Reciprocity			H.S. Peer Disad.			H.S. Peer Delinq.		
	Coef.	RSE		Coef.	RSE		Coef.	RSE		Coef.	RSE		Coef.	RSE	
Disadvantage	-0.064	0.012	***	-0.010	0.006		-0.012	0.007		0.175	0.028	***	0.029	0.012	*
Grades	0.152	0.026	***	0.040	0.013	**	0.015	0.015		-0.239	0.052	***	-0.072	0.025	**
Absences	0.002	0.021		-0.001	0.011		-0.018	0.012		0.120	0.045	**	0.071	0.022	**
Family relations	0.097	0.052		0.024	0.026		0.022	0.029		-0.170	0.105		-0.052	0.051	
Mental Health	-0.133	0.047	**	-0.019	0.024		-0.012	0.027		0.011	0.103		-0.046	0.049	
Express Opinion	-0.028	0.023		0.013	0.011		0.010	0.013		0.014	0.052		0.001	0.021	
Delinquency	0.027	0.027		-0.025	0.014		-0.007	0.016		0.076	0.067		0.155	0.028	***
Unstr. Socializing	0.118	0.019	***	0.021	0.010	*	0.058	0.012	***	-0.087	0.049		0.058	0.022	**
Male	0.020	0.037		-0.034	0.019		-0.135	0.021	***	-0.121	0.077		0.046	0.037	
White	-0.024	0.054		-0.008	0.027		0.030	0.032		-0.023	0.110		-0.081	0.053	
Age	0.000	0.038		0.006	0.019		-0.005	0.022		0.234	0.075	**	0.001	0.041	
Treatment	0.007	0.034		0.017	0.017		0.022	0.019							
Constant	-0.037	0.884		0.062	0.436		0.551	0.508		-5.444	1.709	**	0.131	0.914	

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Level 1 $N = 727$, Level 2 $N = 27$. Abbreviations: Coef. = Coefficient, RSE = Robust Standard Error, Unstr. = Unstructured; Disad. = Disadvantage; Delinq. = Delinquency.

Table 5-4: Disadvantage Predicting Educational Attainment, with Social Measures as Mediators.

	Without Mediators				With Mediators				
	O.R.	Coef.	RSE		O.R.	Coef.	RSE	% Med.	
Disadvantage	0.759	-0.275	0.080	**	0.806	-0.215	0.089	*	
Popularity					2.157	0.769	0.231	**	18.39
Stability					2.466	0.903	0.477		3.34
Reciprocity					0.705	-0.349	0.443		-1.61
Grades	10.950	2.393	0.216	***	6.449	1.864	0.183	***	
Absences	0.594	-0.521	0.114	***	0.549	-0.600	0.129	***	
Family relations	1.561	0.446	0.387		1.725	0.545	0.415		
Mental Health	0.976	-0.024	0.259		0.918	-0.086	0.271		
Express Opinion	0.861	-0.150	0.146		0.857	-0.154	0.147		
Delinquency	0.939	-0.063	0.161		0.826	-0.191	0.150		
Unstr. Socializing	0.983	-0.017	0.123		0.900	-0.106	0.164		
Male	1.081	0.078	0.189		1.067	0.065	0.225		
White	0.515	-0.664	0.320	*	0.446	-0.807	0.349	*	
Age	0.615	-0.486	0.274		0.617	-0.483	0.278		
Treatment	1.026	0.026	0.246		0.942	-0.060	0.252		
Constant		2.876	6.665			2.508	6.884		

Notes: *p<0.05, **p<0.01, ***p<0.001. Level 1 N=727, Level 2 N=27. Total mediation = 20.13%, significant at the p<0.01 level. Abbreviations: O.R. = Odds Ratio, Coef. = Coefficient, RSE = Robust Standard Error, Med. = Mediated, Unstr. = Unstructured.

Table 5-5: Disadvantage Predicting Educational Attainment, with Social Measures and Type of Friends as Mediators.

