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THE PEER GROUP REVISITED: A NETWORK APPROACH FOR UNDERSTANDING ADOLESCENT DELINQUENCY

A Thesis in Sociology

by

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Abstract

Assuming that social networks both direct and constrain the behavior of their participants, it is important to examine whether the peer group's structure and composition are associated with patterns of delinquency. Potentially important characteristics of the adolescent's network include the number of friendship nominations given and received (size), how many others can access the adolescent (reach), how tightly the adolescent is integrated into the network (density), the adolescent's position within the network (centrality), and the adolescent's status within the peer network (leading crowd membership). I propose that the influence of the peer group's behavior (e.g., delinquency) on an individual's own behavior will be modified by these network characteristics. Additionally, the relationships will depend on the adolescent's age (i.e., will change developmentally) and will be moderated by school characteristics such as the school's sociometric network characteristics (density, sex and age heterogeneity, reciprocated friendship ties), demographic characteristics (student composition, school size, school type), and behavioral climate (school's alienation index, school's mean grade point average).

The Adolescent Health Survey provides several advantages over data used in prior research to address these issues in novel ways. Perhaps the most important advantage of these data, in terms of this project, is the inclusion of exceptionally detailed social network information on high school-aged adolescents. Not only do the network data allow more accurate conceptualization of the peer group, but they also allow for a more rigorous measurement of peer delinquency. Instead of relying on respondent's reporting

of peers' delinquent behavior, the network-based design incorporates the peers' self-reported delinquent behavior, as well as the school context in which these behaviors occur. These data are analyzed using multilevel modelling techniques (hierarchical generalized linear models) where adolescents and their peer groups are situated within the school environment. This allows school characteristics to both influence average levels of delinquency as well as to moderate the relationship between peer network characteristics and adolescent delinquency. Drawing on criminological, developmental, and social network literature, this research improves current science by providing a systematic empirical basis for the investigation of the ways in which peer groups influence delinquent behavior.

Findings from this study indicate that 1) peer group delinquency, as measured by responses from friends composing the adolescent's egocentric network, is robustly associated with an adolescent's own delinquency involvement; 2) this relationship persists whether the focus is on violent offending or property offending; 3) the delinquency-peer group association is conditioned by characteristics of the adolescent's egocentric friendship network such as density, size, centrality, reach, popularity, and integration; 4) delinquent peers have the strongest association with a respondent's delinquency in early adolescence (compared to middle and late adolescence), whereas the ability of network characteristics to condition the delinquency-peer group association remains largely age-invariant; and 5) school characteristics (e.g. school network density, school alienation) are associated with average levels of delinquency involvement, but rarely moderate the delinquency-peer group association.

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CHAPTER ONE

THE DELINQUENCY-PEER GROUP RELATIONSHIP

1.1 INTRODUCTION (RESEARCH QUESTIONS)

An understanding of the relationship between peers and delinquency is at the heart of delinquency research. One of the most consistent and robust findings in the literature on adolescent delinquency involves the association between friends' delinquent behavior and a respondent's own delinquency.[1] Dating back to the 1930s with Shaw and McKay's (1931) discovery that more than 80 percent of juveniles appearing before court had peer accomplices, researchers have continued to stress this group nature, noting the strong tendency for offenders to commit delinquent acts in the company of others (Reiss, 1986; Warr, 1996). In fact, a large number of studies find that the relationship of peer delinquency to self-report delinquency exceeds that of any other independent variable, regardless of whether the focus is on status offenses, minor property crimes, violent crimes, or substance use (Akers et al., 1979; Elliott, Huizinga, and Ageton, 1985; Jensen, 1972; Matsueda and Heimer, 1987; Short, 1957; Warr and Stafford, 1991). Additionally, longitudinal studies focusing on cigarette and alcohol use have demonstrated the

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[1]Adolescent delinquency is typically defined as activities that place youth at risk for adjudication, that is, violating the juvenile code (Henggeler, 1989; Thornberry, 1987). These activities can vary widely in their seriousness and detrimental effects on others. Status offenses are at the low end of the seriousness continuum and reflect those activities for which adults would not be arrested or prosecuted (e.g., truancy, alcohol use, smoking, running away). Serious offenses are at the other end of the continuum and reflect serious criminal activity which can have very detrimental consequences for victims and other members of the community (e.g., homicide, rape, aggravated assault, burglary, auto theft, and arson). Most criminology studies use an omnibus rather than offense-specific measure of delinquency (see Table 1). In reviewing the literature on adolescent delinquency, a number of interchangeable terms have been used to define these activities. Criminologists refer to such activities as delinquency, whereas psychologists and developmentalists have used such terms as antisocial behavior, problem behavior, and conduct problems. The current study continues the tradition in criminology and uses the term delinquency to discuss behaviors elsewhere described as antisocial behavior/conduct problems, norm-violating conduct, minor deviance and deviance, and delinquency.

etiological importance of peers in the initiation and persistence of substance use (Dishion and Loeber, 1985; Kandel, 1985; Kandel and Davies, 1991).

Because these results have gained such prominence in the literature, causal explanations of delinquency continue to emphasize delinquent peer associations (e.g., differential association, social learning, and developmental theories such as Thornberry's interactional theory). Despite establishing that adolescents are likely to behave in a manner consistent with their friends,[2] a knowledge gap remains concerning characteristics of the network structure of peer relations among delinquent and non-delinquent youth, and whether these network properties condition peer influence.[3] This omission is largely attributable to a reliance on a conceptualization of peer influence as referring to whether or not the respondent has had any exposure to delinquent friends. By ignoring the underlying social structure of friendship patterns, prior research has been unable to examine some important issues related to the influence of adolescent peer groups. Therefore, the objective of this project is to incorporate the context of friendship networks in which delinquent and non-delinquent adolescents are enmeshed, enabling the following issues to be addressed: 1) Is a measure of peer group delinquency, as measured

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[2] Criminology research has measured this association using responses about friends' behavior reported by the respondents, rather than the friends themselves. Limitations of this measurement strategy are discussed in a subsequent section.

[3] Peer influence refers to the association between friends' delinquent behavior (or non-delinquent involvement) and the respondent's delinquency (or non-delinquency). As discussed in Chapter Two, I am unable to distinguish between selection and socialization effects with cross-sectional data, and the two effects are likely confounded in my measure of peer influence (see Matuseuda and Anderson [1998] for a recent discussion of this point).

directly by responses of the friends composing the adolescent's friendship network (i.e., peer group[4]), associated with an adolescent's delinquency?; 2) Does the adolescent's location within the friendship group and other characteristics of the peer group condition the association of peer influence on delinquency?; 3) Does peer influence depend upon the adolescent's developmental stage (do the relationships change with age?); 4) Is school context associated with average levels of delinquency and does it moderate the association of the peer group's behavior on an adolescent's behavior?

A newly available data source, The Adolescent Health Survey, allows these questions to be addressed in a novel manner--through the application of a social network perspective and methods. An important advantage of these data is the inclusion of exceptionally detailed social network information on high school-aged adolescents, allowing for an examination of peer relationships among adolescents in considerable detail (Bearman, Jones, and Udry, 1997). Specifically, these data allow for an assessment of the influence of the peer group by considering different aspects of the social structure of the peer network, including the number of friendship nominations given and received (size), how many others have access to the adolescent through friendship ties (reach), how tightly the adolescent is integrated into the network (density), the adolescent's position within the network (centrality), and the adolescent's prestige in the friendship network (popularity). Incorporation of these peer group attributes enables an investigation of whether the delinquency-peer group association is conditioned by

[4] A peer group is defined in terms of the adolescent's personal friendship network (also referred to as a friendship group or egocentric network).

characteristics of the friendship network in which the adolescent is embedded. By utilizing network methods as a tool, these data allow for a deeper understanding of the role that the adolescent peer group plays in either facilitating or discouraging delinquent behavior.

Therefore, the advantages of this study include 1) the incorporation of a network approach and network measures to gain a more accurate depiction of the role the peer group plays on delinquency; 2) the use of a developmental framework to assess whether the influence of peer group characteristics on delinquency change with age; 3) the examination of the school context in which peer group networks are nested; and 4) methodological advantages in research design. The strengths of the research design include i) more accurate construction of peer groups using the friendship nominations of all students attending school; ii) measures of friends' delinquent behavior through information provided by friends themselves rather than respondent's perceptions; iii) collection of sensitive information through self-administered computer-assisted interviews; iv) random samples of adolescents (ages 11-19), including those students frequently absent from school; and v) the collection of information from relevant others, such as teachers, administrators, parents, and friends. Finally, the Adolescent Health Survey enables the use of more accurately specified multi-level models with individuals situated in peer groups that are nested within schools.

This chapter begins with a review of prior literature on the delinquency-peer group relationship with specific emphasis on prior studies' conceptualization and measurement of peer influence. Next, the developmental significance of peer friendship

groups is discussed, focusing on how the effects of peer group characteristics and peer influence are likely to change over the adolescent age-span. The chapter concludes with a discussion of the role of school context in influencing adolescent delinquency as well as moderating the influence of peer group characteristics on delinquency involvement.

1.2 STUDIES OF THE DELINQUENCY-PEER GROUP RELATIONSHIP

As stated earlier, a consistent finding in the literature on delinquency is that adolescents with delinquent peers are more likely to be delinquent themselves. Central here are a series of studies by Mark Warr investigating many dimensions of peer influence. Findings from these studies have advanced our understanding of peer influence by indicating that 1) friends' behaviors are more important correlates of a respondent's own behavior than are friends' attitudes toward delinquency, supporting tenets of social learning theory over differential association theory (1991); 2) attachment to parents only indirectly affects respondent's delinquent behavior by inhibiting the initial formation of delinquent friendships (1993); 3) characteristics of friendship relations associated with delinquency--the number of delinquent friends, the amount of time spent with friends, and loyalty towards friends--change greatly over the lifespan, peaking in middle adolescence (1993); and, 4) life course transitions such as marriage affect desistance from delinquency by altering friendship relations with delinquent peers (1998).

While specifying some of the causal mechanisms underlying the delinquency-peer group association, prior studies employ a one-dimensional conceptualization of peer influence, with peer influence measured as the respondent's perceptions of exposure to delinquent peers. This approach, I argue, greatly limits our understanding of peer

influence because it precludes any information about whether the structure of the friendship network conditions the effects of peer influence. In particular, two issues in prior research's investigation of the delinquency-peer group relationship are noteworthy.

The first issue involves the measure of peer influence commonly used. Table 1 presents a listing of many recent studies which investigate, either directly or indirectly, the delinquency-peer group association. As indicated in Table 1, the majority of studies measure whether or not respondents' friends have engaged in delinquency, but this information is provided by the respondent, not the friends' themselves. This limitation is partly attributable to a lack of suitable data. For example, data sets commonly used to examine the role of peers on delinquency--Monitoring the Future, National Survey of Youth (NSY) and National Youth Survey--are not network-based and only provide information from the respondent's perspective. Therefore, prior research assumes that respondents' perceptions of their friends' attitudes and behaviors accurately reflect the reality of these attitudes and behaviors without allowing for the powerful influence of assumed similarity (Jussim and Osgood, 1989). This limitation has been highlighted in both the developmental and criminological literature which finds that respondents' perceptions of friends' behavior are not very accurate assessments of the friends' actual behavior (Bauman and Fisher, 1986; Billy, Rodgers, and Udry, 1984). These findings give particular credence to Gottfredson and Hirschi's (1990:157) argument that measures of peer delinquency are simply "another measure of self-reported delinquency." That is, when asked to report their peers' delinquent behavior, adolescents show a proclivity to report their own delinquent behavior. If this is the case, it casts considerable doubt on the

frequently observed relationship between peers' delinquency and adolescents' own reports of their delinquency.

The second issue involves consideration of the underlying structure of the friendship networks adolescents are embedded in--in particular, whether characteristics of their peer group condition the relationship between the peer group's delinquency and an adolescent's delinquency. Most research on delinquent peers asks respondents if any friends engage in delinquent behaviors, or asks about the number of friends involved in delinquency--what is referred to as a simple sociometric count. This approach assumes that the number of relationships is most important in peer influence and that the dyadic relationships (i.e., friendship pairs) are independent from social structure. But dyads are embedded in larger social structures, the peer group, and the structure of this larger friendship network is likely to condition the influence of the delinquent peers. By focusing only on the number of delinquent friends an adolescent has, prior research tends to assume that everyone in the friendship group is affected similarly by the behavior of the group regardless of their position within the group and their status among group members.

The point here is that the criminological literature reflects a surprising lack of clarity in conceptualization of the peer group and little consideration of peer group structure. An alternative but yet unexplored approach in the criminological literature is to assess whether the susceptibility adolescents have to the influence of their peer group (defined more rigorously with network methods) derives in part from their position within the peer group. This is the approach taken in this project.

Although much less is known about the friendship characteristics of delinquent and non-delinquent youth than is known about the relationship between delinquency and friends' behaviors, a few studies present some preliminary information on group characteristics. Warr (1996) innovatively uses the NSY to examine some specific features of delinquent subgroups, including group organization and the instigator role within delinquent groups. A particularly important finding from a network perspective is highlighted in his study--the premise that the network structures in which individuals are enmeshed influence individual behavior over and beyond that of stable individual traits. Specifically, in regard to the instigator role (the adolescent responsible for initiating the delinquent act), Warr finds that particular offenders do not assume stable roles, but instead switch roles depending on the structure of the group. Results from his study also suggest that groups are more specialized than individuals tend to be, so that most delinquent offenders belong to multiple groups, each specializing in a smaller range of offenses. Unfortunately, only limited characteristics of delinquent peer groups could be examined with the NSY dataset. By incorporating the behavior of the group as a defining characteristic (i.e., delinquent group), Warr's study offers only descriptive characterization of group characteristics for delinquent adolescents.

Two influential studies also go beyond others by incorporating a consideration of the nature of friendship relations. First, an often cited study by Giordano et al. (1986) compares characteristics of delinquent and non-delinquent friendship groups. Findings from this study suggest that various dimensions of friendship relations do not differ markedly between delinquent and non-delinquent adolescents, and that both groups of

adolescents describe similar positive features in regard to their friendships with others. Therefore, in contrast to control theory's common depiction of delinquents' friendships as cold and exploitive (Hirschi, 1969), Giordano et al. (1986) find that both delinquent and non-delinquent adolescents report similar levels of attachment to friends, intimacy with friends, and amount of contact with friends. Similarly, Kandel and Davies (1991) investigated whether friendship groups among adolescents who do and do not use illicit drugs differ in terms of intimacy. Again, contrary to social control theory which expects substantial differences in the affective quality of friendships among delinquents and non-delinquents, the authors find few differences in the characteristics of the friendship groups. In fact, among frequent drug users they find more intimate friendships than among adolescents with no drug use or lower levels of drug use.[5] While these latter two studies go beyond others by incorporating the nature of friendship relations, they are largely descriptive and do not consider whether characteristics of friendship relations condition the influence of the friendship groups' behavior on an adolescent's own delinquency involvement.

Therefore, despite advancing our understanding of the role that peer groups play in adolescents' delinquency, prior research has yet to incorporate the underlying connections among adolescents within their peer networks and their social positions among these connections. By assuming that persons and groups are independent, past

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[5] These findings stand in contrast to some research coming out of the developmental field which suggests that children most at risk of delinquency are those who are rejected by their peers at an early age and later in middle adolescence form less stable and less affectionate friendships with other peer-rejected adolescents (Patterson et al., 1989).

research has overlooked how interconnections among persons and groups influence behavior. Although a review of the recent literature on the delinquency-peer group relationship indicates that respondents with greater exposure to delinquent friends are more likely to be delinquent themselves[6], very little is known about whether characteristics of the networks condition this association. This is the knowledge gap addressed by this project.

1.3 DEVELOPMENTAL SIGNIFICANCE OF FRIENDSHIP GROUPS

Developmentalists have long recognized that the peer group is an important force in the development of children's cognitive, emotional, and social competence. However, it is during adolescence that the peer group becomes most important as individual and developmental factors coalesce with the adolescent's struggle to establish an identity separate from their families of origin (Jackson and Rodriguez-Tome, 1993; Silbereisen and Todt, 1994). Susceptibility to peer influence in both antisocial and neutral behaviors is associated with the increase in emotional autonomy from parents during this stage of early adolescence (Steinberg and Silverberg, 1986). In addition, it is during this intense period of change from childhood into adolescence that individuals make the formal transition from the relatively protected and homogeneous space of elementary school into the increasingly complex world of junior high school and high school. These transitions are crucial for development; one requirement of successful development is the expansion of social networks allowing adolescents to identify their position within a more elaborate

[6] Still at issue is whether this association exists when friends' delinquency is measured by responses of friends themselves, rather than the respondent's perceptions of friends' behavior.

social landscape. As adolescents maneuver through the new social hierarchy of junior and senior high school they increasingly rely on their peers for approval and social status. In 1961, Coleman highlighted that "adolescents today are cut off... They are still oriented toward fulfilling their parents' desires, but they look very much to their peers for approval as well. Consequently our society has within its midst a set of teen-age societies, which focus teen-age interests and attitudes on things far removed from adult responsibility, and which may develop standards that lead away from those goals established by the larger society" (1961:9). Although this characterization of peer culture is still relevant for some groups of adolescents, it does not necessarily characterize all adolescents. Instead of a monolithic peer culture oriented toward hedonistic youthful pursuits as described by Coleman, there appear to be multiple peer cultures, which Brown (1990) refers to as "crowds"--each with unique orientations towards academic success, participation in extracurricular activities, and engagement in delinquent activity (Brown et al., 1986; Brown, 1990). While peer groups compensate for the movement away from the family as the singular mechanism of influence on the adolescent, they award acceptance and status on a new basis. Acceptance by the peer group is based largely on an individual's personal qualities, such as attractiveness, athleticism, and social skills (Eckert, 1989; Eder, 1985). Possessing these attributes not only ensures inclusion within the peer hierarchy, but also largely determines the type of friends and the particular peer culture the adolescent will be exposed to (and thus their own status within the peer hierarchy).

There are four primary ways in which peer groups become more influential during

adolescence. First, peer interactions begin to comprise a larger amount of an individual's time, with friendships among peers also accounting for a larger proportion of an adolescent's social network than they did in childhood (Brown, 1982). Second, adolescent peer groups begin to operate much more independently with considerably less adult guidance or control (Jensen and Rojek, 1992). Third, as adolescents submerge themselves in peer culture they distance themselves from adults and begin to incorporate peers of the opposite sex into their social groups (Zani, 1993). Finally, peer interactions expand beyond dyadic and clique relationships so that the inter-relationships of these smaller groups connect to the larger peer aggregate comprised of relationships between and among different peer cultures (Brown et al., 1986; Brown, 1990).

Although research supports the expectation that peer networks are integral to understanding adolescents' behavior, there is also reason to expect that the influence of peer group characteristics will depend upon the adolescents' developmental stage. For example, the literature finds that peer relations, including exposure to peers, time spent with peers, and loyalty to peers, change dramatically throughout adolescence, following a pattern similar to the age-crime curve (Steffensmeier et al., 1989; Warr, 1993). Variations in the number of friends in an adolescent's social network similarly follow a curvilinear trend, increasing from middle childhood through middle adolescence, followed by a gradual but substantial decline thereafter (Zani, 1993). There also is a steady decline in adolescents' rating of the importance of belonging to a peer group and an increasing concern with identity development in middle and late adolescence, often expressed in the belief that remaining close to the peer group stifles self-expression and

identity formation (Brown et al., 1986; Coleman, 1961). It is during this period of older adolescence that peer cultures become more permeable, with greater movement between crowds (Brown et al., 1986; Brown, 1990).

A trajectory of structural alterations in peer groups during adolescence is described by Zani (1993:98) as beginning with "the isolated, unisexual cliques or pubertal groups which are typical of early adolescence [which are then] succeeded by the fully developed crowds or heterosexual cliques in close association of middle adolescence, and these, in turn, lead to the relatively independent, heterosexual cliques or loosely associated groups of couples which emerge in later adolescence." This view of the evolution of the peer group is also consistent with the "focal model" of adolescent development, espoused by Coleman and Hendry (1990). Their model posits that an adolescent's attitudes towards parents, peers, friends, and romantic partners change as a function of age, leading to heightened concern with the primacy of different relationships at different stages in the adolescents' development. For example, primary interest tends to move from parents to peers and peer-oriented activities in middle adolescence, finally gravitating towards romantic relationships in late adolescence. Although the relationship has not been teased out in the literature, it is plausible that changing primacy towards peers is closely associated with changes in the structuring of friendship networks. For example, changes in peer influence--especially the association between friends' delinquency and an adolescent's own delinquency--may be highly associated with network characteristics which alter throughout adolescence.

As peers and adolescent peer cultures become increasingly important in

adolescence, exposure to delinquent peers changes from a period of little exposure in preteen years, to heavy exposure in middle adolescence (Warr, 1993). Furthermore, these observed increases in exposure to peer antisocial behavior are associated with rapid increases in an adolescent's own problem behavior (Elliott and Menard, 1991). One explanation for increased exposure to delinquent peers and rising levels of delinquent behavior in middle adolescence is that adolescents increasingly spend time with peers in places that lack adult supervision (Osgood et al., 1996). These unstructured socializing activities are thought to increase the pressure adolescents receive from friends to engage in problem behavior (Steinberg, 1990). Although adolescents may express conventional values and beliefs, their marginal structural position in society provides them with much leisure time, high levels of peer group interaction, and freedom from many types of conventional bonds, all of which are conducive to delinquent behavior (Jensen and Rojek, 1992). While this view implies that all adolescents are at heightened risk of delinquency during adolescence, especially if their friends are delinquent, there is reason to believe that the influence of the group's behavior will depend upon both an adolescent's developmental stage as well as their position within the friendship network. Rapid changes in delinquent peer associations across adolescence in conjunction with changing friendship group characteristics may account for part of the age distribution in delinquency (Steffensmeier et al., 1989; Warr, 1993). Thus, it is important not only to investigate the ways in which peer groups influence delinquency, but also to examine whether and how the effects of peer association may change with developmental alterations occurring in adolescence.

1.4 SCHOOL CONTEXT

Because schools remain a primary setting of adolescent friendships, studies of adolescent delinquency are appropriately conducted on school-based relationships (Blythe, Hill, and Thiel, 1982). While peer involvement has emerged in the literature as a source of influence on individuals' behavior, this influence is typically portrayed as a result of pressure, modelling, and interaction in small friendship groups and cliques (Akers, 1985; Eckert, 1989; Sutherland, 1947). Not only do adolescents adopt attitudes and behavior to fit in with their friends, but they also may be influenced by the larger aggregate of network ties in the school. This suggests that peer influence may also operate at a more macro level--within a larger school context. Thus, peer influence may occur both through strategies adopted within homogenous friendship groups, as well as in the dynamics among different groups within the overarching school network. This overarching network is responsible for generating a school culture comprised of categories of adolescents defined by different orientations to school (e.g., academic-oriented, athletic-oriented, status-oriented, anti-establishment- oriented) (Brown et al., 1986; Brown, 1990; Eckert, 1989). Furthermore, these categories affect an individual's school orientation through their reflection of the larger socioeconomic and ethnic groupings in society.

These considerations suggest that another relatively unexplored topic in the criminological literature is whether the larger school context is associated with an

individual's delinquency.[7] It is important to recognize that the organization of schools ensures that adolescents will spend a large proportion of their waking hours in close association with groups of other adolescents of approximately the same age and intellectual development (Entwisle, 1990). If influence from peers is to be better understood, the nature of the school setting needs to be taken into account. A social network perspective allows an emphasis to be placed on the organizational structure of schools, suggesting that variation in delinquent behavior is related to one's social position within one's friendship group (the egocentric network) and the structuring of the overall global network of friendships and associations within the school (the sociometric network) (Coleman, 1961; Hollingshead, 1949).

Therefore, some of the more important moderators of the relationship between peer group characteristics and individual's delinquent behavior are expected to involve characteristics of the overall school network. Specifically, characteristics of the school network, what is referred to as the sociometric network--including density, network heterogeneity by sex and age, and the percent of mutual ties in the school network (i.e., reciprocated friendship ties)--are examined to determine if they are associated with an adolescent's level of delinquency. For example, is average delinquency lower in schools characterized by many interconnections between students (e.g., high sociometric density or high percentages of mutual friendship ties)? Also, school network characteristics are

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[7] Some recent studies which have explored the role of school context include Gottfredson (1987), Gottfredson et al. (1991), Hellman and Beaton (1986), and Jenkins (1997), although these studies have not incorporated the school context of social network ties which is addressed by this project.

investigated to see if they moderate the association between peer group delinquency and the adolescent's own delinquent behavior. For example, is an adolescent's behavior less associated with their friends' delinquent behavior when the school is characterized by high sociometric network density? As the density of the school network increases, adolescents are more likely to know other students in the school and these bonds with others may imply that adolescents' behavior becomes more subject to the reactions and constraints of all network members. If prosocial (anti-delinquent) behavior is normative in the school (which may not always be the case), it is expected that overall school network density will be associated with a lower rate of delinquent behavior. However, egocentric network density (i.e., a respondent's personal friendship group's density) may interact with sociometric school network density so that high egocentric network density in a context of low sociometric school network density can indicate isolation of the personal friendship network from the rest of the school. In this situation we would expect a stronger association between friends' behavior and the respondent's behavior.

By altering any of these factors--characteristics of the adolescent's egocentric peer group, characteristics of the sociometric school network, behavioral attributes of the adolescent's peer group, or the school context--the association between the variable of interest and the adolescent's own delinquency is likely to change. Because of the scarcity of studies which have investigated these multiple dimensions of peer relations, analyses are conducted in which characteristics of the school network are examined to determine whether school context either influences the individual's average delinquency levels or moderates the relationship between friendship group characteristics and delinquency

involvement.

In addition to the constraint of the overarching school network, schools provide different resources which may affect individuals' delinquency both directly and indirectly through peer associations. These influential characteristics of schools may include the overall race and sex composition of the student body, whether the school is a private, public, or parochial institution, and the size and urbanicity of the school (Gottfredson and Gottfredson, 1985). An example of how a demographic characteristic of the school can affect a student's position within the school involves school size. Research has consistently shown that smaller schools (in terms of student population) enhance personal development and prosocial behavior among adolescents (Entwisle, 1990). One explanation for this finding is that smaller schools have a limited pool of students available for school-related activities, allowing even marginal students to become better integrated into the school structure through participation in extracurricular activities. Some evidence also suggests that the more responsive nature of administrators in small schools allows greater flexibility in rewarding and punishing students, which in turn is associated with lower levels of school delinquency (Gottfredson and Gottfredson, 1985).

Finally, school climate can be assessed through the aggregation of the students' perceptions and behaviors. One potentially important characteristic of the school is the average student's perception of school connectedness. Whether or not students feel connected to their school environment, or conversely, alienated from the school, is likely to be associated with student behavior. Specifically, it is expected that adolescents will be more influenced by their peers (i.e., a stronger association will exist between a

respondent's delinquent behavior and friends' behavior) when they attend schools less able to sustain atmospheres of connectiveness where students feel close to others and a part of the school environment. When students perceive they have little power or influence and minimal connection to the school and others in the school, a culture of delinquency may be better sustained. Although adolescents have little opportunity to choose the schools they attend, the school environment defines and limits the behavioral choices available to them (Darling and Steinberg, 1997). Therefore, different school resources and the school's behavioral climate are investigated to determine if they are associated with adolescents' delinquency or operate to moderate the relationships between friendship group characteristics and delinquency.

1.5 SUMMARY

In summary, this research project uses a social network perspective to examine an important element of peer influence, the observed pattern of interpersonal friendship relations. This allows for an investigation of whether individual behaviors are shaped through the patterning of interpersonal relationships which serve as the context in which social norms and cultural values regarding delinquency are shared. Because of the importance of peer relationships in delinquency, the fact that few accounts of the delinquency-peer group association have been based on a social network perspective provides an opportunity to determine whether a network approach can provide a deeper understanding of the delinquency-peer group association. To recap, the focus on interpersonal relationships among adolescents in school settings will allow the following issues to be addressed:

i. Is peer group delinquency, as measured directly by responses of the friends composing the adolescent's friendship network, associated with an adolescent's delinquency?

ii. Does the adolescent's location within the friendship group and other characteristics of the friendship group condition the effect of peer influence on delinquency?

iii. Does the peer group influence depend upon the adolescent's developmental stage (do the effects change with age?)

iv. Does the school context influence average delinquency levels and/or moderate the effect of the peer group on adolescents' behavior?

Table 1. Prior Research's Measurement of Peer Influence and Respondent's Delinquency

Author, Year	Data	Measure Peer Influence	Measure Self-Report Delinquency

Caspi et al., 1993	Multidisciplinary	Exposure to Delinquent Friends: sum of the number	29-item scale of illegal behavior where responses were summed and 0=never,...
	Health and Develop.	of friends who engage in each of 20 illegal behaviors	
	Study	where (0=none, ... 2=lots of kids I know do it) based	3=3+times. Weighted for seriousness
		on respondent's perceptions of friends' behavior	
Elliott et al., 1996	Neighborhood Project	Exposure to Delinquent Friends: measure of the	15-item scale

		proportion of friends involved in illegal activities based on respondent's perceptions of friends' behavior	measuring involvement in delinquent behavior and 7-item scale measuring drug use
Giordano et al., 1986	942 youth aged 12-19 living in a large North central SMSA	13 distinct dimensions of friendship, including self-disclosure, caring and trust, rewards, frequency of interaction, stability friendship, conflict--measure of susceptibility to peer influence	27-item scale which is used to classify respondents in 1 of 5 offender categories (non-offender, low-frequency minor offender, high freq. minor offender, low-freq. major offender, and high-freq. major offender)
Heimer and Matsueda, 1994	NYS	Exposure to Delinquent Peers: respondent reports of the # friends who have engaged in vandalism, theft, and burglary in the last year, based on respondent's perceptions of friends' behavior	28-item index of self-reported illegal activities. Sum of the ordinal responses.
Lauritesen, Sampson, and Hagan, 1991	NYS	Exposure to Delinquent Peers: multiplied the amount of time adolescents reported spending with their peers by the extent of their peers' involvement in delinquency based on respondent's perceptions of friends' behavior	Summary measure of the # of times in prior year the respondent reported engaging in minor and felony assault, minor and felony theft and robbery. Summed the ordinal scale response instead of using raw frequencies

Table 1 cont.

Osgood et al., 1996	MTF	Measure of unstructured socializing with friends	10-item measure of criminal behavior where responses to items ranged from 0 to 4. Index was the sum scores across 10 items, with scores recoded to a maximum of 20 and the natural logarithm taken
Simons et al., 1994	177 adolescents living in small towns in Midwest	Exposure to Delinquent Friends: respondent asked how many of their close friends had engaged in each of 15 delinquent acts, where 1=none, ... 5=all. Summed	Involvement with Criminal Justice System. Asked how often during the preceding year (0=never, ... 4=6+ times) they had

		responses to obtain a total score. Based on respondent's perceptions of friends' behavior	been arrested, placed in juvenile detention or jail, or had gone to court or been placed on probation
Thornberry et al., 1994	Rochester Youth Development Study	Exposure to Delinquent Friends: sum of the ordinal responses to 8 questions asking what proportion of friends have committed the delinquent act (0=none, ... 4=most). Based on respondent's perceptions of friends' behavior	Summated delinquency index of 28 items derived from NYS. Summed up raw frequencies and took the natural log
Warr, 1998	NYS	Exposure to Delinquent Friends: dichotomous variable indicating whether any friends were self-reported by respondent as having participated in at least one delinquent activity in the past year. Based on respondent's perceptions of friends' behavior	Coded as dichotomous variable with 1 indicating respondent committed at least 1 of 4 delinquent activities at least once during the reference period and 0 otherwise
Warr, 1993 Age, Peers, & Delinquency	NYS	Exposure to Delinquent Friends: measured as the proportion of close friends who participated in 1 of 6 delinquent activities where 1=no friends, 2=very few, 3=some, 4=most, 5=all. Responses coded as raw freq. Based on respondent's perceptions of friends' behavior	Summated delinquency index of how many times in the last year the respondent had engaged in 6 different delinquent acts scored as raw frequencies with highest category scored 5+

Table 1 cont.

Warr, 1993 Age, Peers, & Delinquency	NYS	Exposure to Delinquent Friends: measured as the proportion of close friends who participated in 1 of 6 delinquent acts where 1=no friends, ..., 5=all. Responses coded as raw frequencies. Based on respondent's perceptions of friends' behavior	Raw frequency counts of how many times in the past year respondents have committed 6 different offenses with highest category scored as 5+
Warr, 1996 Organization & Instigation in Delinquent Groups	NSY	Exposure to Delinquent Friends: measured as the number of friends who were present when the delinquent act in question occurred. Based on respondent's perceptions of friends' behaviors	Respondent asked how many times they had committed a variety of delinquent acts (12) during the past 3 years. Treated descriptively

Warr and Stafford, 1991	NYS	Exposure to Delinquent Friends: measured as the proportion of close friends who participated in 1 of 6 delinquent activities where 1=no friends, 2=very few, 3=some, 4=most, 5=all. Responses coded as raw freq. Based on respondent's perceptions of friends' behavior	Raw frequency counts of how many times in past year respondents have used marijuana, committed minor larceny, or cheated on a test. Highest category scored as 5+

CHAPTER TWO

THEORETICAL FRAMEWORK

2.1 INTRODUCTION

Two dominant perspectives on the etiology of delinquent behavior are Hirschi's (1969) social control theory and Sutherland's (1939) differential association theory. Although these delinquency theories are guided by different assumptions, I draw on Krohn's (1986, 1988) work with a network perspective to argue that basic tenets of each theory can be bridged through

the application of a network framework. Additionally, Thornberry's (1987) interactional theory is incorporated to elucidate the developmental aspect of the delinquency-peer group association. In this chapter I discuss the important concepts from social control, differential association, and interactional theory, suggest how a network perspective can bridge and elaborate on these concepts, and posit expectations for the delinquency-peer group association derived from a network perspective.

2.2 SOCIAL CONTROL THEORY

Travis Hirschi's (1969) social control theory of delinquency is based largely on the notion of social integration from the work of Durkheim (1951). Instead of focusing on why certain individuals commit crime, social control theory emphasizes the necessity of explaining why individuals refrain from criminal activity (Hirschi, 1969). Offering motivation for criminality is unnecessary, according to Hirschi, because "we are all animals and thus all naturally capable of committing criminal acts"(1969:31). Instead, he focuses on constraining influences and argues that adolescents tightly bonded to family, the school, and peers are less likely to engage in delinquent acts because these bonds restrain them from acting on their natural antisocial impulses (1969).

According to social control theory, the four bonds responsible for constraining delinquent behavior are attachment, involvement, commitment, and belief. Adolescents who have strong ties of affection to others (family, friends, school), are involved in many non-deviant activities, have a commitment to their position or future position in society, and believe in the sanctity of the moral code are more behaviorally constrained than those lacking these bonds, and thus less likely to become involved in delinquency. Social

control theory also posits that the bonds are additive, that is, adolescents will be more integrated within society (and less likely delinquent) when they have many bonds via attachment, involvement, commitment, and belief.

While research has provided modest empirical support for Hirschi's theory (see a review of research on this issue in Jensen and Rojek [1992], it remains clear that a complete explanation of delinquent behavior is not offered by the theory. One of the more problematic aspects of social control theory involves the neglect of the context in which the social bonds occur. Specifically, while research establishes that in most cases social bonds are associated with a reduction in delinquency, they are not likely to reduce delinquency when adolescents are bonded to delinquent friends. When adolescents are bonded with delinquent peers, the constraint of the bond is towards delinquency. Thus, constraint appears to operate in either direction (i.e., towards or against delinquency) depending upon the context of the bond. Despite Hirschi's denial of the importance of delinquent friends, it is these delinquent associates who are implicated in the transmission of delinquency and to whom differential association theory attaches primary importance.

In sum, although social control theory pays limited attention to the context in which social bonds occur, its emphasis on the constraining influence of social integration is consistent with a social network perspective (Krohn, 1986). Elaborating on social control theory, Krohn (1986) suggests that instead of viewing constraint as occurring only in the direction of conventional behavior, the nature of the constraints depends on the content of the norms and behavior present in the friendship network. Differential association's emphasis on the transference of these norms and behaviors from friends to

adolescents is a necessary additional consideration.

2.3 DIFFERENTIAL ASSOCIATION THEORY

Edwin Sutherland's (1947) differential association theory is based on the premise that delinquency is learned through intimate social relations with peers where attitudes or "definitions" favorable to law violation are acquired. Thus, not only are adolescents' attachments to peers important for delinquency involvement, but more importantly, the context or norms of the friendship group determines whether attachment to friends will result in conventional or delinquent behavior. Specifically, Sutherland believes that the social transmission of delinquency occurred through the dissemination of attitudes about the appropriateness of delinquent behavior within the friendship group. While Sutherland's theory emphasizes the attitudes of peers in the transmission of delinquency, Aker's (1985) extension to social learning theory suggests that the adoption of delinquent behavior occurs through imitation or modeling of peers' behavior, or through observation of the positive consequences of peers' behavior. Consistent with Aker's reformulation of differential association theory, research finds that behavior of peers is more important than attitudes of peers in influencing an individual's own delinquency (Warr and Stafford, 1991). Differential association theory is particularly suited to an examination of peer groups because "definitions favorable to violation of law" are learned in the intimate social networks of individuals (Sutherland and Cressey, 1974). Several researchers drawing on differential association theory have argued that the effect of delinquent peers is conditioned by specific features of social relations (Agnew, 1991; Short, 1960, 1985; Voss, 1964). The features that Sutherland's theory stipulate as most

relevant for differential association and which are expected to condition the delinquent peer influences are frequency, duration, priority, and intensity of associations. Because Sutherland only provides vague descriptions of these features of differential association, various definitions have been offered by subsequent researchers. For example, Sutherland and Cressey (1978:81) state that the dimensions of frequency and duration "are obvious and need no explanation." Generally, frequency is used to refer to how much contact or involvement adolescents have with their peers, while duration refers to how long the relationship has been maintained. However, the definitions of priority and intensity are much more vague and subject to interpretation. Agnew suggests that "the dimension of priority is based on the assumption that, other things being equal, associations formed early in life are more important than those formed later in life" (1991:49). In addition, Agnew argues that intensity is closely related to Hirschi's bond of attachment, or the affection the adolescent has towards his or her friends.

Using these definitions of social relations, Agnew (1991) finds that the effect of friends on adolescents' delinquency is conditioned by characteristics of the social relations. Specifically, the effect of peers is stronger when an adolescent has high attachment to peers, much contact with friends, and when their peers display delinquent patterns. These are particularly important findings because they indicate that even in delinquent peer groups, individuals display substantial variation in their attachment to peers and in how much time they spend with these peers. This suggests that peer groups are composed of individuals displaying variation in delinquency such that delinquent and non-delinquent groups are not composed of aggregates of similarly delinquent or non-

delinquent individuals. Thus, all group members are not affected by the group's behavior in exactly the same way.

Agnew's focus on interactions between peer relationships and peer delinquency is extended in the present project's investigation of whether and how characteristics of the friendship network condition the delinquency-peer group relationship. By drawing on a network perspective and network data, I expand on Agnew's work and investigate whether structural characteristics of the friendship network condition the effect of peer delinquency on a respondent's own delinquency involvement. Characteristics of the peer group and of the adolescent's position within the group are used to improve understanding of the association between the group's behavior and an individual's own behavior. As discussed next, a network perspective suggests that 1) some group members are more susceptible to control by their friendship network due to their position within the friendship group, and 2) some friendship networks are more effective in controlling the behavior of their members due to structural characteristics of the group.

2.4 SOCIAL NETWORK PERSPECTIVE

Network methods can be used to gain insight into the delinquency-peer group association through an examination of the underlying social structure of network relations among adolescents. These methods are guided by a basic proposition, that "the structure of a network has consequences for its individual members and for the network as a whole, over and above effects of characteristics and behaviors of the individuals involved" (Klovdahl, 1985:1204). A social network is defined as a "set of nodes (e.g., persons) linked by a set of social relationships (e.g. friendships) of a specified type" (Laumann et

al., 1987:458). In network analysis, the pattern of linkages among a group of nodes is of primary interest (Friedman et al., 1999). An egocentric network, as the term is used here, centers on the individual and represents his/her direct friendship links to other respondents within the school; in contrast, a sociometric network refers to the patterning of relationships among all respondents in the target population (e.g., the school). Both networks, egocentric and sociometric, provide different information and thus are incorporated into this project. For example, an adolescent's egocentric network density is assessed in conjunction with the overall sociometric network density of the school which they attend.

Social network analysis is uniquely suited for measuring and understanding the behavior of peer groups because it provides a formal means for "mapping" friendships and measuring properties of those friendships (Ennet and Bauman, 1996). In all prior criminology/delinquency research designs adolescents simply describe their perceptions of their friends' behavior. This is then construed as a measure of peer influence. An alternative and more methodologically valued approach is offered in network analyses, where the beginning point is asking respondents both to describe their own behavior and to identify their friends as well. The second step involves locating and interviewing the friends, with the friends describing their own behavior and then identifying their friends, and so on. In a best case scenario (which the Add Health comes very close to), all adolescents and friends in the population of adolescents provide this information. This allows the links among friends to be established for the purpose of constructing analytical

peer groups with identifiable group properties. The characteristics of the adolescent's friendship network, including peer delinquency, can then be treated as individual attributes of that respondent.

Incorporation of a network perspective thus allows for an examination of how the structure of the personal friendship network constrains and guides adolescents' behavior. The influence of the egocentric network (i.e., the peer group's delinquency) may depend on how large the friendship group is (size), how many others can access the adolescent (reach), how tightly the adolescent is integrated into the network (density), the adolescent's position within the network (centrality), and the adolescent's status (leading crowd membership) within the larger sociometric network (i.e., overall school network). These patterns of positions within the friendship networks are emphasized by a network perspective and are used to interpret the individual's behavior (Wellman, 1988). The strength of network analysis resides in the information provided by the patterning of ties among network members; these patterns of friendship ties structure the flow of information, social norms, and social support, and potentially provide linkages for the transmission of delinquent behavior (Ennett, Bailey, and Fedem, 1999).

Although advances in network methodologies have resulted in findings which suggest the importance of social relations for understanding behavior (e.g., Bott, 1957; Coleman, 1961; Granovetter, 1973; Kapferer, 1969), most criminologists have not yet examined the different ways in which social networks can influence adolescent's participation or non-participation in delinquency. In particular, while the relationship between friends' delinquency and the delinquency of adolescents is one of the strongest

and most consistent findings, very little is known about the mechanisms through which peer group associations influence delinquency (Giordano, Cernkovich, and Pugh, 1986). In particular, no studies investigate how a person's structural location within peer networks influences one's delinquency. Theories of adolescent delinquency have focused on the existence of peer networks (differential association theory) or on adolescents' feelings toward the group, such as attachment to friends (social control theory), without considering characteristics of the networks themselves (Krohn, 1986). A social network perspective begins to redress this imbalance by suggesting that behavioral patterns depend upon the degree of constraint evidenced in social networks (Knoke and Kuklinski, 1982).

Krohn (1986, 1988) is one of the few criminologists who has recognized the benefits of applying a network perspective to the study of crime and delinquency. Specifically, he discusses theoretically how a network perspective can be used to bridge concepts from social control and differential association theory. Krohn presents a network theory of delinquency which incorporates both the delinquency-constraining effects of social bonds and the delinquency-enhancing effects of differential association. To evaluate the degree to which delinquent behavior (versus conventional behavior) is within the purview of an individual's network, Krohn discusses the usefulness of two network characteristics--multiplexity (defined as the number of activities in which the same people interact jointly) and density (defined as the extent to which all people in the social network are connected by direct ties) (1986, 1988). Although Krohn did not have

access to network data to test his theory directly,[8] he was able to ask adolescents about the multiplexity of their network relations. This indicated that being involved in multiple relationships simultaneously, that is participating in activities with both parents and peers, led to a lower likelihood of cigarette smoking for adolescents even controlling for best friend's smoking behavior (Krohn, Massey, and Zielinski, 1988).

This project expands on Krohn's ground-breaking work in four important ways. First, a peer group is defined more rigorously using network data on friendship nominations to link adolescents. Rather than an abstract group of friends, the peer group in this study consists of all adolescents who the respondent directly nominates as friends, as well as those adolescents who directly nominate the respondent as a friend (see footnote #16). Second, the behavior and structural characteristics of the personal friendship network (i.e., egocentric network) are measured directly through information provided by all members of the friendship group, rather than by the perceptions of the respondent. This includes information on how delinquent the group is, as well as structural properties of the friendship network such as size, density, centrality, reach, and popularity. These network properties should improve understanding of the constraining behavior of social networks as well as provide useful conceptualizations of Sutherland's properties of differential association, especially the property of intensity. For example, the network properties of density and centrality are useful conceptualizations of Sutherland's notion of intensity because adolescents who are located within a dense

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[8] Krohn did not use sociometric data which would allow for direct measurement of network properties; instead, he asked respondents in his survey to describe properties of their personal networks.

friendship network, or who are found within central positions in the friendship network, should be influenced more by the group's behavior than are adolescents located in less dense networks or those who occupy peripheral positions. That is, their differential associations reflect greater intensity in these situations. Third, I draw on Agnew's (1991) discussion of interaction effects and explore whether the structural characteristics of an adolescent's personal friendship network condition the relationship between the behavior of the friendship group and an adolescent's delinquency involvement. Lastly, characteristics of the overall school network (the sociometric network) are incorporated to explore whether characteristics of the school network are associated with average levels of delinquency and/or moderate the relationships found between structural characteristics of an adolescent's egocentric friendship network and peer group delinquency.