	Without Mediators				With Mediators			% Med.
	O.R.	Coef.	RSE		O.R.	Coef.	RSE	
Disadvantage	0.759	-0.275	0.080	**	0.857	-0.154	0.084	
Bonacich Cent.					1.801	0.588	0.250	* 13.67 **
Stability					2.582	0.948	0.512	3.23
Reciprocity					0.615	-0.485	0.470	-2.52
Peer Disadvantage					0.587	-0.533	0.144	*** 33.94 ***
Peer Delinquency					0.894	-0.112	0.260	0.61
Grades	10.950	2.393	0.216	***	6.007	1.793	0.171	***
Absences	0.594	-0.521	0.114	***	0.573	-0.557	0.134	***
Family relations	1.561	0.446	0.387		1.249	0.222	0.362	
Mental Health	0.976	-0.024	0.259		1.105	0.100	0.258	
Express Opinion	0.861	-0.150	0.146		0.867	-0.143	0.139	
Delinquency	0.939	-0.063	0.161		0.822	-0.196	0.133	
Unstr. Socializing	0.983	-0.017	0.123		0.853	-0.160	0.159	
Male	1.081	0.078	0.189		1.049	0.048	0.240	
White	0.515	-0.664	0.320	*	0.445	-0.810	0.298	**
Age	0.615	-0.486	0.274		0.661	-0.415	0.269	
Treatment	1.026	0.026	0.246		0.942	-0.060	0.252	
Constant		2.876	6.665			7.568	6.407	

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Level 1 $N = 727$, Level 2 $N = 27$. Total mediation = 48.18%, significant at the $p < 0.001$ level. Abbreviations: O.R. = Odds Ratio, Coef. = Coefficient, RSE = Robust Standard Error, Med. = Mediated, Unstr. = Unstructured.

Chapter 6

Conclusion

Disadvantage has received much attention within the fields of criminology and education as scholars have sought to understand why individuals from lower socioeconomic backgrounds have poorer outcomes (Cohen 1955; Hagan 1992; Coleman 1959). However, the critical aspect of social worlds has not received enough empirical attention, even though stressed by early leaders like Coleman (1959) and Cohen (1955). This dissertation examined the indirect effects of disadvantage on adolescent social relations by using recent, social network data.

This dissertation had two primary objectives: (1) to further our understanding of the relationship between disadvantage and social success and (2) to examine the consequences of the relationship between disadvantage and social success. This dissertation provides evidence that one's socioeconomic background has effects on adolescent social success that can be partially explained by specific school, family, and individual attributes. More specifically, the relationships of disadvantage to students' school grades, family home condition, and poor mental health results in these factors playing large mediating roles in the relationships between disadvantage and several indicators of social success. These mediating effects were evident across all of my measures of social of social relations, including in-degree, Bonacich centrality, friendship reciprocity, and friendship stability. Notably, the social relations measures used in this research are strong because they derive from social network data and other students

friendship choices, rather than being limited to respondents' self-reports. These findings indicate that there are indeed indirect effects of disadvantage related to adolescent social relations.

In terms of policy, these findings can benefit social acceptance programs by helping such programs target individual mechanisms. The findings from this research imply that academic, family, and other individual characteristics affect adolescent social relations and, thus, programs attempting to resolve this disparity in social success should consider a holistic approach across these three dimensions. Further, this research demonstrates that youth from disadvantaged backgrounds may benefit the most from such social acceptance programs that target academic, family, and other individual characteristics.

The second objective of this dissertation was to examine the consequences of the disparity in social relations for disadvantaged adolescents. This dissertation examined both short- and long-term consequences of financial disadvantage in adolescence. More specifically, the findings demonstrated that the structure of adolescent social networks increases the likelihood that disadvantaged adolescents will have friends who are more disadvantaged and more delinquent than non-disadvantaged adolescents. Supporting subcultural theories of delinquency (Cohen 1955), differential association theory (Sutherland 1947), and researchers from the field of education (Coleman 1959; Wehlage et al. 1989; Rumberger and Larson 1998), these social disparities have important consequences for disadvantaged adolescents relative to delinquent involvement and school instability.