In summary, a network perspective suggests that adolescents engage in delinquency not only because their friends are participating, but because their location within the friendship group determines whether the group has more or less constraint on their behavior. An important principle of a network perspective is that norms emerge from location in structured patterns of social relationships (Wellman, 1988). Behavior is thus interpreted "in terms of structural constraint on activity instead of assuming that internalized norms impel actors in voluntaristic, sometimes teological, behaviors toward desired goals" (Wellman, 1988). Therefore, a network perspective implies that delinquent behavior is a consequence of structural location, not internalized norms.

2.5 INTERACTIONAL THEORY

In addition to a consideration of the structure of networks, an investigation of

adolescent behavior requires insight into whether age acts as a structuring mechanism. Specifically, an examination is needed of changes in the delinquency-peer group association across adolescence, as well as the varying nature of friendship network characteristics on an adolescent's risk of delinquency. Terrence Thornberry's (1987) interactional theory of delinquency provides a framework for exploring these issues as it combines elements of social control and differential association theory with components of social structure. Thornberry argues that while the weakening of social bonds (e.g., parental and school attachment) is the underlying cause of adolescent delinquency, delinquent behavior will only occur via weakened bonds if the behaviors are learned through associations with delinquent peers. Although Thornberry does not discuss social structure in terms of the patterning of friendship relationships, he does examine social structure as it relates to age, social class, race, and neighborhood characteristics interacting with social control and differential association variables (Akers, 1994).

An important contribution of Thornberry's theory is his rejection of the static nature of these processes. He argues that social bonds to parents and school, as well as associations with delinquent peers, are not invariant across the age span, but rather change across developmental stages. Unfortunately, little research has examined whether these relationships are age-invariant (see Joon Jang [1999] for a recent exception). More importantly, because delinquency research has not investigated the patterning of network relations, no research has examined whether the association between friendship network properties and friends' delinquency is invariant throughout adolescence.

2.5.1 Developmental Aspect of Interactional Theory

The specification of the age-varying effects of family, school, and peers on delinquency during adolescence is a primary goal of Thornberry's interactional theory (1987). Thornberry examines three separate models of the relationships: for early adolescence (ages 11-13), middle adolescence (ages 15-16), and late adolescence (ages 18-20). A distinguishing characteristic of developmental theories is the division of theory into separate models for different phases of the age-span (Vold et al., 1998).

Because the present study focuses on the delinquency-peer group association, the discussion of Thornberry's theory is limited in large part to the delinquency-peer group relationship.[9] In early adolescence, Thornberry expects peers to already have a significant effect on an adolescent's behavior. However, it is during middle adolescence that the effect of delinquent peers on the adolescent's behavior is expected to steadily increase to a peak, as interaction and social influence shift from the family to peer networks. Although not discussed by Thornberry, his work implies that network characteristics will be most important during middle adolescence since that is when adolescents' identities are most likely to be influenced by their position within the peer network structure (Zani, 1993). Finally, Thornberry expects the association between delinquent peers and an adolescent's behavior to remain significant in late adolescence, although the relationship is expected to decline in strength. This is attributed to older youth's emerging commitments to conventional activities such as employment, college education, marriage, and military service.

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[9] Thornberry also discusses the age-varying effects of bonds to parents and schools during adolescence (1987).

Thus, interactional theory draws on a developmental framework and hypothesizes that peer influences are already significant by early adolescence, increase and peak during middle adolescence, and then decline gradually in late adolescence. While interactional theory does not discuss the changing influence of friendship group properties over adolescence, findings from the developmental literature suggest some hypotheses about these relationships. These are presented later in the chapter.

2.6 EXPECTATIONS

In summary, it is proposed that the application of a network perspective to these theories of delinquency will allow for a more complete understanding of the processes through which peer groups influence adolescent delinquency. Drawing on these linkages it is hypothesized that *the peer group's behavior will be more closely associated with an adolescent's behavior when the group is highly cohesive*--that is, when group density is high and all members of the group are likely to know and interact with one another (Bott, 1957). More cohesive groups contain higher levels of interaction and communication within them so that the opportunities for group members to express their views of appropriate behavior are maximized (Giordano et al., 1986). Additionally, when all group members know one another, the likelihood of knowing others outside the network is reduced compared to the opportunity to know outsiders in less dense friendship networks (Granovetter, 1973). This suggests that outside pressures will be less influential for adolescents located in dense friendship networks.

James Coleman (1990) discusses the advantages of social closure of this sort in an individual's network for the facilitation of a clear social identity. Conceptualizing

networks in terms of social capital suggests that "a cohesive network conveys a clear normative order within which the individual can optimize performance, whereas a diverse, disconnected network exposes the individual to conflicting preferences and allegiances within which it is much harder to optimize" (Podolny and Baron, 1997:676). This suggests that very dense social networks will better be able to facilitate a common group identity and constrain the behavior of their members to be consistent with the group's behavior.

Related to the idea that dense peer networks will better facilitate group cohesion, an individual's position within the group will affect how influential the group's behavior is on the adolescent's own behavior. Therefore, *adolescents located in more central positions are expected to report behavior more closely associated with their friendship group's behavior than individuals located in more peripheral positions* (Giordano, 1983).[10] A central adolescent has ties to all or most of the group members in the peer group so that information passed through the group will most likely be passed through this central adolescent. This is an exposure argument--the more central adolescents are exposed to greater communication and interaction within their friendship group than adolescents located in peripheral positions within the group.

Similarly, individuals who receive many friendship nominations (have a large receive network or "in-degree") are expected to be more constrained by the behavior of

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[10] Conversely, it could be argued that more central actors (and more popular actors) have greater influence on the group's behavior. While I am unable to determine the direction of the relationship with cross-sectional data as used here, either position implies that the association between friends' behavior and a respondent's behavior will be stronger when the respondent is located in a more central position within the peer group.

the group than individuals who receive fewer friendship nominations. For example, the individuals who are the most popular, those whom Coleman (1961) termed "the leading crowd" *may have behavior more similar to their friendship group than individuals with less status in the peer hierarchy.* This expectation arises because the most popular students have the most to lose (the furthest to fall in the status hierarchy) by not adapting to the group's behavior. Supporting this idea, ethnographic research by Eder (1985) finds that the most popular adolescent girls in a junior high school perceived much more limited friendship choices and experienced great stress associated with maintaining their dominant position within the student hierarchy. This was partly attributable to expending considerable effort ensuring that their behavior was consistent with that expected from their elite position within the school setting.

As for differences between violent and property delinquency it is expected that *delinquent peers will be more strongly associated with violent delinquency than property delinquency* for two reasons. First, since violence is often used to establish or defend a reputation, it is likely that violent behavior will be overt in an effort to enhance one's status (Felson and Tedeschi, 1993). In fact, both experimental and survey research indicates that audiences have strong effects on violent behavior (Felson, 1978). Therefore, adolescents with violent friends are more likely to know about and be encouraged to use similar violent means to establish status within the friendship group. In contrast, property delinquency may be more covert and idiosyncratic, so adolescents may be less likely to know about their friends' delinquent behavior and to be influenced by it. Second, delinquent peers may be more strongly associated with violent behavior

because this type of delinquency has the potential for more immediate repercussion in the form of violent retaliation. Therefore, having friends who also engage in violence and are willing to back the adolescent up may shield the adolescent from potential retaliation from the victim(s), and consequently provide greater incentive to participate in violent behavior. Friends do not necessarily provide similar benefits for property offending (although an exception is that friends can serve as lookouts).

Turning to developmental expectations and drawing on Thornberry's (1987) interactional theory, it is hypothesized that *the characteristics of the peer group network will be less strongly associated with an individual's delinquency in early adolescence, most strongly associated in middle adolescence, followed by a small decline during late adolescence.* This expectation draws on the developmental literature which suggests that peer associations follow a curvilinear distribution, with peer influence reaching its peak in middle adolescence. Additionally, it is expected that *network characteristics will be least important in early adolescence* when adolescents are entering and beginning to navigate the new social structure of junior and senior high school. This period of transition is characterized by great flux as adolescents expand their social networks and attempt to find their position within the overall school network. *In middle adolescence, as youth begin to structure more stable friendship relationships and friendship networks, network characteristics are expected to become significant correlates of delinquency and will increasingly condition the delinquency-peer group association. Finally, in late adolescence, as older youth become more interested in establishing autonomy and an identity separate from their peers (Brown et al., 1986; Coleman, 1961), network*

characteristics are hypothesized to be somewhat less associated with delinquency than they were in middle adolescence.

The guiding premise of these expectations is that adolescent delinquency can better be understood by incorporating characteristics of social networks. The extensive social network data in the Adolescent Health Survey will enable the teasing out of the specific ways in which network relations among adolescents influence delinquent behavior and also provide a test of the main premise--that the influence of the peer group's delinquent behavior on an adolescent's own behavior will be conditioned by network characteristics.

CHAPTER THREE

DATA AND MEASURES

While fundamental, the effect of social networks within a school context on adolescents' delinquency has rarely been studied. In part, this is because the requisite data have not been available. Understanding social networks' influence on adolescent delinquency requires detailed population-level data on the structure of friendship patterns within a school, for many different schools. Until very recently, the only data which approached these stringent requirements was Coleman's landmark study (1961) of social relationships among high school students in the 1960s. Although these data provided insight into the importance of peer relationships and adolescent culture, they were only available for a small number of schools, so that generalizability to other schools and adolescents as a whole was prevented.

3.1. ADOLESCENT HEALTH SURVEY

This study utilizes data from the first wave of the Adolescent Health Survey (Add Health), a newly available data set consisting of a nationally representative sample of 15,000 adolescents in grades 7 through 12 nested within 140 randomly selected schools in the United States in 1994-1995. The innovative design of this sample, particularly its emphasis on the effects of multiple contexts of adolescents' lives, allows for an examination of the causes of adolescent health and health behavior (including delinquency) that goes considerably beyond prior research. The different contexts which will be highlighted from these data include school, networks, peer groups, and family members.

3.1.1 In-School Interviews

In contrast to other nationally representative surveys of adolescent delinquency that use area random sample designs to randomly select adolescents from the social landscape, the Add Health study has the unique advantage of containing very detailed social network data for students in 140 randomly selected schools stratified by region, urbanicity, school type, ethnic mix, and size (Bearman, Jones, and Udry, 1997). Within each school, brief interviews were conducted with every student attending the school on that day (n=90,000). During this in-school phase, students were asked to identify their best male and best female friends from a school roster (up to 5 friends of each sex)[11], as well as provide some brief demographic information and describe their participation in a few minor delinquent activities. Because friendship nominations were identified by

[11]Although the maximum number of nominations allowed was 10, very few students were affected by this restriction. In fact, the mean number of nominations an adolescent identified (from their send-network) was 4.15 (standard deviation=3.02).

student identification number from school rosters, it is possible to link together most of the students in the schools, thereby recreating the social networks.[12] From this complete network information, network measures are derived as well as the mean delinquency rate of the respondent's peer group (discussed in a subsequent section).

3.1.2 In-Home Interviews

This project also draws on a second component of the Add Health study which contains extensive in-home interviews with a randomly selected sample of adolescents. This nationally representative sample of adolescents in grades 7 to 12 was drawn from school rosters provided by each school, with students stratified by grade and sex. Approximately 200 adolescents were selected from each of the 80 pairs of schools (the high school and its feeder junior high school), yielding a sample of approximately 15,000 adolescents [13] (Bearman, Jones, and Udry, 1997). These in-depth interviews involved the collection of more sensitive data such as an extensive series of questions that concern involvement in both property and violent delinquency. An additional advantage of this data involves the use of lap-top computers to maintain confidentiality about sensitive subjects such as delinquency (Bearman, Jones, and Udry, 1997). This method of data

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[12]Approximately 15 percent of the friendship choices were to others not attending the school or sister school; however, about 8 percent of the friendship nominations within the school were to individuals whose names were not on the school rosters. These latter nominations may be to students new to the school or to students known only by nicknames.

[13] Of the 160 schools initially selected, 134 schools agreed to participate yielding a response rate of 79 percent. Of the 134 schools, 129 (96 percent) arranged for a in-school survey to be completed between September 1994 and September 1995 (Bearman, Jones, and Udry, 1997).

collection allowed respondents to maintain their anonymity by listening to pre-recorded questions about participation in different delinquent activities and then entering their responses directly into the computer. This self-report information on participation in a series of delinquent activities is used to construct the dependent variable--delinquency involvement--which is described in the following section. Because the dependent variable can only be constructed from the in-home survey (versus the in-school survey), the in-home survey comprises the main sample for this project. Network information from the in-school survey is appended to this sample.

3.1.3 Other Data Components

Two other components of the Add Health data are integral for this research. First, information from school administrators was collected which detailed the demographic characteristics of the school as well as school-level variables. Second, in 14 schools (2 large and 12 small) in-home interviews were attempted with every student attending the school. These saturation samples allow for exploratory school-level network analyses which are described in greater detail in Chapter Four.

In sum, the Add Health collects data from individuals who make up the relevant contexts of an adolescent's life, rather than other contextual designs in which context measures are based on a respondent's perceptions (Bearman, Jones, and Udry, 1997). This means that information on schools is collected from interviews with all students and school administrators; information on the family is collected from interviews with parents and siblings; and information on friends' behavior is gathered from friends themselves. A key advantage of these data for the proposed project is that measures of the

respondent's friends' delinquent behavior are derived from the friends' own reports of their behavior, rather than filtered though the respondent's perceptions of his/her friends.

Drawing on these data components, the final sample for this study consists of 12,800 adolescents nested within 100 schools. Although there were 129 schools with complete sociometric network data available, schools with fewer than 50 observations were excluded (29), resulting in a sample of 100 schools.

3.2. PROJECT LIMITATIONS

Despite the strengths of the data, it is important to acknowledge an important debate in the criminological literature which this project is unable to address. This debate concerns the issue of causality and is often discussed in terms of selection versus socialization effects. That is, do delinquent respondents self-select other delinquent friends, or do delinquent friends socialize non-delinquent adolescents towards delinquency? Research suggests that both processes operate: Delinquent adolescents are more likely to select other delinquent adolescents to befriend; however, once the friendship is formed the friends' behavior exerts effects over and beyond that of the respondent's initial behavior (Elliott and Menard, 1992; Kandel, 1978; Krohn et al., 1996; Matsueda and Anderson, 1998; Thornberry, 1987). Addressing this reciprocal causality requires longitudinal network data on friendship patterns. Although the Add Health is a longitudinal data source with two waves of data currently available, budgetary constraints prevented the network portions of the data from being followed up in Wave Two. Therefore, while this research project can speak of associations between the measures of interest, it cannot speak of causality or untangle whether the associations

between friends' delinquency and a respondent's behavior are driven primarily by self-selection or socialization. Nevertheless, the unique advantages of the data should illuminate some of the complexities underlying the delinquency-peer group relationship.

3.3 KEY MEASURES

3.3.1 Dependent Variable

To assess an adolescent's involvement in delinquent behavior, I begin with the type of measure most commonly used in research on the topic, an index of overall delinquency involvement (see Table 1 for a description of the different measures used in recent research). This additive index of delinquency involvement is based on the self-reported responses from adolescents describing participation in a series of different delinquent activities during the past year. Short and Nye (1957) introduce the self-report method of measuring delinquency. Subsequent work has established that adolescents do report their delinquent behavior, these reports tend to be internally consistent, and the reports relate to differences in official delinquency status and to other differences predicted by research and theory (Hindelang, Hirschi, and Weis, 1980). The 14 delinquency items incorporated into the index are listed in Table 2 and include paint graffiti, damage property, shoplift, steal something worth less than $50, steal something worth $50 or more, burglarize, steal a car, sell drugs, involvement in serious physical fight, seriously injure another, use or threaten to use a weapon, participate in a group fight, pulled a knife/gun on someone, or shot/stabbed someone.[14] The particular

[14] In a later chapter the question of dual domains reflecting a separate property and violence delinquency factor underlying the delinquency index is explored.

questions ask students to report how often in the past 12 months they have participated in these activities. Each response ranges on a seven-point scale from never to nearly every day. Following common procedures used to measure self-report delinquency (see Table 1), a summated delinquency index is created based on responses to the 14 delinquency items. The Cronbach alpha of 0.85 indicates that these items have considerable internal consistency.[15] The average delinquency levels for respondents is 2.5, although there is considerable variation around this mean. Because the most common response to the delinquency items is "never participated in the act" the appropriate modelling strategy, Poisson regression, is discussed in detail in Chapter Four. Finally, because the set of delinquency items includes a heterogenous list of offenses representing both violent and property delinquency which may or may not have different underlying causes, the unidimensionality of the index is examined in Chapter Five.

3.3.2. Independent Variables

3.3.2.1 Egocentric Network Measures

To examine how peer groups influence individual behavior requires use of the full social network data derived from the in-school interviews with all students in the 100 schools. During the in-school interview every student was asked about his or her involvement in a series of five minor delinquent acts. This allows a measure of friendship group's delinquency to be created based on the average response of all identified friends (derived from both send- and receive-nominations) to the minor

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[15] The items running away from home, lying to parents, and disorderly conduct had very low intercorrelations with the index and therefore were not included in the index.

delinquency items for the respondent's peer group. The five minor delinquency items that friends report participation in include smoke cigarettes, drink alcohol, get drunk, do things on a dare, and raced a vehicle (see Table 2 for a description of the five items). The peer group, for which the average response of these five items is calculated, is defined as including all those adolescents whom the respondent nominated as friends (the respondent's send-network), as well as all those adolescents who nominated the respondent as a friend (the respondent's receive-network).[16] Table 2 indicates that the mean value of a respondent's peer group's delinquency is 1.06, which indicates that members of the typical respondent's peer group committed one minor delinquency activity once or twice in the past 12 months.

Unfortunately, information on friends' delinquency is only available from in-school interviews which do not include the friends' involvement in the extensive list of delinquency items (which were collected during the in-home portion of the interview). Therefore, a measure of friends' minor delinquency involvement is the only information available for all adolescents composing the respondent's peer group in the schools included in the complete sample. This is unfortunate as the most desirable measurement

[16] Exploratory analyses incorporating different measurement strategies of peer groups examined which of several network definitions provided the strongest association between friends' delinquency and a respondent's delinquency. The four different definitions of a peer group examined included definitions based on the send-network only (those the respondent nominated as friends), based on the receive-network only (those who nominated the respondent as a friend), based on both the send-receive network (described above), or reciprocated friendship ties only (those who both nominated and were nominated by the respondent as a friend). Examination of the bivariate association between friends' delinquency and a respondent's delinquency indicated the strongest relationship for definitions based on both the send-receive network.

strategy would be to use indicators of friends' delinquency involvement which match the respondent's involvement in the list of 14 more serious delinquency items. Nevertheless, in the saturation sample, the information on friends' involvement in the extensive list of 14 delinquency items is available for 9 schools (with 50 observations or more).[17] To gain an initial benchmark of how big a discrepancy there is between the association of friends' minor delinquency involvement and a respondent's more serious delinquency involvement--compared to the association between friends' more serious delinquency and a respondent's serious delinquency index--some preliminary regression analyses are conducted on the saturation sample. Table 3 provides these comparisons, but before assessing the strength of the relationship it is necessary to ensure that the two samples (the saturation sample compared to the complete sample) have similar distributions in regard to a respondent's delinquency involvement and friends' delinquency involvement. Fortunately, this appears to be the case as Panel A indicates that both samples have a mean friends' minor delinquency index of 5.3 and have respondents' delinquency indices which does not substantially differ (2.5 versus 2.4).

Panel B focuses on the correlation between friends' minor and friends' serious delinquency involvement in the saturation sample and suggests that while the two indicators of friends' misbehavior are correlated substantially (r=0.47), as expected, it is far from a perfect association.

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[17] Recall that in the saturation sample all students in the school were also interviewed in-depth in their homes (in-home interviews) compared to the random subset of students who were interviewed in detail in the in-home interviews for the complete sample.

Lastly, Panel C regresses both measures of friends' delinquency independently on the respondent's delinquency index (using both OLS and poisson regression). This indicates that using friends' minor delinquency as a proxy for more serious delinquency involvement provides a more conservative estimate of the association between friends' delinquency and a respondent's behavior. Nonetheless, despite a weaker association, friends' minor delinquency involvement remains strongly and significantly associated with a respondent's more serious delinquency involvement and supports the use of this measure in subsequent analyses.

In addition to constructing the mean delinquency rate of the peer group, the connections among adolescents are used to describe different characteristics of their friendship network. Table 4 provides definitions and distributional attributes of the ego-centered network attributes considered. These attributes include centrality, leading crowd membership, size, density, reach, and "integration." The first egocentric network measure, centrality, is indicative of whether adolescents are located in prominent positions within their friendship networks in the sense that they are interacting with many others in the group. Panel A in Figure 1 presents two hypothetical friendship networks and indicates that actor A is located in a more central position than is actor B. Recall that it is hypothesized that adolescents found in more central positions within the friendship group will have behavior that is more closely associated with the friendship group's behavior than will individuals located in more peripheral positions. This hypothesis stems from the finding that, on average, more central adolescents are exposed to more communication and interaction within their friendship group (Giordano et al., 1986).

Leading crowd membership is a dichotomous variable that refers to whether the respondent received among the top ten percent of friendship nominations distributed in his/her school, that is, if they are among the most popular students in their school. Network size is a measure of the number of friends who are nominated by the respondent or who nominate the respondent as a friend. It is somewhat similar to the common measure of delinquent peer exposure used in prior research, where researchers ask respondents how many delinquent friends they have or (more commonly) the proportion of delinquent friends they have (see Table 1). However, the measure of size used in this study differs from prior measures since it is based on the actual friendship ties going in both directions--that is, the number of other adolescents in the school network whom the respondent nominated as a friend as well as those who nominated the respondent as a friend.

Leading crowd membership and network size both are network measures which capture how many others are connected to the respondent in their peer group. They are related in the sense that an adolescent who is a member of the leading crowd in their school will also have a large friendship network. However, they differ because an adolescent who sends out many friendship ties to others (and thus has a relatively large friendship network based on her/his friendship nominations) may receive few network ties in return and thus not be a member of the school's leading crowd.

Density is the number of ties present in the friendship network divided by the number of possible ties in the network. Panel B of Figure 1 illustrates this measure with two hypothetical friendship networks. The network on the left, where actor C is located,

is much denser than the network on the right, where actor D is found. Earlier it was hypothesized that the group's behavior will be more strongly associated with an adolescent's own behavior when the peer group is very dense. High density has been found to signify greater group cohesion, which operates to facilitate a common group identity and constrain the behavior of its members to be consistent with the group's behavior (Botts, 1957).

Reach indicates the number of other adolescents in the school network that the respondent has access to either directly or indirectly via other friendship ties. Panel C in Figure 1 illustrates this network characteristic by indicating that actor D has greater reach in the network on the left than in the network on the right even though she/he is directly connected to only one other actor. The difference in the two hypothetical networks is that actor G is removed in the network on the right, breaking the bridge between the two actors.

"Integration" is the last egocentric network characteristic examined and measures whether the respondent is in the top percentiles in terms of having high network density, high reach, and high centrality simultaneously. If a respondent has a high value for all three network characteristics, then they are considered to be "integrated" into their friendship network.[18] "Integration" is a composite measure which taps the combined effect of being very connected into a friendship network.

In addition, an extensive list of control variables associated with delinquency in

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[18] This is a dichotomous variable where respondents are either "integrated" or not "integrated" in their friendship network.

prior criminological research is included in this study and measurement of these variables is described in Table 4. These control variables include gender, race, age, a self-esteem index, measure of religiosity, indicator of family structure, receipt of public assistance, a parental attachment index, grade point average, the number of extracurricular school activities participated in, a school attachment index, a friend attachment index, a measure of friend involvement, and friend intimacy.

Table 5 provides the descriptive characteristics of the variables examined in this project. Inspection of this table reveals that the average adolescent is white, lives in a two-parent family, has a B- grade point average (2.8), has relatively high attachment to parents and friends, is involved in about two extracurricular activities, and spends a considerable amount of time "hanging out" with friends. In terms of friendship network characteristics (i.e., egocentric network characteristics), the average adolescent is not among the most popular students nor the most integrated into the school network (by definition as only 10% of all adolescents are classified as leading crowd members or "integrated"). Instead, they have about eight friends directly connected to them, have a network density of 0.30 (range .06-1.00) and a centrality level of 0.80 (range 0-4.3), and can reach less than one other adolescent on average in three steps (that is, a friend of a friend of a friend). However, the egocentric friendship characteristics reveal substantial variability in these network attributes, with much fluctuation around mean characteristics.

3.3.2.2 School Characteristics

Because it is expected that school context will partially determine how attributes

of peer groups influence delinquent involvement, school context measures are incorporated into the analyses. The measures of school characteristics are based on complete school-level network information (sociometric network information), the aggregation of student behavior, or the responses of school administrators to a series of questions concerning characteristics of their schools. Sociometric network measures, based on complete school-level network information, include school network density, grade and sex segregation of the school network, and the percent mutual friendship ties in the school. These measures are described in greater detail in Table 4. Other measures examined include the mean school alienation index, mean school grade point average, the percent black and percent female in the school, an indicator of whether the school is a junior high school or senior high school, whether the school is a public or private institution, the urbanicity of the school, and the region of the country the school is located in.

Table 5 provides descriptive characteristics of the schools included in these analyses. This table indicates that most of the schools are public institutions, located in the suburbs, and have on average 20 percent African American students. Additionally, the average school reports an alienation index of 2.08 (range .25-4.8), has a mean density of 0.7 (range .21-.93), tends to be homogenous in regard to friendship mixing between sexes, but to have greater heterogeneity in terms of friendship mixing between grades.

The next three chapters present the findings from this dissertation. Chapter Four contains a broad overview of the delinquency-peer group relationship. It begins with a visual examination of the friendship networks in three small schools, examines

differences in network characteristics between delinquent and non-delinquent adolescents, and presents multivariate results examining whether network characteristics condition the delinquency peer-group relationship. Chapter Five follows with an examination of the differences between more serious violent delinquency and less serious property offenses, and Chapter Six incorporates a developmental approach and considers age differences in these relationships.

Table 2. Frequency Distributions of Delinquency Items Used to Create Dependent Variable and Friendship Delinquency Variable

	N	Percent
Dependent Variable		
Delinquency Index* (alpha=.85) (summed index based on the 14 items below)		
Mean=2.46 St. Dev.=4.03		
1. Paint Graffiti--Last 12 Months		
Never	11,783	1.4%
1 or more times	1,106	8.6%
Missing	20	
2. Damage Other's Property--Last 12 Months		
Never	10,613	82.4%
1 or more times	2,274	17.6%
Missing	22	
3. Shoplift from a Store--Last 12 Months		
Never	9,757	75.8%
1 or more times	3,123	24.2%
Missing	29	
4. Steal Something Worth Less $50--Last 12 Months		
Never	10,313	80.1%
1 or more times	2,565	19.9%
Missing	31	
5. Steal Something Worth More $50--Last 12 Months		
Never	12,292	95.3%
1 or more times	601	4.7%
Missing	16	
6. Burglarize a Building--Last 12 Months		
Never	12,281	95.3
1 or more times	612	4.7%
Missing	16	
7. Steal A Car--Last 12 Months		

Never	11,619	90.1%
1 or more times	1,275	9.9%
Missing	15	
8. Sell Drugs--Last 12 Months		
Never	11,997	93.1%
1 or more times	886	6.9%
Missing	26	
9. Get into Serious Physical Fight-Last 12 Months		
Never	9,047	70.2%
1 or more times	3,838	29.8%
Missing	24	

Table 2 cont.

	N	Percent
10. Seriously Injure Someone--Last 12 Months		
Never	10,667	82.8%
1 or more times	2,221	17.2%
Missing	21	
11. Take Part in Group Fight--Last 12 Months		
Never	10,475	81.3%
1 or more times	2,412	18.7%
Missing	22	
12. Use or Threaten to Use Weapon--Last 12 Months		
Never	12,408	96.2%
1 or more times	485	3.8%
Missing	16	
13. Pulled a Knife/Gun on Someone--Last 12 Months		
Never	12,359	95.8%
1 or more times	543	4.2%
Missing	7	
14. Shot/Stabbed Someone--Last 12 Months		
Never	12,687	98.4%
1 or more times	210	1.6%
Missing	12	

Friends' Delinquency Index (alpha=.82) (Items from the in-school interviews used to calculate mean delinquency of friendship send/receive-network)
Mean=5.30 St. Dev.=3.37

1. Smoked Cigarettes--Last 12 Months		
Never	7,864	64.0%
1 or more times	4,414	36%
Missing	631	
2. Drank Alcohol--Last 12 Months		
Never	5,470	44.6%
1 or more times	6,781	55.4%

Missing	658	
3. Got Drunk--Last 12 Months		
Never	8,392	68.8%
1 or more times	3,798	31.2%
Missing	719	
4. Raced on Bike, Boat, or Car--Last 12 Months		
Never	5,496	44.8%
1 or more times	6,770	55.2%
Missing	643	

Table 2 cont.

	N	Percent
5. In Danger Due to Dare--Last 12 Months		
Never	7,415	60.7%
1 or more times	4,801	39.3%
Missing	693	

Table 3. Comparison of Friends' Minor Delinquency Involvement to Friends' Serious Delinquency Involvement (Saturation Sample)

Panel A: (Comparison of Means in Saturation to Complete Sample)

	Saturation Sample		Complete Sample	
	Mean	St dev	Mean	St dev
Friends' Minor Delinquency	5.29	(3.60)	5.30	(3.37)
Delinquency Index	2.52	(3.77)	2.40	(3.70)

Panel B: Correlation of Friends' Minor Delinquency with Friends' Serious Delinquency (Saturation Sample)

r=0.47

Panel C: Regression of Friends' Delinquency Involvement on Respondent's Delinquency Index (Saturation Sample)

	OLS Regression		**Poisson Regression***		
	Coeff	st error	Coeff	st error	Exp
Model 1					
Intercept	1.66	(O.14) 0.59	(0.05)	1.80	
Friends' Minor Delinquency	0.16	(0.02) 0.06	(0.01)	1.06	
R^2 or -2 Log Likelihood	0.02		-65.22		
Model 2					
Intercept	1.87	(0.10)	0.72	(0.03)	2.05
Friends' Serious Delinquency	0.43	(0.04)	0.11	(0.01)	1.11
R^2 or -2 Log Likelihood	0.04		-42.90		

N=2,243 adolescents nested in 9 schools (saturation sample).

Friends' Minor Delinquency consists of the average response of all friends to five items: smoked cigarettes, drank alcohol, got drunk, raced on bike, boat, or car, and in danger due to dare.

Friends' Serious Delinquency consists of the average response of all friends to 14 items: paint graffiti, damage property, shoplift, steal < $50, steal >$50, burglarize, steal car, sell drugs, physical fight, injure another, group fight, use/threaten with weapon, pulled knife/gun on someone, and shot/stabbed someone.

*Poisson Regression with overdispersion.

Table 4. Definitions and Calculations of Independent Variables Included in Analyses

Variable	Definition	Calculations (Network calculations derived from Bearman et al., 1997)
Network Characteristics		
Mean Friendship Delinquency	Mean value of minor delinquency items	$MEANDEL_i = \Sigma xj / nj$, where: x_j = the value of the delinquency index for the for the respondent's friendship jth member of the adolescent's network, n_j = the number of nodes network in the adolescent's network based on send and receive friendship nominations (excluding ego)
Member Leading Crowd	Measures whether the respondent received in the top 10% of the friendship nominations	LDCROWD = 1 if in-degree > 9, = 0 if in-degree ≤ 9
Density (relative)	Number of ties in respondent's friendship send/receive-network divided by the number of possible ties in the total friendship *send/receive network (corrected for the* maximum number of ties a respondent can send)	$ESRDEN_i = (\Sigma SR / sr * (sr-1)) / (abs((10*sr)/sr(sr-1))$, where **SR** = total ego send/receive-network, and sr = number) of nodes (ties in **SR**)
Centrality (Bonacich)	Respondent's centrality, weighted by the centrality of those to whom he/she sends ties	$BCENT10x(a,b)_i = a(I-bX)^{-1}X1$, where: **α**= a scaling vector, **β**= power weight (here=0.1), **I** = identity matrix, **X** = total

		friendship network and, **1** = column of 1s
Reach	The maximum number of other adolescents steps in the total friendship network	$REACH3_i = \Sigma \beta_{ij}$, where **β** is a variant of the reachability matrix (alters) the respondent (ego) can reach in three of **X**.
Network Size	Number of others (alters) who are nominated by the respondent (ego) or who nominate ego, plus ego	$NESR_i$ = sr , where sr = # nodes in **SR**

Table 4 cont.

Variable	Definition	Calculations
Integrated Respondent	Measures whether respondent (ego) is located in respondent received in the top 25% of the a dense friendship group, is located in a central distribution for density (gt .26), for centality (gt .75) position, and has a high reach to others in the network	INTEGRATED = 1 if and for reach (gt 52), =0 otherwise
Control Variables		
Female (male reference)	Dummy variable indicating respondent is female	FEMALE = 1 , MALE = 0
Black (white reference)	Dummy variable indicating that respondent is of African American descent	BLACK = 1, White, Other Race = 0
Other Race	Dummy variable indicating respondent is of Indian, Asian, or other racial descent (not white, or African American)	OTHRACE = 1, White, Black = 0
Age	Measures respondent's age at the time of the initial in-school survey	Continuous variables in years
Self-Esteem Index	Index comprised of five questions: have lots of good qualities; have a lot to be proud of; like self as is; feel socially accepted; feel loved and wanted. (Cronbach alpha = .84.)	Coded: Strongly Disagree =1 ... Strongly Agree =5. (Average Response of the five items)

Importance Religion	Measures respondent's importance associated with religion. Based on responses to the following question: how important is religion to you?	Coded: Not important at all = 1, ... Very Important = 4
Two-Parent Family	Dummy variable which indicates whether respondent lives in a household with two married parents present	TWOPAR = 1, Other Living Arrangements = 0

Table 4 cont.

Variable	Definition	Calculations
Public Assistance	Dummy variable indicating whether respondent's family acknowledged receipt of public assistance	PUBASSIST = 1, No Public Assistance = 0
Parental Attachment Index	Mean value of two items: 1) feel close to parents; 2) feel parents care about you. (Cronbach alpha = .78)	Coded: Not at all = 1, Very little =2, Somewhat =3, Quite a bit =4, 5 = Very Much. (Average Response of the 2 items)
Grade Point Average	Measures respondents grade point average	Coded: A = 4, B =3, C = 2, D or F =1
Extracurricular Activities	Measures the number of school-related extracurricular activities respondent participated in during the last year	Continuous variable indicating the number of activities. Capped at 10 activities
School Attachment Index	Mean value of three items: 1) feel close to people at school; 2) feel like part of school; 3) happy to be school. (Cronbach alpha = .78)	Coded: Strongly Disagree =1, Disagree = 2, Neither Agree/Disagree = 3, Agree = 4, Strongly Agree =5. (Average response of the three items)
Friend Attachment	Measures the response to the following question: How strongly do you believe that your friends care about you?	Coded: Strongly Disagree = 1, ..., Strongly Agree = 5
Friend Involvement	Measures the response to the following question: During the past week, how many times did you just hang out with friends?	Coded: Not at all =0, 1 = 1 or 2 times, 2 = 3 or 4 times, and 3 = five or more times
Friend Intimacy	Measures the number of separate activities spent	Continuous variable adding up the different activities with

	with each friend during the past 7 days (up to 10 friends). Activities include spending time at friend's home, engaging in a activity with friend after school, spending time with friend on the weekend, talking about a problem with friend, and speaking on the telephone with friend	each friend listed by the respondent

Table 4 cont.

Variable	Definition	Calculations
School-Level Characteristics		
School Network Density	Measures the observed density divided by the the maximum possible density given out-degree = 10	SCHDEN = (Σ **X** / g * (g -1)) / (abs(10*g)/(g(g-1))where: **X** is the total friendship network and g = number of nodes in **X**
Grade Segregation School Network	Measures the overall level of grade segregation present in the school, to the null of random mixing. Grade segregation index has a theoretical maximum to -1 (pure out-group preference). A value of 0 indicates no group preference	GRADESEG = Random Grade Mixing - Observed Grade Mixing / Random Grade Mixing (Cross Trait Ties)
Mutual Friendship Ties	Measures the proportion of friendship ties in the overall school network which are mutually reciprocated	PCTMUT = M / D where: M = the number of mutual dyads within the total network, and D = the number of dyads within the total friendship network, **X**
Sex Segregation School Network	Measures the overall level of sex segregation present in the school, to the null of random mixing. Sex segregation index has a theoretical maximum of 1 (pure in-group preference or total segregation) to -1 (pure out-group preference). A value of 0 indicates no group preference	SEXSEG = Random Sex Mixing - Observed Sex Mixing / Random Sex Mixing (Cross Trait Ties) where: cross trait ties refer to the total number of ties sent from each set of nodes sharing one trait to all nodes not sharing that trait
Mean School Alienation Index	Measures the school's average student response to 4 questions related to school alienation: "trouble getting along with teachers", "trouble getting along with other students", "teachers do not	$SCHALLIEN_j = (\Sigma alien_{ij}/stud_j)$ where: $alien_{ij}$ = the summed value of the alienation index for all students in school j and $stud_j$ = the number of students in school j

	treat students fairly", "students are prejudiced".	
Mean School GPA	Measures the average grade point average of the students attending the school	$SCHGPA_j = (\Sigma gpa_{ij}/stud_j)$ where: gpa_{ij} = the summed value of the gpa for all students in school j and $stud_j$ = the number of students in school j

Table 4 cont.

Percent Black	Measures the percent of students who are of African American race attending the school	BLACKPER = number black students/ total school population
Junior High School	Dummy variable indicating the school is a junior high school with no grades greater than 9th	JRHIGH =1, High School or Combination School = 0
School Type	Dummy variables indicating whether the school is a Private or Public institution	PRIVATE =1, Public School = 0
Urbanicity of school	Dummy variables indicating whether the school is located in a rural (reference), suburban, or urban community	URBAN =1, SUBURBAN =1, and Rural = 0
Region of Country	Dummy variables indicating whether the school is located in the south (reference), west, midwest, or north east of the U.S	WEST =1, MIDWEST =1, NEAST =1, and SOUTH =0

Table 5. Means and Standard Deviations for Sample (students in schools with more than 50 respondents completing both in-school and in-home interviews)

Variable	Mean	St. Dev.	Min	Max	n
Dependent Variables					
Overall Delinquency	2.46	4.03	0.00	40.00	12,796
Violent Delinquency	1.41	2.65	0.00	28.00	12,793
Property Delinquency	1.05	1.95	0.00	12.00	12,788
Background Individual Characteristics					
Male (ref)	0.48	0.50	0.00	1.00	12,796
Female	0.52	0.50	0.00	1.00	12,796
White (ref)	0.62	0.49	0.00	1.00	12,796
Black	0.24	0.42	0.00	1.00	12,796
Other Race	0.14	0.38	0.00	1.00	12,796
Age	15.11	1.68	10.00	19.00	12,871
Self Esteem Index 3.89	0.45	1.00	4.80	12,796	
Importance Religion	3.06	1.05	1.00	4.00	12,895
Two-Parent Family	0.70	0.46	0.00	1.00	12,796
Public Assistance Receipt	0.07	0.25	0.00	1.00	12,796
Parent Attachment Index	4.56	0.77	0.00	5.00	12,903
Grade Point Average	2.79	0.75	1.00	4.00	12,802
# Extracurricular Activities	2.25	2.16	0.00	10.00^	12,796
School Attachment Index	3.78	0.86	1.00	5.00	12,908
Friend Attachment4.25	0.80	1.00	5.00	12,896	
Friend Involvement	1.98	0.99	0.00	3.00	12,796
Friend Intimacy	13.31	9.68	0.00	50.00	12,796
Friendship Characteristics (Network Characteristics)					
Mean Friendship Delinquency Rate5.30	3.37	0.00	30.00	12,796	
Leading Crowd Member	0.09	0.29	0.00	1.00	12,796
Centrality in Network (Bonacich)	0.82	0.64	0.00	4.29	12,796
Network Density (send/receive)	0.30	0.14	0.06	1.00	12,796
Network Size (send/receive)	8.26	4.23	2.00	34.00	12,796

Reach	0.59	0.48	0.00	2.7	12,796
"Integrated" in Network	0.12	0.32	0.00	1.00	12,796
School Characteristics					
Density	0.69	0.15	0.21	0.93	100
Grade Segregation School Network	0.68	0.10	0.44	0.94	100
Sex Segregation School Network	0.19	0.06	0.08	0.40	100
Mutual Friendship Ties in Network	0.35	0.45	0.04	3.40	100
School Alienation	2.08	0.65	0.25	4.75	100
School Grade Point Average	2.78	0.22	2.25	3.35	100
Percent Black	20.76	25.09	0.00	96.92	100
Junior High School	0.18	0.39	0.00	1.00	100
Private School	0.07	0.26	0.00	1.00	100
Public School (ref)	0.93	0.26	0.00	1.00	100
Urban School	0.27	0.44	0.00	1.00	100
Suburban School	0.55	0.50	0.00	1.00	100

Table 5 cont.

Rural School (ref)	0.19	0.39	0.00	1.00	100
West	0.20	0.40	0.00	1.00	100
South (ref)	0.40	0.49	0.00	1.00	100
Midwest	0.23	0.42	0.00	1.00	100
North East	0.16	0.37	0.00	1.00	100

^ Capped at 10 activities (3% respondents reporting participating in all activities).
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated they hung together with the other violent incidents. Property Delinquency consists of paint graffiti, damage property, shoplift, steal <$50, steal >$50, and burglarize.

CHAPTER FOUR

OVERALL DELINQUENCY INVOLVEMENT

4.1 INTRODUCTION

Since the delinquency-peer group association is at the heart of delinquency research, it is suggested that a better understanding of its relationship requires an incorporation of network structure. Examining the patterning of friendship relationships, and, more importantly, the adolescent's position within these relationships will enable greater insights into the mechanisms underlying the delinquency-peer group association. This chapter, and the two that follow, contribute to the growing body of research directed at understanding peer influence by focusing on peer group characteristics that condition the association between friends' delinquency and an adolescent's own behavior.

Three main questions are addressed in this chapter: 1) Are measures of peer group delinquency, as reported by the friends composing the adolescent's friendship network, associated with a respondent's delinquency?; 2) Is the association conditioned by friendship network characteristics?; and 3) Are school characteristics associated with average levels of delinquency and/or moderate the delinquency-peer group association? Chapters Five and Six follow up on these questions by addressing whether the relationships found for overall delinquency levels persist when the focus is on either violent or property delinquency separately (Chapter Five) and when developmental changes are taken into account (Chapter Six).

4.2 SOCIOGRAMS

To gain a sense of the structures of friendship relationships, an examination is undertaken of the visual depictions of the friendship networks in three small schools varying by average school delinquency levels. These descriptive examinations of friendship patterns draw on the saturation sample where complete school-level network and delinquency information is available

for the majority of students attending the school.[19] Visual depictions make use of sociograms for the friendship networks within the schools where each point in the plot represents an adolescent and the lines connecting points represent the existence of a friendship nomination between them. Because the network information is directional, arrows indicate which way the friendship relationship is flowing (i.e., who nominated who as a friend). The sociograms were constructed using Krackplot software and a multidimensional scaling (MDS) procedure was used to display the patterning of relations, allowing the subgroup cleavages within the school to be examined (Krackhardt, Blythe, and McGrath, 1995). MDS utilizes the geodesic path distance between all pairs of points (i.e., friendship ties between adolescents), allowing the layout of the graph to be based on this two-dimensional scaling solution. Gender is incorporated into the sociograms through the fictional assignment of names to the respondents (based on their gender status) and delinquency status is represented by boxes around the respondent such that a box indicates that the respondent has participated in at least one serious delinquent activity (out of the possible 14) during the past year (non-delinquents are not enclosed by boxes).

The first sociogram depicted in Figure 2 provides the visual depiction of friendship relations in a small rural private school with a low average level of school delinquency. Although a lower than average delinquency rate is found in this school,[20] some evidence of clusterings of delinquent and non-delinquent youth are revealed. For example, in the upper center portion of the

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[19] In order to present a visually coherent picture, visual depictions of sociograms were limited to the three schools which contain 50-100 adolescents; therefore, these schools will not necessarily be representative of the typical school in our sample. Appendix A presents the descriptive characteristics of these three schools.

[20] The comparison is the overall school delinquency mean (mean = 5.44).

sociogram, a group of delinquents centering around "Ben", "Lucy", and "Ginger" is present, with "Kevin" serving as a bridge to other groups. In contrast, in the center right portion of the graph, a non-delinquent group of adolescents is centered around "John". Therefore, despite a below average school delinquency level, some subgroup cleavages are visible.

Figure 3 presents the friendship network for a small rural public school with average levels of school delinquency. In this sociogram a more distinctive clustering of delinquent subgroups emerges, which is especially evident in the group found in the upper left corner, where a group of delinquents is clustered around "Jack". In this graph, "Jack" appears to be a central actor in this delinquent group. Additionally, a similar clumping of male delinquents is found in the upper middle portion of the graph.

The last sociogram illustrated in Figure 4 portrays the friendship patterns in a small rural public school with a higher than average school delinquency rate. Because the delinquency rate is much higher in this school, the unusual adolescents appear to be those who do not participate in delinquency. While they are engaging in non-normative behavior in this setting, they still appear in relatively prominent positions within the school landscape. These visual depictions suggest that delinquent and non-delinquent adolescents tend to associate together rather than randomly mix within the school population. Nonetheless, the graphs are descriptive, do not capture adolescents' level of delinquency involvement, and do not necessarily generalize to the overall sample of schools which tend to be much larger, more heterogenous in terms of ethnicity, and more urban (Appendix A provides a description of these three schools). Also, these three sociograms offer little insight into whether the network characteristics of delinquent and non-delinquent adolescents differ substantially. The important point suggested by the graphs is that

delinquent and non-delinquent adolescents appear to cluster together.