Additionally, this dissertation demonstrated that social class stratification in adolescent popularity has important long-term consequences for educational attainment, mediating the relationship between disadvantage and attaining a four-year degree. Combining these findings with prior work that found adolescent popularity to be related to adult income, disadvantage and adolescent popularity are clearly linked to income and education in the first few years of the transition to adulthood. Research should continue to explore the long-term consequences of adolescent social relations. Specifically, future research should continue to examine how strongly these patterns continue into the succeeding years as the former adolescents move into full adulthood (e.g. establishing their careers and families).

Taken together, this dissertation suggests that programs attempting to improve cohesion in social networks within schools for disadvantaged adolescents should consider multiple dimensions, both in terms of social relations and causes. In other words, I found that disadvantage does have an effect on both popularity and qualitative aspects of friendships. Further, this dissertation improved our understanding of the primary factors that mediate the relationship between disadvantage and social relations, demonstrating support that all three (i.e., school, family, and individual) types of factors should be considered. Additionally, this dissertation demonstrates that adolescent social relations should be an important focus of research that examines relationships between low socioeconomic status and short- and long-term consequences.

While this research moves forward knowledge of disadvantage, social relations, and related outcomes, there are a few limitations worth noting. For one, as discussed previously, the PROSPER data set was collected from rural to semi-rural communities

from Iowa and Pennsylvania that were predominately white. Though this data set had many features that made it ideal for my current project, the generalizability of my findings may be lacking. Second, one of the strengths of this data set for my research is the social network component. However, it should be discussed again that the friendship choices were restricted to in-school, in-grade friends. This may be a limitation for my research as subcultural theories of delinquency argue that disadvantaged adolescents may be especially likely to befriend those in other schools and/or grades, so there is some question as to how this might be impacting their in-school social ties. However, these theories predict that these out-of-grade/school friendships should result as adolescents get older *from* a lack of in-school social ties. Using data that tracked one's social ties beginning in sixth grade through twelfth grade helps to somewhat alleviate this concern. Additionally, I estimated sensitivity analyses in Chapter 3 that specifically addressed this out-of-grade and out-of-school friends. Though concerns stemming from this network bounding are eased based on the results of the sensitivity analyses, this still may be an important question for future research to address.

In conclusion, my results show the need for continued research on the role of disadvantage. This dissertation has contributed to both the criminology and education literatures by examining how one's social class indirectly affected delinquency, school instability, and young adulthood adjustment through one's adolescent social relations. Finally, this dissertation pointed to promising directions for future research and efforts to improve the lives of disadvantaged adolescents and young adults.

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CONFERENCE PRESENTATIONS

- Baals, Douglas A.** Subcultures, Delinquency, and Social Relations. Paper presented at the Annual Meeting of the American Society of Criminology, Philadelphia, PA. November 2017.
- Baals, Douglas A.,** D. Wayne Osgood, and Nayan Ramirez. Financial Disadvantage, Popularity, and Delinquency: An Analysis of Longitudinal Social Network Data. Paper presented at the Annual Meeting of the American Society of Criminology, New Orleans, LA. November 2016.
- Ramirez, Nayan, and **Douglas A. Baals.** Where You Live and Who You Know: Community Disadvantage, Peer Group Membership, and Adolescent Delinquency. Paper presented at the Annual Meeting of the American Society of Criminology, New Orleans, LA. November 2016.
- Sanders, Amber N. and **Douglas A. Baals.** Exploring the Relationship Between Drinking Games and Alcohol-Related Consequences: A Test of Competing Hypotheses. Paper presented at the Annual Meeting of the American Society of Criminology, New Orleans, LA. November 2016.
- Ramirez, Nayan and **Douglas A. Baals.** Delinquency, Drinking, and Academic Success: A Test of Subculture Theory. Paper Presented at the Annual Meeting of the American Sociological Association, Seattle, WA. August 2016.
- Baals, Douglas A.** and Joseph Kuhns. Gender Differences in Burglary Profiles and Pathways. Paper presented at the Annual Meeting of the American Society of Criminology, Washington, D.C. November 2015.
- Coston, Charisse and **Douglas A. Baals,** Amber Sanders, and Anita Blowers. Utilizing learning communities as a tool for CJ transfer students' success. Roundtable presentation at the annual meeting of the American Society of Criminology, San Francisco, CA. November 2014.