4.3 DESCRIPTIVE ANALYSES (Differences in Means)

To begin to quantify these visual depictions and generalize to a more representative sample of schools, examination is directed to whether delinquent and non-delinquent adolescents differ in terms of their network characteristics. Perhaps delinquent adolescents are less integrated into their friendship groups as suggested by social control theory (Hirschi, 1969) and will subsequently have lower density, centrality, and reach in their networks than their non-delinquent counterparts. Conversely, delinquents may be more integrated into their friendship groups as suggested by learning theories of delinquency, and have higher levels on these network characteristics than do non-delinquent adolescents (Akers, 1985; Sutherland, 1947).

Table 6 presents the means of the independent variables by category of delinquency status (where a respondent is classified as a delinquent if they admitted to engaging in one or more delinquent activities during the past year), allowing this question to begin to be addressed. While this analysis involves heuristic distinctions (since most adolescents classified as delinquents have actually only reported minimal involvement in delinquency), it serves as a good beginning for examining potential differences in network characteristics.

As expected, delinquent respondents have friendship groups reporting higher delinquency involvement than do non-delinquent respondents (5.7 versus 4.8, p=.001). In regard to network properties, these descriptive findings tend to support premises made by social control advocates. On average, delinquent adolescents are more likely to be found in less dense friendship networks, hold less central positions within the group, and have lower reach in the networks, and are less likely to be classified as "integrated" than the non-delinquent adolescents. However, two network

characteristics, leading crowd membership and network size do not differ significantly between delinquent and non-delinquent adolescents. Regardless of their delinquency status, adolescents are similar in their likelihood of being among the most popular students in the school (leading crowd members) and of having similar numbers of friends within the schools (on average eight friends).

In terms of the control variables, while delinquent adolescents report being less attached to their friends on average, they also report spending more time with friends, and having higher intimacy with friends than non-delinquent adolescents, findings consistent with those reported by Giordano and colleagues (1986). Other control variables display significant differences between delinquent and non-delinquent adolescents and operate in the expected directions consistent with prior research. For example, delinquent adolescents are more likely to be male, to report lower school and parental attachment, and to have a lower grade point average than their non-delinquent counterparts. Because these results are descriptive and cannot tell us the strength of the association, other things being equal, it is necessary to turn to multivariate analyses. Additionally, multivariate analyses will allow for assessment of the primary research questions.

4.4 MULTIVARIATE ANALYSES

4.4.1 Poisson Distribution

Assessment of whether peer network characteristics are associated with delinquency and operate to condition the delinquency-peer group relationship necessitates multivariate analyses. However, determining the proper modelling procedure for the analyses requires an examination of the distribution of the dependent variable--delinquency involvement. While the mean value of the overall delinquency index is 2.5 (see Table 5), the distribution of the variable is far from normal.

Figure 5 shows the frequencies of the plotted values of the delinquency index and reveals that the most common value is zero, indicating that the majority of adolescents report no delinquency involvement. Additionally, Figure 5 shows a large positive skew, meaning that a minority of respondents report involvement in a very large number of delinquent activities. Due to the large number of zeros present and the large positive skew in the distribution, the normality assumption of OLS cannot be approximated by a transformation. Therefore, OLS is inappropriate in this situation because it assumes equal error variability and can also lead to predictions of negative values which are meaningless with count data (Gardner, Mulvey, and Shaw, 1995).

Since the distribution for the delinquency index indicates that there is much more variability in residuals at higher levels of the index, a Poisson distribution is used to model the delinquency index. Designed for dependent variables that are counts of events, Poisson-based regression models utilize a distribution that characterizes the probability of observing any discrete number of events given an underlying mean count of events (Osgood, 1999). This distribution results in easily interpretable coefficients and approximates the shape of the dependent variable.[21] In the Poisson regression model, $u_i = \exp(n_i)$, which indicates that a one-unit increase in X_{ij} multiplies the expected delinquency index by a factor of $\exp(B_j)$, and conversely, a one-unit decrease divides the expected index by the same amount (Gardner, Mulvey, and Shaw, 1995).

The basic Poisson regression model is appropriate only if the variance of the dependent variable equals the mean. In most cases, this assumption does not hold up and the variance is greater than the mean. A substantial underestimation of standard errors of the B_js can be produced

[21] Additionally, HLM software now allows multi-level analyses of Poisson distributions with overdispersion incorporated into the models.

by overdispersion of residuals, leading to misleading significance tests (Osgood, 1999). In this project the variance of the delinquency index is much greater than the mean; thus, a quasi-likelihood adjustment for overdispersion is incorporated. This approach adjusts the standard errors and significance tests based on the estimate of the unexplained variance, while retaining the coefficients etstimated from the basic Poisson model (Osgood, 1999).

4.4.2 Analytical Technique (Hierarchical Generalized Linear Models)

Moreover, since standard Poisson regression models assume that regression coefficients are fixed between groups and that error terms are not correlated, these models are inadequate for complex multi-level analyses where individuals are nested within a larger macro unit (here schools) (Goldstein, 1987; Lee and Bryk, 1989; Raudenbush and Bryk, 1986). Because of the clustering of the data and the correlated error structure, hierarchical models are necessary. Additionally, the assumption that the school context influences individual behavior, as well as moderates the relationship between individual characteristics and delinquent behavior, necessitates a multi-level modeling technique. Thus, a contextual or multi-level model does two things: it adjusts for correlated error terms due to individuals being nested within schools, and it allows coefficients to be treated as random variables which can be modelled with school-level variables.

The first set of models involves the typical comparative models of adolescent delinquent behavior represented by the following equation:

$$\log \mu_{ij} = B_{0j} + B_{1j} X_{1ij} + B_{2j} X_{2ij} + \ldots + B_{Qj} X_{Qij} \varepsilon_{ij} \quad (1)$$

where the expected delinquency score for individual "i" in school "j" is a function of the set of individual-level predictors (**X**) defined in Table 4 and ε_{ij} is the individual-level error term.

To examine whether school context moderates the effects of the individual characteristics, the school context variables are used to predict B_{0j} and $B_{1...Qj}$ as follows[22]

$$B_0 = \Upsilon_{00} + \Upsilon_{01} Z_1 + \Upsilon_{02} Z_2 + ...+ \Upsilon_{0Q} Z_Q r \quad (2)$$

$$B_{1...Q} = \Upsilon_{1...Q0} + \Upsilon_{1...Q1} Z_1 + \Upsilon_{1...Q2} Z_2 + ... + \Upsilon_{1..QQ} Z_Q + r \quad (3)$$

where the set of school characteristic variables (Z) become predictors for the individual-level regression estimators in each school context "j" and r_j are school-level error terms. Thus, the delinquency score for individual "i" in school "j" is a function of both individual- and potential school-level variables. This approach allows the relationship between adolescent attributes and delinquency involvement to be different across the population of schools. If this is found to be the case, school characteristics are examined to determine if they are associated with effects of individual-level attributes. Thus, interactions of individual attributes with school-level predictors

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[22] Because risks of multicollinearity increase with the incorporation of many cross-level interaction terms involving school characteristics, exploratory analyses were conducted to assess which school characteristics were associated with the largest amount of variance in individual-level slopes across schools (see Bryk et al., 1988). These results consistently indicated that type of school (public versus private), urbanicity of the school, and region of the country were not associated with delinquency levels. In contrast, junior high schools, school density, age and sex segregation of networks, percent mutual friendship ties, average school grade point average, and school alienation were the school characteristics most commonly found to be associated with delinquency involvement.

can be tested in this multilevel modelling strategy to assess whether school context variables moderate the relationship between peer group characteristics and adolescents' delinquency. This in particular will allow an assessment of whether school characteristics moderate the delinquency-peer group association.

To determine whether the slopes of independent variables varied across schools, preliminary analyses in HLM using a random coefficient model were explored. If such variation was found to be present,[23] the slope of the coefficient was specified as a random variable in the multi-level analyses. If the slope did not vary across schools it was subsequently treated as a fixed coefficient in the analyses (Bryk et al., 1988).

In order to preclude the possibility of multicollinearity influencing the results of the HLM analyses, careful inspection of the correlation matrix was conducted. Appendix B provides this matrix and shows that among the variables other than egocentric network properties, correlations do not exceed 0.40 (exception is age with junior high school). However, the matrix does indicate that the different egocentric network characteristics are correlated amongst themselves (these correlations are highlighted in Appendix B). For example, an adolescent's network reach and centrality are correlated substantially at 0.66, as are his/her network density and reach (r=0.47), and network density and centrality (r=0.31). These results suggest that adolescents with high values on one property of their friendship network are likely to have high values on other dimensions of their network characteristics. Therefore, analyses which focus on the egocentric

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[23] Significant variation was determined using the maximum likelihood point estimate of the variance of the coefficient mean across the population of schools and the p-value associated with the chi-square test to indicate if the variance means obtained in the sample were not due to sampling variation.

network characteristics will examine each network property separately.

4.4.3 Delinquency-Peer Group Association

Turning to results from these hierarchical generalized linear models (HGLM),[24] Table 7 presents three baseline models examining the association among friends' delinquency involvement, background individual-level characteristics, and school context variables. The purpose here is to address the first issue of this project: Is a measure of peer group delinquency, as measured directly by responses of the friends composing the adolescent's friendship network, associated with an adolescent's delinquency? Recall that a common critique of prior studies' finding of a strong association between delinquent peers and a respondent's self-report delinquency is that the friends' behavior is measured through the respondent's potentially-biased perceptions. Since the data in this project are network-based, the responses of friends regarding their delinquency involvement is derived from their actual self-reported behavior, allowing a more stringent test of the association.

Model 1 tests this association by, first, only including the variable of interest, peer delinquency. Findings from this model indicate that friends' delinquency, as measured by the friends' actual reported behavior, is robustly associated with a respondent's own delinquency. Each unit increase in friends' delinquency yields a 7 percent increase in the respondent's mean delinquency level. Moreover, although the addition of an extensive list of control variables in model 2 reduces the association between friends' delinquency and a respondent's level of delinquency somewhat, peer delinquency remains significantly associated with a respondent's

[24] HGLM is similar to standard hierarchical linear modelling but it permits the prediction of count data with a Poisson distribution, rather than continuous data.

involvement.

Model 3 is discussed in a subsequent section which examines the role of school context on an individual's delinquency involvement. However, it is worth noting that incorporation of school characteristics does not explain away the delinquency-peer group association.

Focusing on the random components of the model in Table 7 reveals that although average levels of delinquency vary significantly across schools, most variation in delinquency levels is within schools, as indicated by the level-1 variance component. This is a common finding in recent multi-level research and does not discount the important point that moderate and even large context effect sizes typically translate into small proportions of explained variance in individual outcomes (Duncan and Raudenbush, 1998). Additionally, the effects of gender, self-esteem, age, and school attachment vary significantly across school contexts. This indicates that effects associated with these variables may depend upon the characteristics of the school.

4.4.4 Network Characteristics

To examine the second issue of this project, whether the properties of friendship networks will condition the delinquency-peer group relationship, interactions between peer delinquency and each network characteristic of interest are examined in Table 8 and models 4 through 9. Each model focuses on a particular network characteristic or property of an adolescent's friendship network.[25]

Model 4 begins with an examination of whether the association between friends' delinquency and a respondent's own delinquency is conditioned by membership in the school's

[25] Each network characteristic is examined separately as preliminary analyses indicated moderate levels of multicollinearity between the different measures.

leading crowd. This model indicates that the relationship is conditional; when an adolescent has no delinquent friends, popularity is unrelated to delinquency status ($b=-.10_{ns}$), but when the respondent has delinquent friends, popularity is related to delinquency status (as indicated by the interaction term, b=0.03). Specifically, when an adolescent has a peer group which averages a minor delinquency index of 10 (which is about one standard deviation above the mean), leading crowd membership is associated with a mean delinquency index of 4.8 for the respondent versus 3.9 for a non-leading crowd member. However, when peer delinquency is at greater levels (when it averages 15), leading crowd membership is translated into a mean delinquency index of 6.8 versus 4.8 for non-leading crowd members. Panel A of Figure 6 presents a graph depicting this relationship.[26] What is important in this graph is that as friends' delinquency level increases, the relationship between being a member of a leading crowd and an adolescent's own delinquency involvement increases multiplicatively. This highlights the important finding that the relationship between friends' delinquency and a respondent's own delinquency is conditioned by popularity.

Turning to the network property of density, model 5 indicates that when a respondent has no delinquent friends, density is associated with a reduction in the respondent's average level of delinquency (b=-1.71). However, when a respondent has delinquent friends, density is associated with higher levels of delinquency involvement (b=.23). Graphing this relationship in panel B of Figure 6 shows that with few or no delinquent friends there is a weak negative relationship; however, as friends' delinquency increases, the association between density and friends' delinquency becomes much stronger. For example, when an adolescent has a peer group with a

[26] The graph shows a curvilinear relationship because of the logarithmic relationship described by the Poisson distribution.

minor delinquency index of 10, medium and low density in the peer network is associated with a respondent's mean delinquency index of 2.7; however, being enmeshed in a dense peer network translates into a mean delinquency index of 3.14. Moreover, when friends' delinquency is at higher levels (equals an index of 15), a less dense friendship network is associated with a respondent's mean delinquency index of 2.9 versus 5.5 for respondents located in very dense friendship networks. Higher peer delinquency in conjunction with high network density appears to be especially associated with a respondent's own delinquency involvement.

In terms of the other network characteristics, in models 6-9, very similar patterns are revealed where the association between friends' delinquency and a respondent's own level of delinquency is stronger when the respondent is located within a central position in the friendship network (model 6), when their reach is greater (model 7), when they are attached to many other adolescents in the network (model 8), and when they are "integrated" into the friendship group (model 9). These relationships are similarly depicted in panels C through F in Figure 6, where congruent patterns of results emerge, though some interactions appear stronger than others.

To compare the relationships it is helpful to again calculate how peer delinquency levels in conjunction with network attributes correspond into a respondent's mean delinquency index. Focusing first on centrality, in model 6, when an adolescent has peers with a delinquency level of 10, centrality is unrelated to their self-reported mean delinquency index (delinquency equals approximately 3.2 for all levels of centrality). However, some differences in the effects of centrality emerge when a respondent has peers reporting a mean minor delinquency index of 15; being located in a less central position in this situation translates into a mean delinquency index of 3.6 versus 4.7 for respondents located in more central positions within their peer group.

Similarly, in model 7, reach is not associated with a respondent's delinquency index when their peers average a minor delinquency index of 10; however, when their friends' delinquency is slightly greater (averages 15), low reach is associated with a respondent's mean delinquency of 3.6 versus 4.7 if the respondent has high reach in their friendship network.

Network size, in model 8, appears to be an especially important network characteristic in conditioning the delinquency-peer group association. For example, a difference in the effect of network size appears when the peer group reports an average minor delinquency index of 10. Being located in a small peer network (with five friends) in this situation translates into a mean delinquency index of 4.0 versus a mean delinquency index of 6.1 for respondents located in a large friendship network (11 friends). The relationship is much stronger with greater peer delinquency. When peers average a delinquency index of 15, being located in a small friendship network is associated with a mean delinquency index of 5.4 versus 11.3 for those respondents located in a large friendship network.

The last network characteristic examined in model 9, being "integrated" into the peer network, similarly acts to condition the delinquency-peer group association. Being located in a peer group with a minor delinquency index of 10 in conjunction with being classified as "integrated into the peer network" corresponds with a respondent's mean delinquency index of 3.9 (versus 3.6) for a non-integrated adolescent. Again, the differences really emerge at higher levels of peer delinquency. When a respondent has friends averaging a minor delinquency index of 15, being "integrated" into the network means that the respondent on average reports a mean delinquency index of 5.3 versus 4.1 for "non-integrated" respondents.

In summary, these results indicate that all of the network characteristics examined operate

to condition the delinquency-peer group association, although graphs of the interactions suggest that network density and network size are particularly important structural properties. Incorporation of the underlying pattern of relationships among adolescents helps to explain when peer groups are more or less effective in constraining adolescents' behavior to resemble that of their peers.

4.4.5 School Context

The last issue addressed in this chapter concerns school context. Specifically, are school characteristics associated with average delinquency levels and/or do they moderate the delinquency-peer group association? I begin by exploring whether the intercept and slopes of the individual-level coefficients vary across schools. If such variation is present, school characteristics are incorporated into the models to explain some of that variation.

Beginning with model 3 in Table 7, the school characteristics found to be associated with average levels of delinquency are assessed.[27] Because each individual-level continuous variable is centered around the school mean, the intercepts in each model represent average relationships with delinquency.[28] While preliminary analyses indicated that most of the school characteristics are unrelated to average levels of delinquency, model 3 reveals that the school's alienation index and school network density are significantly associated with average levels of delinquency. The school alienation index, a measure of how disconnected average students feel within the school, is

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[27] School characteristics are highlighted in italics in the various tables.

[28] Because HGLM uses a psuedo-likelihood estimation technique, model assessment based on the likelihood ratio Chi-square statistics are not appropriate. Therefore, attempts to find the best-fitting model involve assessing how much variation is attributed to each coefficient found to vary across school context and then determining whether incorporation of school characteristics can explain away or reduce this variation.

associated with higher levels of delinquency, whereas overall school network density is associated with lower average levels of delinquency involvement across schools. This suggests that important aspects of school climate in relation to delinquency involvement are both perceptions (i.e., school alienation) and structures (i.e., school density) of connectiveness.

In addition to being related to average delinquency levels, school characteristics may moderate the relationships between individual-level factors and delinquency levels through slopes as outcomes models (i.e., cross-level interactions) (Bryk, Raudenbush, and Congdon, 1996). This was found to be the case for gender, age, and school attachment. Specifically, school network density is associated with a steeper negative slope for the coefficient associated with gender, suggesting that in schools with greater network density there is an ever larger gender gap in delinquency involvement. In other words, females are less likely than males to engage in delinquency in schools with greater network density than they are in schools with lesser network density.

Turning to the age coefficient, as school networks become more segregated in terms of friendships occurring between grades, the negative effect associated with age is reduced. Thus, in schools with greater grade-segregation in friendship choices there is less aging out of delinquency than is found in schools with less grade-segregation in friendship nominations.

Lastly, the school's average level of school alienation erodes the protective effect associated with an adolescent's individual level of school attachment. In schools with higher average levels of alienation, school attachment is less effective at reducing delinquency involvement than it is in schools with lower average levels of school alienation. Contrary to expectations, no school characteristics were found to moderate the delinquency-peer group

association. In fact, the effect of friends' delinquency is constant across schools, suggesting that the negative association cannot be explained by school characteristics.

4.5 SUMMARY OF RESULTS

Taken together, these results suggest the following: first, peer delinquency, as measured by responses of friends themselves, is strongly associated with an adolescent's own delinquency involvement. Second, the behavior of the peer group (whether pro- or anti-delinquent) is accentuated when friendship network characteristics such as size, density, centrality, reach, popularity, and integration are at higher levels. Thus, these findings suggest that network characteristics are an important missing component of the delinquency-peer group relationship and operate to constrain the behavior of adolescents to be similar to that of their peers. It is important not only to consider the behavior of the friendship group, but also to consider how an adolescent's position within the group and other characteristics of the friendship group operate to condition the delinquency-peer group relationship.

Finally, although school characteristics were found to be moderately helpful in explaining when certain individuals are at greater or lower risk of delinquency involvement, many characteristics were unrelated to delinquency levels. For example, while school alienation and school network density were associated with individuals' levels of delinquency, other indicators such as network heterogeneity, the percent of mutual friendship ties, and different variables indicating school resource availability were unrelated to delinquency levels. Additionally, school characteristics were not found to be moderators of the interactions between friends' delinquency and a respondent's location in their friendship characteristic as hypothesized in the project. This

indicates that associations between friends' delinquency and a respondent's behavior are constant across the different school contexts.

Table 6. Means and St. Deviations Comparing Delinquent* and Non-Delinquent Adolescents

Variable	Delinquents* Mean	St. Dev	Non-Delinquents Mean	St. Dev.	T-value

					e or X^2 value ^ p-value
Background Individual Characteristics					
Male^		0.55	0.50	0.38	0.49
356.23^	0.001				
Female^		0.44	0.49	0.61	0.49
356.04^	0.001				
White^		0.60	0.49	0.64	0.48
26.56^	0.001				
Black^		0.25	0.43	0.22	0.41
21.86^	0.001				
Other Race^		0.21	0.41	0.18	0.39
17.53^	0.001				
Age		15.06	1.66	15.17	1.70
3.56	0.004				
Self-esteem Index		3.86	0.47	3.93	0.43
9.59	0.0001				
Importance Religion		2.97	1.06	3.17	1.01
11.04	0.0001				
Two-Parent Family^		0.67	0.47	0.73	0.44
56.33^	0.001				
Public Assistance Receipt^		0.08	0.27	0.05	0.22
28.54^	0.001				
Parent Attachment Index		4.51	0.78	4.63	0.75
8.99	0.0001				
GPA		2.65	0.75	2.97	0.72
24.08	0.0001				
Extracurricular Activities		2.22	2.20	2.30	2.09
2.14	0.033				
School Attachment Index		3.67	0.89	3.91	0.78
15.52	0.0001				
Friends Attachment Index		4.19	0.81	4.32	0.79
8.98	0.0000				
Friend Involvement		2.10	0.96	1.83	1.00
15.15	0.0001				
Friend Intimacy		14.06	10.02	12.36	9.14
10.03	0.0001				

Friendship Characteristics (Network Characteristics)					
Mean Friendship Delinquency Rate		5.70	3.46	4.79	3.17
15.46	0.001				
(Based on send-receive network inform)					
"Leading Crowd" Member^		0.09	0.29	0.10	0.29
0.17^	0.68				
Centrality in Network (Bonacich)		0.80	0.64	0.86	0.64
5.32	0.0001				
Network Density (send/receive)		0.29	0.15	0.30	0.14
2.33	0.02				
Network Size (send/receive)		8.20	4.24	8.33	4.21
1.77	0.077				
Reach		0.57	0.47	0.61	0.49
5.67	0.0000				
"Integrated" Adolescent^		0.11	0.31	0.13	0.34
16.63^	0.001				

* Delinquents have reported participating in one or more delinquent activities over the past 12 months.
^X^2 value is reported for the dichotomous variables.

Table 6. continued.

Variable	Delinquents* Mean	St. Dev	Non-Delinquents Mean	St. Dev	T-value or X^2 value^ p-value
School Characteristics					
School Network Density	0.68	0.15	0.69	0.15	
4.39	0.0001				
Grade Segregation Index	0.69	0.10	0.68	0.11	
2.15	0.03				
Sex Segregation Index	0.20	0.07	0.19	0.06	
6.45	0.0001				
School GPA	2.78	0.22	2.80	0.22	
7.26	0.0000				
School Alienation Index	2.13	0.16	2.11	0.16	
2.53	0.000				
Percent Black	21.00	25.02	20.45	25.18	
1.25	0.212				
Junior High School only	0.21	0.41	0.18	0.38	
2.81	0.005				
(9^{th} grade maximum)					
Private School^	0.07	0.26	0.07	0.26	
0.08^	0.774				
Public School^	0.91	0.28	0.93	0.26	
0.08^	0.774				
Urban School^	0.27	0.44	0.26	0.44	
0.29^	0.593				

Suburban School^		0.55	0.50	0.54	0.50
2.16^	0.142				
Rural School^		0.18	0.38	0.20	0.40
6.12^	0.013				
West^		0.21	0.41	0.18	0.39
18.34^	0.001				
South^		0.38	0.49	0.44	0.50
43.31^	0.001				
Midwest^		0.23	0.42	0.23	0.42
0.15^	0.904				
Northeast^		0.17	0.38	0.15	0.35
16.24^	0.001				
Sample Size (n)			7,245		5,664

* Delinquents have reported participating in one or more delinquent activities over the past 12 months.
^X^2 value is reported for the dichotomous variables.

Table 7. Base Models: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

	Model 1			Model 2			Model 3		
	Coeff.		Exp	Coeff.		Exp	Coeff.		Exp
Intercept (Average Delinquency)	0.82	(0.03)	2.27	0.95	(0.04)	2.59	0.95	(0.03)	2.59
School Alienation							*0.72*	*(0.15)*	*2.05*
School Network Density							*-0.31*	*(0.16)*	*0.73*
Friends' Delinq. (Minor Delinquency)	**0.07**	**(0.006)**	**1.07**	**0.04**	**(0.003)**	**1.04**	**0.04**	**(0.003)**	**1.04**
Control Variables									
Black			0.22	(0.03)	1.25		0.20	(0.03)	1.22
Other Race (non-white)			0.22	(0.03)	1.25		0.22	(0.03)	1.25
Female			-0.65	(0.04)	0.52		-0.75	(0.04)	0.47
School Network Density							*-0.63*	*(0.30)*	*0.53*
Jr. High School							*0.35*	*(0.07)*	*1.42*
Age			-0.06	(0.01)	0.94		-0.04	(0.01)	0.96
School Grade Segregation							*0.39*	*(0.11)*	*1.48*
Friend Attachment		0.01ns	(0.02)	1.01		0.01ns	(0.02)	1.01	
Friend Involvement			0.16	(0.01)	1.17		0.16	(0.01)	1.17
Friend Intimacy			0.02	(0.00)	1.02		0.02	(0.00)	1.02
Two-Parent Family			-0.07	(0.03)	0.93		-0.07	(0.03)	0.93
Public Assistance			0.10	(0.05)	1.11		0.10	(0.04)	1.11
Parent Attachment Index			-0.12	(0.01)	0.89		-0.12	(0.01)	0.89

Self-esteem Index	-0.21	(0.03)	0.81	-0.21	(0.03)	0.81
Importance Religion	-0.07	(0.01)	0.93	-0.07	(0.01)	0.93
School Attachment Index	-0.20	(0.02)	0.82	-0.20	(0.02)	0.82
School Alienation				*0.23*	*(0.10)*	*1.26*
Extracurricular Activities	0.01	(0.01)	1.01	0.01	(0.00)	1.01

Random Effects	**Variance Component** Model 1	**Variance Component** Model 2	**Variance Component** Model 3
Intercept (mean delinq.)	0.067 (p=.000)	0.051 (p=.000)	0.035 (p=.000)
Female slope	n.a.	0.054 (p=.000)	0.033 (p=.001)
Self-esteem slope	n.a.	0.039 (p=.000)	0.038 (p=.001)
Age slope	n.a.	0.006 (p=.000)	0.005 (p=.002)
School Attachment slope	n.a.	0.011 (p=.001)	0.010 (p=.002)
Level-1 (within school)	5.266	4.011	4.031

All continuous variables have been centered around group mean.
n=12,725 adolescents nested within 100 schools.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 8. Network Interaction Models: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	**Model 4 Leading Crowd** Coeff.	Exp.	**Model 5 Density** Coeff.	Exp.	**Model 6 Centrality** Coeff.	Exp.
Intercept (Average Delinquency)	0.96 (0.04)	2.61	0.94 (0.03)	2.56	0.94 (0.03)	2.56
School Alienation	*0.72 (0.15)*	*2.05*	*0.73 (0.15)*	*2.08*	*0.72 (0.15)*	*2.05*
School Network Density	*-0.29 (0.16)*	*0.75*	*-0.33 (0.16)*	*0.72*	*-0.29ns (0.16)*	*0.75*
Friends' Delinquency (Minor Delinquency)	**0.04 (0.00)**	**1.04**	**0.00ns (0.01)**	**1.00**	**0.02 (0.00)**	**1.02**

Network Characteristic (see above)	**-0.10ns (0.10)**	**0.90**	**-1.71 (0.27)**	**0.18**	**-0.29 (0.04)**	**0.75**
Interaction (Network Characteristic* Friends' Delinquency)	**0.03 (0.01)**	**1.03**	**0.23 (0.04)**	**1.26**	**0.03 (0.01)**	**1.03**
Control Variables						
Black	0.21 (0.03)	1.23	0.20 (0.03)	1.22	0.19 (0.03)	1.21
Other Race (non-white)	0.22 (0.03)	1.25	0.22 (0.03)	1.25	0.22 (0.03)	1.25
Female	-0.75 (0.04)	0.47	-0.75 (0.04)	0.47	-0.75 (0.04)	0.47
School Network Density	*-0.63 (0.30)*	*0.53*	*-0.70 (0.30)*	*0.50*	*-0.73 (0.30)*	*0.48*
Jr. High School	*0.35 (0.07)*	*1.42*	*0.36 (0.07)*	*1.43*	*0.36 (0.07)*	*1.43*
Age	-0.04 (0.01)	0.96	-0.05 (0.01)	0.95	-0.05 (0.01)	0.95
School Grade Segregation	*0.39 (0.11)*	*1.48*	*0.38 (0.11)*	*1.46*	*0.38 (0.11)*	*1.46*
Friend Attachment	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01
Friend Involvement	0.16 (0.01)	1.17	0.16 (0.03)	1.17	0.16 (0.01)	1.17
Friend Intimacy	0.02 (0.00)	1.02	0.02 (0.00)	1.02	0.02 (0.00)	1.02
Two-Parent Family	-0.07 (0.03)	0.93	-0.06 (0.03)	0.93	-0.06 (0.03)	0.93
Public Assistance	0.11 (0.05)	1.11	0.10 (0.05)	1.11	0.10 (0.04)	1.11
Parent Attachment Index	-0.12 (0.01)	0.89	-0.12 0.01	0.89	-0.12 0.01	0.89
Self-esteem Index	-0.21 (0.03)	0.81	-0.21 (0.03)	0.81	-0.21 (0.03)	0.81
Importance Religion	-0.07 (0.01)	0.93	-0.07 (0.01)	0.93	-0.07 (0.01)	0.93
School Attachment Index	-0.20 (0.02)	0.82	-0.20 (0.02)	0.82	-0.19 (0.02)	0.83
School Alienation	*0.23 (0.10)*	*1.26*	*0.22 (0.09)*	*1.25*	*0.21 (0.10)*	*1.23*
Extracurricular Activities	0.01 (0.00)	1.01	0.02 (0.01)	1.02	0.02 (0.01)	1.02

Random Effects	Model 1		Model 2		Model 3	
Intercept (mean delinq.)	0.035	(p=.000)	0.036	(p=.000)	0.035	(p=.000)
Female slope	0.033	(p=.001)	0.033	(p=.001)	0.034	(p=.001)
Self-esteem slope	0.039	(p=.000)	0.039	(p=.000)	0.037	(p=.000)
Age slope	0.005	(p=.002)	0.005	(p=.002)	0.004	(p=.004)
School Attachment slope	0.009	(p=.002)	0.009	(p=.004)	0.009	(p=.003)
Level-1 (within school)	4.028		4.012		3.985	

Variance Component
Variance Component
Variance Component

All continuous variables have been centered around their group mean.
n=12,725 adolescents nested within 100 schools.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 8 cont.

Network Characteristic	Model 7 Reach Coeff.	Exp.	Model 8 Size Coeff.	Exp.	Model 9 Integrated Coeff.	Exp.
Intercept (Average Delinquency)	0.94 (0.03)	2.56	0.94 (0.03)	2.56	0.97 (0.04)	2.64
School Alienation	*0.7 (0.15)*	*2.03*	*0.73 (0.15)*	*2.08*	*0.72 (0.15)*	*2.05*
School Network Density	*-0.37 (0.16)*	*0.69*	*-0.32 (0.16)*	*0.73*	*-0.28 (0.16)*	*0.76*
Friends' Delinquency (Minor Delinquency)	**0.02 (0.00)**	**1.02**	**0.01ns (0.01)**	**1.01**	**0.03 (0.00)**	**1.03**
Network Characteristic (see above)	**-0.39 (0.06)**	**0.68**	**-0.03 (0.01)**	**0.97**	**-0.20 (0.08)**	**0.82**
Interaction (Network Characteristic* Friends' Delinquency)	**0.04 (0.01)**	**1.04**	**0.01 (0.00)**	**1.01**	**0.03 (0.01)**	**1.03**
Control Variables						
Black	0.19 (0.03)	1.21	0.21 (0.03)	1.23	0.20 (0.03)	1.22
Other Race (non-white)	0.22 (0.03)	1.25	0.22 (0.03)	1.25	0.22 (0.03)	1.25
Female	-0.75 (0.04)	0.47	-0.75 (0.04)	0.47	-0.75 (0.04)	0.47
School Network Density	*-0.68 (0.30)*	*0.51*	*-0.68 (0.30)*	*0.51*	*-0.62 (0.30)*	*0.54*
Jr. High School	*0.36 (0.07)*	*1.43*	*0.29 (0.08)*	*1.22*	*0.35 (0.07)*	*1.42*
Age	-0.05 (0.01)	0.95	-0.05 (0.01)	0.95	-0.04 (0.01)	0.96
School Grade Segregation	*0.40 (0.11)*	*1.49*	*0.38 (0.11)*	*1.46*	*0.39 (0.11)*	*1.48*
Friend Attachment	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01
Friend Involvement	0.16 (0.01)	1.17	0.16 (0.01)	1.17	0.16 (0.01)	1.17
Friend Intimacy	0.02 (0.00)	1.02	0.02 (0.00)	1.02	0.02 (0.00)	1.02
Two-Parent Family	-0.06 (0.03)	0.93	-0.06 (0.03)	0.93	-0.06 (0.03)	0.93
Public Assistance	0.10 (0.04)	1.11	0.09 (0.05)	1.09	0.10 (0.04)	1.11
Parent Attachment Index	-0.12 (0.01)	0.89	-0.12 (0.01)	0.89	-0.12 (0.01)	0.89
Self-esteem Index	-0.21 (0.03)	0.81	-0.21 (0.03)	0.81	-0.21 (0.03)	0.81
Importance Religion	-0.07 (0.01)	0.93	-0.07 (0.01)	0.93	-0.07 (0.01)	0.93
School Attachment Index	-0.19 (0.02)	0.83	-0.20 (0.02)	0.80	-0.20 (0.02)	0.80
School Alienation	*0.23 (0.10)*	*1.26*	*0.23 (0.09)*	*1.26*	*0.23 (0.10)*	*1.26*
Extracurricular Activities	0.02 (0.01)	1.02	0.02 (0.01)	1.02	0.01 (0.00)	1.01

Random Effects	Variance Component Model 1		Variance Component Model 2		Variance Component Model 3	
Intercept (mean delinq.)	0.035	(p=.000)	0.035	(p=.000)	0.035	(p=.000)
Female slope	0.035	(p=.002)	0.032	(p=.001)	0.033	(p=.001)
Self-esteem slope	0.036	(p=.001)	0.038	(p=.001)	0.039	(p=.000)
Age slope	0.004	(p=.005)	0.005	(p=.004)	0.005	(p=.002)
School Attachment slope	0.009	(p=.003)	0.009	(p=.004)	0.010	(p=.002)
Level-1 (within school)	3.988		4.011		4.024	

All continuous variables have been centered around group mean.
n=12, 725 adolescents nested within 100 schools.
All variables are significant at $p < .05$ unless noted in table (ns).

CHAPTER FIVE

VIOLENT VERSUS PROPERTY DELINQUENCY

5.1 INTRODUCTION

With substantial evidence supporting the premise that friendship network characteristics condition the delinquency-peer group association for overall delinquency involvement, it is useful to determine whether the observed relationships persevere when focusing on either violent or property offenses separately. Since the overall delinquency index contains a broad range of activities, exploratory factor analysis is used to determine whether a single delinquency domain is represented by the series of items versus a separate violence and property domain.

Although all of the delinquency indicators hang together nicely, with an internal reliability of 0.84, there is a theoretical reason to expect that the more violent items will have a different meaning and underlying structure than the more property oriented offenses. Violent incidents involve face-to-face interaction with others and are often intended to gain status or salvage a reputation (Felson and Tedeschi, 1993), both of which require third-party witnesses. Thus, violent acts are often more overt behaviors and friends' participation is more likely to be known. Relatedly, having the support of a group of friends who encourage violent retaliations or offenses may amplify adolescents' willingness to participate in violent activities. Property offenses, in contrast, offer the possibility of being more covert and may be more congruent with daily routine activities than are violent offenses. Friends' participation in property offending may be less well known to the adolescent due to this differing context of offending. Therefore, while friends' delinquency is expected to be associated with property offending, it is hypothesized that peer influence will be related to a lesser degree for property offending than the association for violent offending.

5.2 DUAL DIMENSIONALITY OF DELINQUENCY

Factor analysis provides a useful method to examine the dimensionality of delinquency. This approach attempts to identify linear combinations of the different delinquency indicators which characterize the underlying structure represented in the intercorrelations of the initial variables (Hindelang et al., 1980). Results from a factor analysis with varimax rotation provide moderate support for two separate delinquency domains, a violent delinquency domain and a property-oriented delinquency domain.[29] Specifically, the factor pattern indicates that the items of minor larceny, shoplifting, burglary, serious larceny (greater than $50), damaging property, and painting graffiti all have relatively high loadings on the property delinquency factor, whereas the items including pulling a knife/gun, shooting/stabbing someone, seriously injuring someone, participating in group fight, serious physically fighting, using or threatening to use a weapon, selling drugs, and stealing a car load higher on the violent delinquency factor (see Appendix C).[30] Based on these results two indices of delinquency are created, a violent delinquency index and a property delinquency index to examine the delinquency-peer group relationship.

5.3 DESCRIPTIVE RESULTS: COMPARISON OF DIFFERENT TYPES OF DELINQUENT INVOLVEMENT

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[29]However, the factor loadings and eigenvalues suggest moderate underlying similarity in the two domains. The eigenvalue of factor 1 equals 4.6, factor 2 equals 1.7, factor 3 equals 1.2, and factor 4 equals 1.0.

[30] The two components almost represent a pure property and violence component; however, selling drugs and stealing a car, while loading more highly on the violence component do not necessarily involve violent interaction. Despite this they seem to infer more serious delinquency and are included in the violent delinquency index.

Following a similar heuristic procedure to that presented in Chapter Four, a descriptive analysis of mean differences in egocentric network characteristics and control variables is presented for different types of delinquent involvement. To aid in interpretation, respondents are classified as either both violent and property offenders (committed at least one violent and one property offense), violent offender only (committed at least one violent offense but no property offenses), property offender only (committed at least one property offense but no violent offenses), or non-delinquents (did not commit any violent or property offenses).

Table 9 presents the descriptive characteristics of the sample by category of delinquency involvement. In the sample of adolescents, 26 percent have committed both types of offenses, 20 percent are classified as solely violent offenders, 11 percent as solely property offenders, and 44 percent as non-delinquents. Of those adolescents not involved in both types of delinquency (which is the modal category after non-delinquency), the distributions suggest that violent offending is more common than property offending. Indeed, in the complete sample of adolescents, 46 percent of the adolescents reported participating in violent delinquency (at least once in the past 12 months) compared to 36 percent of the sample reporting property offending. Greater involvement in violent delinquency supports prior research findings that violence is common and even normative behavior in many situations since it is often used for self-defense, to maintain social control, and for retribution (see Agnew, 1994)

Turning to an examination of the measure of friends' delinquency involvement, Table 9 indicates that respondents classified as both violent and property offenders have the highest mean level of friends' delinquency (6.0), followed by violent delinquents and property

delinquents (both 5.4), and non-delinquents (4.8). For the egocentric network characteristics, respondents engaging only in violent delinquency differ the most from non-delinquents. These adolescents, on average, are found in less central positions, have smaller and less dense friendship networks, have lower reach to others in the network, and are less likely to be "integrated" into their friendship network than are the non-delinquent adolescents.

Adolescents reporting participation in both violent and property delinquency show similar patterns to the violent delinquents except that the size of their friendship networks are not significantly different from the non-delinquents. Lastly, respondents classified as property delinquents (i.e., no violent offending) appear to have network characteristics that most resemble non-delinquents. On average, their friendship networks do not differ from non-delinquents in terms of density, size, and reach. However, property offenders do have higher average centrality in their friendship network and are more likely to be classified as "integrated" in their networks than are the non-delinquent adolescents. Overall, these descriptive findings suggest that property offenders are more likely than violent offenders to resemble their non-delinquent counterparts in terms of network characteristics.

Although violent behavior is more prevalent in this sample of adolescents, descriptive results suggest that violence may be associated to a lesser degree with patterns of interconnections in friendship networks than is the case for property offending. This suggests that network characteristics may be less important mediators of the delinquency-peer group association for violent offending than they are for property offending. Multivariate analyses will allow for a better assessment of this.

5.4 MULTIVARIATE RESULTS

To determine whether these descriptive differences emerge in multivariate models, I

investigate multi-level analyses focusing on the relationships for violent and property offending. Similar to the overall delinquency index, the violent index and property index have distributions that resemble a Poisson process; therefore, the analysis takes the form of hierarchical general linear models (HGLM) with a Poisson distribution and overdispersion. Baseline models without incorporation of the network characteristics initially allow for a comparison of the strength of the delinquency-peer group association by type of offending. T-tests allow for an assessment of significant differences in coefficients across types of offending.[31] Next, focusing explicitly on differences and similarities between violent and property offending, more complete models examine whether network interaction effects are present and condition the delinquency-peer group association for violent and property offending. The chapter concludes with a discussion of the role of school context on violent and property delinquency.

5.4.1 Delinquency-Peer Group Association: Violent and Property Delinquency

Results from baseline HGLM models are presented in Table 10. This analysis allows for an examination of whether friends' delinquency is more strongly associated with a respondent's delinquency for violent offending than for property offending as earlier hypothesized. Contrary to expectation, peer delinquency exhibits a similarly strong positive relationship with both violent and property delinquency. Specifically, for violent delinquency each unit increase in peer delinquency is associated with a 4 percent increase in the adolescent's mean delinquency index. For property delinquency, each unit increase is associated with a 3 percent increase in delinquency involvement. Despite a slightly stronger

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[31] The formula for the t-test is: t-value = $(b_1 - b_2) / ((SE\ b_1^2 + SEb_2^2)^{1/2})$ (Patternoster et al., 1998).

association for violent offending, this difference is not large enough to reach statistical significance (t=1.77). Therefore, it is concluded that delinquent friends has an equally strong association with both property and violent delinquency. This provides tentative evidence that the processes underlying different types of delinquency involvement are more noteworthy for their similarities than their differences. The next section will provide more evidence for this conclusion.

5.4.2 Network Characteristics: Violent and Property Delinquency

To examine more carefully whether differences underlay violent and property offending, models which incorporate both network interaction terms and school characteristics are examined. Beginning with an examination of the correlates of violent delinquency, Table 11 presents the results for HGLM models predicting violent delinquency and Table 12 predicting property delinquency. Focusing first on violent delinquency and the interactions between peer delinquency and network characteristics across models reveals similar findings to those presented for the overall delinquency index. In general, multiplicative effects are associated with peer delinquency in most models, indicating that location in a dense network (model 2), having high centrality in the network (model 3), many friends (model 5), and being classified as an "integrated" adolescent (model 6) increase the association between peers' delinquency and a respondent's own involvement in violent delinquency. When adolescents do not have delinquent friends, these network characteristics are associated with lesser involvement in violent delinquency.

For property delinquency, in Table 12, friends' delinquency is also more strongly associated with property offending when the adolescent is located in a dense network of friends, when s/he is found in a central position within the network, when the adolescent has

larger networks, and when he/she is considered to be "integrated" into their network. Similarly, these same network characteristics are associated with reduced levels of property delinquency when the respondent has few or no delinquent friends. In contrast, interactions between leading crowd membership and peer delinquency, and between reach and peer delinquency, are not associated with either violent or property delinquency involvement.

To examine the strength of the relationship between the interactions concerning peer delinquency and different network characteristics on a respondent's delinquency involvement we turn to Figure 7 and panels A-F. These graphs display the interactions between the different network characteristics and peer delinquency for both violent and property delinquency. Noteworthy among these is panel B which focuses on the network characteristic of density. This graph suggests that the relationship for violent offending is moderately stronger than the relationship for property offending. Specifically, for violence, when peer delinquency is at the mean level (5), being located in a dense network is associated with a mean delinquency index of 1.8 versus 1.3 for property offending. At higher levels of peer delinquency the discrepancy becomes even larger. With peer delinquency averaging 10, location in a very dense peer network is associated with a mean delinquency index of 5.9 for violent behavior and 2.2 for property delinquency. Similar results are found for the interaction between size of the peer group and peer delinquency (panel E) where the association appears stronger for violent delinquency than property delinquency.

In contrast, for interactions involving centrality (panel C) and "integration" (panel F), the association appear stronger for property offending than violent delinquency. For the interactions between centrality and peer delinquency, location in a very central position within the peer group in conjunction with peer delinquency averaging 10 is associated with a

mean violent delinquency index of 1.7 versus 2.3 for property delinquency. With peer delinquency averaging 15, high centrality is associated with a mean violent delinquency index of 2.6 versus 3.8 for property delinquency. Similarly, being very "integrated" in the peer network with high levels of peer delinquency is associated with a moderately higher mean delinquency index for property offending than it is for violent offending. In sum, although the graphs suggest some differences in the strength of the interactions for violent versus property delinquency, the magnitude and patterning of the effects appear more noteworthy for their similarities than their differences.

One place where differences emerge between violent and property delinquency is in regard to the specification of fixed and random effects. Turning to the variance component panel in Tables 11 and 12 reveals that much more variability across schools is evident for violent delinquency than for property delinquency. For example, the panel of results (in Table 11) indicates that the effect of many variables associated with violence vary randomly across school contexts. These include mean violent delinquency, public assistance, gender, self-esteem, extracurricular activities, friend intimacy, age, and school and parental attachment. Additionally, the effects associated with leading crowd membership and egocentric network reach vary across schools for violent delinquency, as do the interaction terms in model 1 (leading crowd membership*friends' delinquency), model 4 (network reach*friends' delinquency), and model 5 (network size*friends' delinquency). Despite finding much variation in the correlates of violent delinquency across school contexts, it is evident that most of the variation in violent delinquency resides within schools as evidenced by the much larger individual-level variance component.

For property delinquency, the random components panel indicates that few of the

correlates associated with property offending are variable across school contexts (i.e., have random effects). Only the effects associated with average property delinquency, gender, and self-esteem were determined to be random coefficients. The association of most of the variables with property delinquency, including friends' delinquency and network characteristics, while having a strong association with property offending, do not vary across schools. Rather, they are specified as fixed effects.

5.4.3 School Context

In terms of the influence of school context on violent and property delinquency, some noteworthy differences are found for violent delinquency in terms of school characteristics moderating the delinquency-peer group association. Specifically, in regard to violent delinquency, models 1 and 4 reveal unusual interaction effects which vary significantly across school contexts (i.e., are not fixed effects). For example, model 1 indicates that in junior high schools (compared to senior high schools), the interaction between peer delinquency and leading crowd membership is even larger. This indicates that being a member of a leading crowd in conjunction with delinquent friends is more strongly associated with violent delinquency in junior high schools than in senior high schools. Conversely, this result also implies that when associating with non-delinquent friends, leading crowd membership is associated with a larger reduction in an adolescent's violent delinquency in junior high than in senior high school. The interaction term in model 4 focuses on network reach and suggests that greater reach, when combined with delinquent friendships, is more strongly associated with a respondent's delinquency in schools with greater sex segregation of the school network. This finding is perhaps explained in terms of the composition of peer groups. That is, those adolescents who have larger delinquent

friendship networks tend to be male and in contexts of segregated friendship networks males have greater risks of associating with other delinquents or with other males who are less likely to discourage violent behavior than female adolescents tend to be. For property delinquency, in contrast, cross-level interactions were not found for network characteristics and friends' delinquency, suggesting that for property delinquency, the relationships between friends' behavior and network attributes are not modified by school characteristics.

To determine whether different school characteristics are related to violent versus property delinquency the contextual factors associated with average delinquency levels are examined. Focusing first on the intercept and the contextual variables associated with average violent delinquency levels, three school characteristics are of particular relevance. In all models, the percent female in the school is associated with a reduction in average delinquency levels. This provides some tentative evidence that an environment less conducive to violence is more likely to be found in schools with a higher proportion of female students. Also, the average level of alienation in a school is associated with increased levels of violence and sociometric network density is associated with reduced levels of delinquency in three of the six models. These latter findings mirror those found for the overall delinquency level and suggest that interconnections among students, both perceptual and structural, are important underlying mechanisms associated with levels of delinquency.

For property delinquency three school characteristics are also of importance. The school's mean grade point average is associated with reduced levels of property offenses, whereas school sex segregation and school alienation are associated with increased levels of delinquency. These results parallel those found previously in either the overall delinquency index or the violent delinquency index.

5.4.4 Control Variables

In terms of the control variables, similar results to those presented for the overall delinquency index are found, with a few notable exceptions. First, extracurricular activities are unrelated to violent delinquency but are associated with property delinquency. In terms of violence, these school-related activities, which involve increased time spent associating with peers, also consist of structured activities with guardianship present where violence is less likely to be condoned. Additionally, spending more time in structured activities with supervision may leave less unstructured time available for violence to occur. For property offending, a routine activities approach may also be used to describe the association. After-school activities ensure that adolescents who are more likely to be friendly with each other because of common interests are in close contact with each other. While extracurricular activities decrease the opportunity for adolescents to be exposed to non-friendly "others", where provocations resulting in violence would be more likely (e.g., hanging out on a streetcorner), these activities also increase the exposure to situations where increased opportunity for school-related property crimes occur (e.g., school vandalism taking place after school-related activities).

Second, in contrast to violent delinquency, two-parent families and receipt of public assistance are associated with violent delinquency (with two-parent families associated with a reduction in violence and receipt of public assistance associated with an increase in violence), but are unrelated to property offending across all models. Since both of these variables can be considered rough indicators of socioeconomic status, the finding that they are associated with violence but not property offending provides tentative support for a culture of violence explanation of the link between socioeconomic status and violence. In fact, a critical

component of the subculture of violence is the use of violence to maintain honor and status (Reed, 1972; Wolfgang and Ferracuti, 1967). This, in particular, gives relevance to Heimer's (1997) suggestion that parents from lower socioeconomic backgrounds may be more likely to translate definitions favorable to violence to their children through the use of "power-assertive or coercive discipline strategies with their children, such as commands, restrictions, threats, and physical punishment" (p. 807). This engenders perceptions in children that violence is an acceptable solution to problems and may explain why background variables associated with socioeconomic status are related to violent offending but not property offending.

Three of the control variables associated with violent delinquency also involve cross-level interactions with school characteristics (gender, age, and paternal attachment). Greater school network density increases females' lesser likelihood of becoming involved in delinquency; in schools with denser social ties, the gender gap in violent delinquency is even larger. However, in junior high schools the gender gap is reduced and girls' delinquency involvement more closely resembles their male counterparts. Similarly, the negative effect associated with age is attenuated in junior high schools; while increasing age is associated with lower levels of violent delinquency in senior high schools, this association is reduced in junior high schools. It may be that ninth graders who are attending junior high schools (grades 6 through 9) rather than senior high schools (grades 9 through 12) are participating in lower levels of delinquency than their similarly-aged counterparts in senior high schools. Finally, the school alienation index is associated with a reduction in the negative association between parental attachment and violent delinquency, suggesting that in schools with higher levels of perceived alienation, attachment to parents is less effective in reducing violent

delinquency involvement than in schools with less alienation.

In terms of cross-level interactions for property delinquency, only gender and age are associated with school characteristics. Females' property offending, again, more closely resembles their male counterparts in junior high schools than in senior high schools. Similarly, the negative association between age and delinquency is reduced in junior high schools.

5.5 SUMMARY

In sum, results from the comparison of violent and property delinquency indicate that while violent activities have the potential for the most detrimental outcomes (e.g., lethal outcomes), in this recent sample of school-aged adolescents violent behavior is more prevalent and therefore more normative than property offending. Nevertheless, friends' delinquency appears to have a similar positive association with both violent and property delinquency, and characteristics of the adolescent's peer network condition the association in most situations for both types of delinquency. Specifically, although the graphs of the interactions suggest some differences in the strength of the interactions for violent versus property offending, the magnitude and patterning of the associations suggest more similarities than differences. While the relationship between friends' delinquency and a respondent's delinquency is noteworthy for the similarity across types of offending, different school characteristics are associated with average delinquency. For violent offending, the percent female adolescents in the school and school network density are associated with lower average violence. For property offending, average school grade point average is associated with reduced offending, while school sex segregation is associated with increased property offending. School alienation is associated with both higher levels of violent and

property offending.

Differences also emerge in regard to the control variables. African American adolescents, adolescents whose family receive public assistance, and those who do not live in a two-parent family are at increased risks of violent offending. However, these background variables are unrelated to property offending. In contrast, participation in extracurricular activities is associated with property, but not violent offending. Lastly, most of the correlates of property offending are non-variant across school contexts, whereas many of the variables associated with violent offending have random effects across schools. This suggests greater variability in characteristics associated with violent delinquency than with property delinquency across schools.

Despite highlighting these differences, much of the results for violent and property delinquency dovetail those presented for the overall delinquency index. Most notably, all results suggest that peer delinquency is a strong correlate of a respondent's delinquency regardless of whether the focus is on violent or property offending, and that characteristics of an adolescent's peer networks condition the delinquency-peer group association for both violent and property delinquency. The consistency of these patterns of findings provide validation for the premise that structural properties of peer groups are an important component of adolescent delinquency, whether the focus is on violent or property offending.

Table 9. Means and Standard Deviations Comparing Different Types of Delinquent and Non-Delinquent Adolescents

Variable	Violent & Property Delinquent		Violent Delinquent Only		Property Delinquent Only	Non-Delinquent (comparison)	
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev	Mean St. Dev
Percent of Sample	25.6%		19.9%		10.6%		43.9%
Egocentric Network Variables							
Mean Friendship Delinquency Rate	6.04*	3.58	5.43*	3.44	5.38*	3.15	4.78 3.17
"Leading Crowd"	0.09	0.29	0.09	0.28	0.10	0.31	0.10 0.29
Centrality	0.79*	0.64	0.75*	0.62	0.90*	0.65	0.86 0.64
Density	0.42*	0.10	0.42*	0.10	0.43	0.10	0.43 0.10
Size	8.21	4.27	8.09*	4.22	8.52	4.21	8.36 4.21
Reach	0.56*	0.47	0.55*	0.48	0.63	0.47	0.62 0.49
"Integrated"	0.10*	0.31	0.09*	0.28	0.16*	0.37	0.13 0.34
Control Variables							
Male	0.60*	0.49	0.54*	0.50	0.45*	0.50	0.38 0.49
Female	0.39*	0.49	0.45*	0.50	0.55*	0.50	0.61 0.49
White	0.60*	0.49	0.55*	0.50	0.68*	0.47	0.64 0.48
Black	0.23*	0.49	0.32*	0.47	0.15*	0.36	0.22 0.41
Other Race	0.17*	0.38	0.13	0.34	0.17*	0.38	0.14 0.34
Age	15.02*	1.63	15.07*	1.74	15.15	1.56	15.17 1.70
Self-esteem Index	3.81*	0.49	3.92	0.44	3.85*	0.47	3.93 0.42
Importance Religion	2.87*	1.08	3.12*	1.04	2.94*	1.05	3.18 1.01
Two-Parent Family	0.66*	0.47	0.64*	0.48	0.76*	0.43	0.73 0.44
Public Assistance Receipt	0.08*	0.27	0.09*	0.28	0.04	0.21	0.05 0.22
Parent Attachment Index	4.46*	0.80	4.56*	0.80	4.53*	0.67	4.63 0.75
GPA	2.57*	0.74	2.65*	0.74	2.85*	0.74	2.97 0.72
Extracurricular Activities	2.16*	2.24	2.20*	2.18	2.42		

2.16	2.30	2.09				
School Attachment Index	3.59*	0.90		3.75*	0.88	3.76*
0.83	3.91	0.80				
Friends Attachment Index	4.16*	0.83		4.20*	0.82	4.26*
0.73	4.32	0.79				
Friend Involvement	2.18*	0.94		1.99*	0.99	2.08*
0.92	1.83	1.00				
Friend Intimacy	14.72*	10.38		13.09*	9.80	14.35*
9.36	12.39	9.13				

*Asterisks indicate a significant mean difference between the different categories of delinquents compared to non-delinquents, t-test.

Violent and Property delinquents (n=3,275) have reported participating in at least one violent and one property delinquent activity over the past 12 months; **Violent delinquents** (n=2,539) have reported participating in one violent delinquent activity but no property delinquent activities during the past 12 months; **Property delinquents** (n=1,359) reported participating in at least one property delinquent activity but no violent delinquent activities during the past 12 months; **Non-delinquents** (n=5,612) report no participation in violent or property delinquency during the past 12 months.

Table 10. Base Models Comparing Violent and Property Delinquency: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard errors in parentheses)

	Violent Delinquency				**Property Delinquency**			
	Coeff.		Exp.		Coeff.		Exp.	T-test
Intercept (Average Delinquency)	0.44	(0.04)	1.55		0.06ns	(0.05)	1.06	5.93
Friends' Delinquency (Minor Delinquency)	**0.04**	**(0.00)**	**1.04**		**0.03**	**(0.00)**	**1.03**	**1.77**
Control Variables								
Black	0.35	(0.04)	1.42		0.03ns	(0.07)	1.03	3.97
Other Race (non-white)	0.26	(0.37)	1.30		0.18	(0.07)	1.20	0.21
Female	-0.77	(0.04)	0.46		-0.55	(0.04)	0.58	3.89
Age	-0.04	(0.01)	0.96		-0.09	(0.02)	0.91	1.77
Grade Point Average	-0.37	(0.02)	0.69		-0.20	(0.02)	0.82	6.01
Friend Attachment	0.01ns	(0.01)	1.01		0.01ns	(0.02)	1.01	0.00
Friend Involvement	0.15	(0.01)	1.16		0.18	(0.02)	1.20	1.34
Friend Intimacy	0.02	(0.00)	1.02		0.02	(0.00)	1.02	0.00
Two-Parent Family	-0.15	(0.03)	0.86		0.02ns	(0.03)	1.02	4.01
Public Assistance Receipt	0.23	(0.06)	1.26		-0.04ns	(0.06)	0.96	3.18
Parent Attachment Index	-0.14	(0.02)	0.87		-0.11	(0.02)	0.90	1.06
Self-esteem Index	-0.15	(0.04)	0.86		-0.29	(0.04)	0.75	2.47
Importance Religion	-0.04	(0.01)	0.96		-0.10	(0.01)	0.90	4.24
School Attachment Index	-0.22	(0.02)	0.80		-0.17	(0.02)	0.84	1.77
Extracurricular Activities	0.01ns	(0.01)	1.01		0.02	(0.01)	1.02	0.71

	Violent Delinquency		Property Delinquency	
Random Effects	**Variance Component**		**Variance Component**	
Intercept (mean delinq.)	0.046	(p=.000)	0.124	(p=.000)
Public Assistance slope	0.062	(p=.004)	N.a.	
Female slope	0.063	(p=.000)	0.052	(p=.001)
Self-esteem slope	0.059	(p=.000)	0.032	(p=.006)
Extracurricular Activities	0.002	(p=.001)	N.a.	

Friend Intimacy slope	0.000	(p=.019)	N.a.	
Age slope	0.008	(p=.004)	0.012	(p=.000)
School Attachment slope	0.022	(p=.000)	N.a.	
Parental Attachment slope	0.003	(p=.014)	N.a.	
Level-1 (within school)	3.042		2.818	

All continuous variables have been centered around their group means.
n=12,725 adolescents nested within 100 schools.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal >$50, and burglarize.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 11. Network Interaction Models of Violent Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic:	Model 1 Leading Crowd Coeff.	Exp	Model 2 Density Coeff.	Exp.	Model 3 Centrality Coeff.	Exp.
Intercept (Average Delinquency)	0.50ns (0.44)	1.65	0.28ns (0.44)	2.32	0.26ns (0.44)	1.30
Percent Female	*-0.02 (0.01)*	*0.98*	*-0.02 (0.01)*	*0.98*	*-0.02 (0.01)*	*0.98*
School Alienation	*0.62 (0.13)*	*1.86*	*0.66 (0.13)*	*1.93*	*0.66 (0.13)*	*1.93*
School Network Density	*-0.20ns (0.16)*	*0.82*	*-0.30 (0.15)*	*0.74*	*-0.26ns (0.15)*	*0.77*
Friends' Delinquency (Minor Delinquency)	**0.04 (0.00)**	**1.04**	**0.01ns (0.01)**	**1.01**	**0.02 (0.00)**	**1.02**
Network Characteristic	**-0.22ns (0.16)**	**0.80**	**-2.44 (0.35)**	**0.09**	**-0.39 (0.05)**	**0.68**
Jr. High School	**-0.70 (0.26)**	**0.50**	-------		------	
Interaction (Network Characteristic* Friends' Delinquency)	**0.03ns (0.02)**	**1.03**	**0.24(0.05)**	**1.27**	**0.04 (0.01)**	**1.04**
Jr. High School	*0.18 (0.04)*	*1.20*	-------		------	
Control Variables						
Black	0.34 (0.04)	1.40	0.33 (0.04)	1.39	0.32(0.04)	1.38
Other Race (non-white)	0.27 (0.04)	1.31	0.27 (0.04)	1.31	0.27 (0.04)	1.30
Female	-0.58 (0.15)	0.56	-0.54 (0.14)	0.58	-0.51 (0.15)	0.60
School Network Density	*-0.41 (0.21)*	*0.66*	*-0.45 (0.20)*	*0.64*	*-0.51 (0.21)*	*0.60*
Jr. High School	*0.32 (0.07)*	*1.38*	*0.34 (0.07)*	*1.40*	*0.34 (0.07)*	*1.40*
Age	-0.08 (0.01)	0.92	-0.08 (0.01)	0.92	-0.08 (0.01)	0.92
Jr. High School	*0.19 (0.03)*	*1.21*	*0.18 (0.03)*	*1.20*	*0.18 (0.03)*	*1.20*
Friend Attachment	0.01ns (0.02)	1.01	0.02ns (0.02)	1.02	0.01ns (0.02)	1.01
Friend Involvement	0.15 (0.01)	1.16	0.15 (0.01)	1.16	0.15 (0.01)	1.16
Friend Intimacy	0.02 (0.00)	1.02	0.02 (0.00)	1.02	0.02 (0.00)	1.02
Two-Parent Family	-0.15 (0.03)	0.86	-0.14 (0.03)	0.87	-0.14 (0.03)	0.87
Public Assistance	0.22 (0.06)	1.25	0.21 (0.06)	1.23	0.21 (0.06)	1.23
Parent Attachment Index	-1.01 (0.23)	0.36	-0.99 (0.23)	0.37	-0.99 (0.22)	0.37
School Alienation	*0.42 (0.11)*	*1.52*	*0.40 (0.11)*	*1.49*	*0.40 (0.10)*	*1.49*
Self-esteem Index	-0.14 (0.04)	0.87	-0.15 (0.04)	0.86	-0.15 (0.04)	0.86
Importance Religion	-0.04 (0.01)	0.96	-0.04 (0.01)	0.96	-0.04 (0.01)	0.96
School Attachment Index	-0.22 (0.02)	0.80	-0.21 (0.02)	0.81	-0.20 (0.02)	0.82

Extracurricular Activities	0.01ns (0.01) 1.01	0.01ns (0.01) 1.01	0.01ns (0.01) 1.01

Random Effects	**Variance Component** Model 1	**Variance Component** Model 2	**Variance Component** Model 3
Intercept (mean delinq.)	0.033 (p=.004)	0.022 (p=.000)	0.023 (p=.000)
Public Assistance slope	0.072 (p=.006)	0.060 (p=.013)	0.071 (p=.008)
Female slope	0.043 (p=.012)	0.034 (p=.007)	0.037 (p=.008)
Self-esteem slope	0.059 (p=.000)	0.059 (p=.001)	0.057 (p=.000)
Extracurricular Activities	0.003 (p=.000)	0.003 (p=.001)	0,002 (p=.001)
Friend Intimacy slope	0.00 (p=.03)	0.00 (p=.039)	0.00 (p=.035)
Age slope	0.005 (p=.124)	0.004 (p=.196)	0.004 (p=.217)
School Attachment slope	0.018 (p=.000)	0.018 (p=.000)	0.019 (p=.000)
Parent Attachment slope	0.003 (p=.035)	0.003 (p=.092)	0.002 (p=.069)
Network Charact. slope	**0.578 (p=.118)**	**1.11 (p=.021)**	------
Network Interaction slope	**0.009 (p=.045)**	------	------
Level-1 (within school)	2.982	3.008	2.983

Table 11 cont.

Network Characteristic	**Model 4 Reach** Coeff.	Exp.	**Model 5 Size** Coeff.	Exp.	**Model 6 Integrated** Coeff.	Exp.
Intercept (Average Delinq.)	0.38ns (0.42)	1.46	0.36ns (0.44)	1.43	0.35 (0.44)	1.42
Percent Female	*-0.02 (0.00)*	*0.98*	*-0.02 (0.00)*	*0.98*	*-0.02 (0.00)*	*0.98*
School Alienation	*0.66 (0.13)*	*1.93*	*0.65 (0.13)*	*1.91*	*0.65 (0.13)*	*1.91*
School Network Density	*-0.34 (0.15)*	*0.71*	*-0.32 (0.15)*	*0.73*	*-0.23ns (0.15)*	*0.79*
Friends' Delinquency (Minor Delinquency)	**0.02 (0.00)**	**1.02**	**0.01ns (0.01)**	**1.01**	**0.04 (0.00)**	**1.04**
Network Characteristic	**-0.57 (0.07)**	**0.57**	**-0.04 (0.01)**	**0.96**	**-0.33 (0.10)**	**0.72**
Interaction (Network Characteristic* Friends' Delinq)	**0.02ns (0.02)**	**1.02**	**0.01 (0.00)**	**1.01**	**0.03 (0.01)**	**1.20**
School Sex Segregation	***0.18 (0.09)***	***1.20***	----		----	
Control Variables						
Black	0.32 (0.04)	1.38	0.35 (0.04)	1.42	0.33 (0.04)	1.39
Other Race (non-white)	0.27 (0.04)	1.31	0.27 (0.04)	1.31	0.26 (0.04)	1.30
Female	-0.56 (0.15)	0.57	-0.59 (0.15)	0.55	-0.56 (0.14)	0.57
School Network Density	*-0.43 (0.20)*	*0.65*	*-0.41 (0.21)*	*0.66*	*0.42 (0.20)*	*0.66*
Jr. High School	*0.34 (0.07)*	*1.40*	*0.35 (0.07)*	*1.42*	*0.32 (0.07)*	*1.38*
Age	-0.09 (0.01)	0.91	-0.08 (0.01)	0.90	-0.07 (0.01)	0.93
Jr. High School	*0.18 (0.03)*	*1.20*	*0.18 (0.03)*	*1.20*	*0.18 (0.03)*	*1.20*

Friend Attachment	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01	0.01ns (0.01)	1.01
Friend Involvement	0.14 (0.01)	1.15	0.15 (0.01)	1.16	0.15 (0.01)	1.16
Friend Intimacy	0.02 (0.00)	1.02	0.02 (0.00)	1.02	0.02 (0.00)	1.02
Two-Parent Family	-0.14 (0.03)	0.87	-0.14 (0.03)	0.87	-0.15 (0.04)	0.86
Public Assistance	0.21 (0.06)	1.23	0.21 (0.06)	1.23	0.22 (0.06)	1.25
Parent Attachment Index	-1.01 (0.22)	0.36	-0.99 (0.23)	0.37	-1.01 (0.23)	0.36
School Alienation	*0.41 (0.10)*	*1.51*	*0.40 (0.11)*	*1.49*	*0.41 (0.11)*	*1.51*
Self-esteem Index	-0.15 (0.04)	0.86	-0.15 (0.04)	0.86	-0.15 (0.04)	0.86
Importance Religion	-0.04 (0.01)	0.96	-0.04 (0.01)	0.96	-0.04 (0.01)	0.96
School Attachment Index	-0.20 (0.02)	0.82	-0.22 (0.02)	0.80	-0.22 (0.02)	0.80
Extracurricular Activities	0.01 (0.00)	1.01	0.01ns (0.01)	1.01	0.01 (0.01)	1.01

Random Effects	**Variance Component** Model 4		**Variance Component** Model 5		**Variance Component** Model 6	
Intercept (mean delinq.)	0.022	(p=.000)	0.023	(p=.001)	0.022	(p=.001)
Public Assistance slope	0.069	(p=.003)	0.072	(p=.007)	0.068	(p=.009)
Female slope	0.033	(p=.007)	0.034	(p=.026)	0.034	(p=.011)
Self-esteem slope	0.057	(p=.001)	0.058	(p=.001)	0.059	(p=.000)
Extracurricular Activities slope	0.002	(p=.005)	0.002	(p=.001)	0.003	(p=.000)
Friend Intimacy slope	0.000	(p=.067)	0.00	(p=.051)	0.000	(p=.024)
Age slope	0.004	(p=.311)	0.004	(p=.151)	0.004	(p=.222)
School Attachment slope	0.020	(p=.000)	0.019	(p=.000)	0.021	(p=.000)
Parent Attachment slope	0.002	(p=.067)	0.003	(p=.029)	0.002	(p=.063)
Network Interaction slope	0.00	(p=.125)	0.00	(p=.006)	------	
Level-1 (within school)	2.977		4.012		3.037	

All continuous variables have been centered around their group means.
n=12,725 adolescents nested within 100 schools.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessary involve violence, factor analyses indicated that they hung together with the other violent incidents.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 12. Network Interaction Models of Property Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	**Model 1 Leading Crowd** Coeff.	Exp.	**Model 2 Density** Coeff.	Exp.	**Model 3 Centrality** Coeff.	Exp.
Intercept (Average Delinquency)	-0.90ns (0.78)	0.41	-0.90ns (0.79)	0.41	-0.95ns (0.78)	0.39
School G.P.A.	*-0.45 (0.18)*	*0.64*	*-0.45 (0.18)*	*0.64*	*-0.44 (0.18)*	*0.64*
School Sex Segreg.	*1.28 (0.34)*	*3.60*	*1.26 (0.35)*	*3.53*	*1.25 (0.34)*	*3.49*
School Alienation	*0.62 (0.22)*	*1.86*	*0.63 (0.23)*	*1.88*	*0.64 (0.23)*	*1.90*
Friends' Delinquency (Minor Delinquency)	**0.03 (0.00)**	**1.03**	**-0.00ns (0.01)**	**1.00**	**0.02 (0.01)**	**1.02**
Network Characteristic	**-0.03ns (0.12)**	**0.97**	**-1.13 (0.33)**	**0.32**	**-0.20 (0.05)**	**0.82**
Interaction (Network Characteristic* Friends' Delinquency)	**0.02ns (0.01)**	**1.02**	**0.26 (0.05)**	**1.30**	**0.04 (0.01)**	**1.04**
Control Variables						
Black	0.01ns (0.05)	1.01	0.02ns (0.05)	1.02	0.01ns (0.05)	1.01
Other Race (non-white)	0.18 (0.04)	1.20	0.19 (0.04)	1.21	0.18 (0.04)	1.20
Female	-0.60 (0.05)	0.55	-0.61 (0.05)	0.54	-0.61 (0.05)	0.54

Jr. High School	*0.24 (0.09)*	*1.27*	*0.25 (0.09)*	*1.28*	*0.25 (0.09)*	*1.28*
Age	-0.83 (0.19)	0.44	-0.81 (0.19)	0.43	-0.84 (0.19)	0.45
School G.P.A.	*0.26 (0.07)*	*1.30*	*0.25 (0.07)*	*1.28*	*0.25 (0.07)*	*1.28*
Jr. High School	*0.16 (0.04)*	*1.17*	*0.16 (0.04)*	*1.17*	*0.16 (0.04)*	*1.17*
Friend Attachment	0.01ns (0.01)	1.01	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01
Friend Involvement	0.17 (0.02)	1.19	0.17 (0.02)	1.19	0.17 (0.02)	1.19
Friend Intimacy	0.02 (0.00)	1.02	0.02 (0.00)	1.02	0.02 (0.00)	1.02
Two-Parent Family	0.02ns (0.03)	1.02	0.02ns (0.03)	1.02	0.03ns (0.03)	1.03
Public Assistance	-0.05ns (0.04)	0.95	-0.02ns (0.06)	0.94	-0.06ns (0.06)	0.94
Parent Attachment Index	-0.11(0.02)	0.90	-0.11 (0.02)	0.90	-0.11 (0.02)	0.90
Self-esteem Index	-0.28 (0.04)	0.76	-0.28 (0.04)	0.76	-0.28 (0.04)	0.76
Importance Religion	-0.10 (0.01)	0.90	-0.10 (0.01)	0.90	-0.10 (0.01)	0.90
School Attachment Index	-0.17 (0.02)	0.84	-0.18 (0.02)	0.84	-0.18 (0.02)	0.84
Extracurricular Activities	0.02 (0.01)	1.02	0.02 (0.01)	1.02	0.02 (0.01)	1.02

Random Effects	**Variance Component** Model 1		**Variance Component** Model 2		**Variance Component** Model 3	
Intercept (mean delinq.)	0.097	(p=.000)	0.098	(p=.000)	0.094	(p=.000)
Female slope	0.046	(p=.004)	0.045	(p=.005)	0.047	(p=.028)
Self-esteem slope	0.029	(p=.008)	0.029	(p=.009)	0.025	(p=.008)
Age slope	0.006	(p=.024)	0.006	(p=.033)	0.006	(p=.031)
Level-1 (within school)	2.832		2.827		2.868	

All continuous variables have been centered around their group means.
n=12,725 adolescents nested within 100 schools.
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal >$50, and burglarize.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 12 cont.

Network Characteristic	**Model 4 Reach** Coeff.	Exp.	**Model 5 Size** Coeff.	Exp.	**Model 6 Integrated** Coeff.	Exp.
Intercept (Average Delinquency)	-0.89ns (0.44)	0.41	-0.90ns (0.78)	0.41	-0.93ns (0.76)	0.39
School G.P.A.	*-0.46 (0.18)*	*0.63*	*-0.45 (0.18)*	*0.64*	*-0.44 (0.17)*	*0.64*
School Sex Segreg.	*1.29 (0.34)*	*3.63*	*1.28 (0.35)*	*3.60*	*1.28 (0.34)*	*3.60*
School Alienation Index	*0.62 (0.16)*	*1.86*	*0.62 (0.23)*	*1.86*	*0.63 (0.22)*	*1.88*
Friends' Delinquency (Minor Delinquency)	**0.03 (0.01)**	**1.03**	**0.01ns (0.01)**	**1.01**	**0.03 (0.00)**	**1.03**
Network Characteristic	**-0.04ns (0.04)**	**0.96**	**-0.02 (0.01)**	**0.98**	**-0.07ns (0.10)**	**0.93**
Interaction (Network Characteristic* Friends' Delinquency)	**0.01ns (0.01)**	**1.01**	**0.004 (0.00)**	**1.00**	**0.03 (0.01)**	**1.03**
Control Variables						
Black	0.00ns (0.05)	1.00	0.02ns (0.05)	1.02	0.02ns (0.05)	1.02
Other Race (non-white)	0.17 (0.04)	1.19	0.18 (0.04)	1.20	0.18 (0.04)	1.20
Female	-0.60 (0.05)	0.55	-0.61 (0.05)	0.54	-0.60 (0.05)	0.55
Jr. High School	*0.24 (0.09)*	*1.27*	*0.24 (0.09)*	*1.27*	*0.24 (0.09)*	*1.27*
Age	-0.83 (0.19)	0.44	-0.80 (0.19)	0.45	-0.76 (0.15)	0.47

School G.P.A.	*0.25 (0.07)*	*1.28*	*0.25 (0.07)*	*1.28*	*0.23 (0.05)*	*1.26*
Jr. High School	*0.15 (0.04)*	*1.16*	*0.16 (0.04)*	*1.17*	*0.17 (0.03)*	*1.18*
Friend Attachment	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01	0.01ns (0.02)	1.01
Friend Involvement	0.17 (0.02)	1.19	0.17 (0.02)	1.19	0.17 (0.02)	1.19
Friend Intimacy	0.02 (0.00)	1.02	0.02 (0.00)	1.02	0.02 (0.00)	1.02
Two-Parent Family	0.03ns (0.03)	0.97	0.03ns (0.03)	1.03	0.02ns (0.03)	1.02
Public Assistance	-0.05ns (0.06)	0.95	-0.06ns (0.06)	0.94	-0.06ns (0.06)	0.94
Parent Attachment Index	-0.11(0.02)	0.90	-0.13 (0.02)	0.88	-0.12 (0.02)	0.89
Self-esteem Index	-0.28 (0.04)	0.76	-0.28 (0.04)	0.76	-0.28 (0.04)	0.76
Importance Religion	-0.11 (0.01)	0.90	-0.10 (0.01)	0.90	-0.10 (0.01)	0.90
School Attachment Index	-0.17 (0.02)	0.84	-0.18 (0.02)	0.84	-0.18 (0.02)	0.84
Extracurricular Activities	0.02 (0.01)	1.02	0.02 (0.01)	1.02	0.02 (0.01)	1.02

Random Effects	**Variance Component** Model 1		**Variance Component** Model 2		**Variance Component** Model 3	
Intercept (mean delinq.)	0.097	(p=.000)	0.098	(p=.000)	0.094	(p=.000)
Female slope	0.046	(p=.004)	0.045	(p=.005)	0.047	(p=.002)
Self-esteem slope	0.029	(p=.008)	0.029	(p=.009)	0.025	(p=.008)
Age slope	0.006	(p=.024)	0.006	(p=.034)	0.004	(p=.034)
Level-1 (within school)	2.831		2.827		2.868	

All continuous variables have been centered around their group means.
n=12,725 adolescents nested within 100 schools.
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal >$50, and burglarize.
All variables are significant at $p < .05$ unless noted in table (ns).

CHAPTER SIX

DEVELOPMENTAL CHANGES: AGE INVARIANT EFFECTS?

6.1 INTRODUCTION

Because research on adolescent development indicates that the period of adolescence and early adulthood is full of transitions and alterations in psychological and social status (Peterson and Ebata, 1987), it is important to examine whether these changes are reflected in an adolescent's relationship with peers. Therefore, this chapter examines whether the delinquency-peer group relationship is age variant (i.e., is the association conditioned by age?). An important theoretical treatise informing this section is Thornberry's (1987) "interactional theory" which rests on the premise that the effects of

family, school, and delinquent peers on adolescent delinquency vary systematically across the adolescent's developmental stages. Thornberry hypothesizes that while delinquent peer influences will be significant at early ages of adolescence (ages 11-13), the association will increase until it reaches a peak during middle adolescence (ages 15-16), and will gradually decline in late adolescence (ages 18-20) as the adolescent's commitment to conventional activities begins to increase (e.g., employment, stable romantic relationships, college education).

This chapter focuses on one aspect of Thornberry's developmental theory, the delinquency-peer group relationship. Specifically, the analyses examine whether the association between delinquent peers and an adolescent's own delinquency is age invariant. Is a pattern found where delinquent friends are more strongly associated with a respondent's delinquency in middle adolescence as compared to early and late adolescence?

Respondents are classified into early adolescence if they are ages 11 or 12 (n=1,017), middle adolescence if they are ages 13 to 15 (n=6,146) and late adolescence if they are ages 16 to 19 (N=5,585). This breakdown best captures the changing nature of the age-delinquency relationship depicted in Figure 8 where delinquency begins at a relatively low level in early adolescence and steadily rises with age until it reaches a peak at age 15, after which it begins to decline.[32]

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[32] Appendix D provides the frequency breakdown for the individual delinquency items by category of adolescence. Interestingly, this table indicates that violent behaviors such as serious physical fights, seriously injuring another, and group fights are the behaviors which tend to peak in young adolescence and remain at a high level through middle adolescence followed by declines in late adolescence. It is the property offenses which show a curvilinear distribution over adolescence with the gradual peak in middle adolescence.

6.2 DESCRIPTIVE RESULTS

To begin focusing on developmental differences, mean differences in delinquency, delinquent friends, and network characteristics are examined across the three periods of adolescence. Table 13 presents preliminary evidence and indicates that overall delinquency, as well as violent and property delinquency, are lowest during early adolescence, peak during middle adolescence, and then subside somewhat during late adolescence. However, instead of mirroring this curvilinear trend, friends' level of delinquency continues to rise throughout adolescence until it reaches its highest level in late adolescence (4.11 to 5.64). Focusing on characteristics of the adolescent's friendship network reveals that centrality, density, and size are all greater for young adolescents, compared to older adolescents, whereas reach and integration are greater during middle adolescence. Conversely, all network characteristics (with the exception of integration which does not significantly differ) are at their lowest levels in late adolescence suggesting that this may be the period where adolescents are least enmeshed in their personal networks.

The control variables reveal that attachment to friends does not change over the developmental stages, although the amount of time spent with friends and intimacy with friends increases with age. Similar to predictions derived from developmental theory, average levels of attachment to parents and school attachment diminish with age. Therefore, average levels of these correlates of delinquency show patterns suggested by developmental theory.

6.3 MULTIVARIATE RESULTS

Although average levels of these variables are consistent with developmental research in general, and Thornberry's interactional theory in particular, descriptive results

cannot reveal whether the association between these variables and a respondent's delinquency are consistent across adolescence. This requires mulitivariate analyses where different models are specified for each period of adolescence. Because some differences were found for violent and property delinquency in the previous analyses, the three age stages are modelled separately for each type of problem behavior.

I begin by addressing whether the delinquency-peer group association changes across developmental stages. To examine this, base-line models which do not incorporate network characteristics or school characteristics are presented for all three age groups. Next, network interaction models are specified which incorporate school characteristics and relevant cross-level interactions for each age stage. These models will allow a determination of whether the interactions between peer delinquency and the different network characteristics are age invariant. The chapter concludes with a discussion of the similarities and differences that emerge from these comparisons with a focus on fitting the findings into a developmental framework.

6.3.1 Delinquency-Peer Group Association: Early, Middle, and Late Adolescence

Table 14 presents results from base-line models (no interactions or school characteristics are included) that allow for comparisons across different age categories using t-tests to indicate statistical significance (Patterson et al., 1998). Beginning with friends' delinquency, this table indicates that the delinquency-peer group association is greatest for the youngest adolescents. Specifically, each unit increase in friends' delinquency is associated with an 8 percent increase in the respondent's violent behavior and an 11 percent increase in property delinquency in early adolescence, compared to a 4 percent increase in violent delinquency and a 3 percent increase in property delinquency in middle adolescence (t= 2.83 and 3.85, respectively). No significant difference in the

delinquency-peer group association is found between middle adolescence and late adolescence. Therefore, comparisons of the developmental stages across adolescence indicate that delinquent peers have the largest association with delinquency in early adolescence, followed by a small but significant decline in the association in middle and late adolescence.

A possible explanation for the stronger delinquency-peer group association in early adolescence is that the observed relationship is an artifact of a stronger connection between minor and serious self-report delinquency at younger ages rather than older ages. Because peer delinquency is measured for the minor delinquency items and self-report delinquency for the more serious delinquency items, the observed relationship between peer delinquency and self-report delinquency may not necessarily be valid if this is the case. For example, it is plausible to expect that smoking and drinking might be more relevant to serous offending at younger ages, but less related at older ages when many more adolescents indulge. To test this, correlations between an adolescent's self-reported involvement in minor and serious delinquency were calculated for the three age stages. Findings indicated a similar correlation for the different ages (0.50 in early adolescence, 0.52 in middle adolescence, and 0.53 in late adolescence). This finding of essentially unchanged correlations over age groups rules out the possibility that the delinquency-peer group association is an artifact of a stronger connection between minor and serious delinquency at younger ages and provides more confidence that the change with age is substantively meaningful.

These findings do not align perfectly with Thornberry's interactional theory, which hypothesizes that the association between delinquent peers and a respondent's delinquency will be greatest in middle adolescence. Nonetheless, the results are consistent

with results from a five-wave panel of adolescent drug use which found that the effect of peer drug use on a respondent's drug use decreased over the age span that represented early, middle, and late adolescence (Krohn et al., 1996).

Turning briefly to other aspects of peer relationships to which Thornberry draws attention--indicators of closeness to friends--I find that affection towards friends (i.e., friend attachment) is not associated with violent or property delinquency in all age groupings once other relevant variables are accounted for. In contrast, while the amount of time spent with friends (i.e., friend involvement) is associated with both types of delinquency, the association remains constant across age groupings. Lastly, Table 14 indicates that intimacy with friends has a moderately stronger association in early adolescence than in middle or late adolescence. Two other variables that developmental theorists emphasize as having an age invariant association, parental and school attachment, are found to have similarly strong associations with delinquency across the age span, after relevant variables are accounted for.

6.3.2 Network Characteristics: Early, Middle, and Late Adolescence

To examine whether the delinquency-peer group association is conditioned by the adolescent's position within their egocentric network to a differing degree across the different stages of adolescence, we turn to the network interaction models. A comparison of the effects for early adolescence in Tables 15 (violent delinquency) and 16 (property delinquency) to those for middle adolescence (Tables 17-18) and late adolescence (Tables 19-20) indicates some discrepancy. At first glance these tables suggest that network characteristics do not condition the delinquency-peer group association in early adolescence (i.e., the interactions are mostly insignificant at the .05 level); however, this appears to be an issue of statistical power related to differing sample sizes. Comparing

the magnitude of the effects for young adolescents versus middle-aged adolescents indicates similar patterns of results. In fact, t-tests of the strength of the coefficients across the three-age stages reveals very few significant differences.[33]

Focusing on middle adolescence in Tables 17 and 18 reveals that during middle adolescence, peer delinquency is conditioned by network characteristics for violent delinquency (in all cases), and in most instances for property offending. For property delinquency (Table 18), only leading crowd membership and network "integration" do not condition the delinquency-peer group relationship. Additionally, in many cases for property delinquency, once the network characteristic is accounted for, peer delinquency is no longer associated with the respondent's behavior (e.g., density, centrality, reach, and size). This indicates that friends' behavior is unrelated to delinquency when the respondent is located in a non-dense friendship network, is found in a peripheral position, has low reach to others, or has few friends. Conversely, for violent delinquency (see Table 17), friends' delinquency while conditioned by network characteristics remains associated with a respondent's behavior, even when these network characteristics are at low levels (the exceptions are density and size which show similar patterns to those found for property delinquency).

Delinquency in late adolescence reveals many similarities to the relationships found for middle adolescence (see Tables 19 and 20). Friends' delinquent behavior is conditioned by all of the network characteristics with the exception of network "integration" for both types of delinquency and leading crowd membership for property delinquency. This means that in older adolescence, adolescents who are "integrated" are

[33] Results available upon request from the author.

no more influenced by friends' delinquency than are "non-integrated" adolescents. A similar interpretation applies for leading crowd membership and property delinquency. Also, these models indicate that friends' delinquency is only associated with delinquency (both property and violence) when adolescents are located in dense friendship networks and have many friends. For property delinquency, respondents located in a peripheral position (i.e., who have low centrality) are unaffected by friends' delinquency (i.e., friends' delinquency is not associated with the respondent's property delinquency when centrality is low).

To better enable comparison of the effects of the interactions (peer delinquency * different network characteristics) across the stages of adolescence, graphs of the associations are examined (Figure 9, panels A-F). I focus on the relationships for violent offending, but note that the pattern of results is very similar for property offending. Beginning with membership in a leading crowd in panel A, the graph of the interaction illustrates that with moderate peer delinquency (average level of 10), in early adolescence leading crowd membership is associated with a mean violence index of 7.2, in middle adolescence with a mean index of 2.4, and in late adolescence with a mean delinquency index of 2.2. Similarly, being located in a dense friendship network (panel B) with moderate levels of peer delinquency (average level of 10) translates into a mean violence index of 2.3 in early adolescence, 1.5 in middle adolescence, and 1.2 in late adolescence. Location in a central position within the peer group (panel C) in conjunction with high peer delinquency (average level of 15) is associated with a mean violent delinquency index of 6.6 in early adolescence, 2.5 in middle adolescence, and 1.8 in late adolescence.

Having high reach in the friendship network in combination with a high peer delinquency level (average level of 15) is associated with delinquency index of 11.3 in early adolescence, 2.0 in middle adolescence, and 2.2 in late adolescence. Lastly, being classified as an "integrated" adolescent in the peer network along with high levels of peer delinquency in the peer group is associated with a mean delinquency index of 2.0 in early adolescence, 3.5 in middle adolescence, and 2.1 in late adolescence.

In sum, the graphs of the associations between the interactions and a respondent's delinquency involvement indicate that in most situations, network characteristics condition the delinquency-peer group association most strongly in early adolescence followed by a substantial association in middle and late adolescence. Despite these suggested differences, t-tests of the magnitude of the interactions across the stages of adolescence suggest very few significant differences. Thus, it is concluded that at all stages of adolescence network characteristics condition the delinquency-peer group association.

6.3.3 School Context: Early, Middle, and Late Adolescence

An examination of the role of school context finds some differences but again many similarities across adolescence. Focusing first on the variance component panel in the tables indicates that almost all of the coefficients for both violent and property delinquency are specified as fixed coefficients during early adolescence. This means that most variables associated with delinquency during early adolescence do not vary across school contexts as they were found to in previous analyses. Additionally, the variance components, including individual-level variance, are smaller than previously found

(Tables 11 and 12--where the models were unstratified by age), suggesting that there is simply less variation in delinquency during younger ages. Related to this lack of variation across school contexts, few school-level variables are associated with delinquency in early adolescence. School alienation and a school's grade point average are two exceptions. Average school alienation is associated with increased average levels of violence, whereas the school's academic orientation is associated with reduced levels of property delinquency.

Contrary to results presented for younger adolescence, more variability is found both within and between schools in delinquency during middle adolescence. This is especially true for violent behavior, where many of the variables are found to have random effects across schools (see Table 17). In terms of influencing average delinquency levels, school alienation is again found to be associated with increased average levels of violent delinquency. For property delinquency, in contrast, school characteristics are not associated with average levels of property delinquency (see Table 18). However, some school characteristics are associated with individual-level variables (cross-level interactions) in middle adolescence. For violent delinquency (Table 17), females are at greater risk of delinquent involvement in junior high schools, the percent reciprocated friendship ties reduces the positive association between age and violent delinquency, and school alienation erodes the negative association between school attachment and delinquency. For property delinquency during middle adolescence (Table 18), the only cross-level interaction is found for gender; once the overall density of the school network is accounted for, females no longer have a lower risk of property

delinquency compared to their male counterparts.

Lastly, in late adolescence patterns consistent to those presented for middle adolescence are found, with more random effects present for violent delinquency (e.g., intercept, friend involvement, friend intimacy, self-esteem, extracurricular activities, school and parental attachment) than for property delinquency (only the intercept, self-esteem, and grade point average are specified as random variables). More variation also exists at the individual level for violent delinquency than for property delinquency. In terms of the cross-level interactions for violent delinquency in late adolescence, the percent of female students in the school is associated with a reduction in the average risk of violent delinquency, as is the percent mutual friendship ties in the overall school network (e.g., sociometric network). In contrast, school alienation is once again associated with an increased risk of violent delinquency as it was in middle adolescence. School alienation also erodes the protective effect of parental attachment, and self-esteem appears to have a smaller negative association with violent behavior in schools with higher grade point averages. This finding is unexpected and suggests that self-esteem matters most in school contexts characterized by less academically-oriented atmospheres.

For property delinquency in late adolescence, the percent female in the school similarly reduces the risk of delinquent involvement, whereas the overall sex segregation of the school network is associated with increased property offending. School alienation again emerges as an important contextual element of the school environment and operates to reduce the negative association between a student's grade point average and property delinquency. School network density also reduces the negative association between

individual self-esteem and delinquency. Similar to the effect of school grade point average on self-esteem for violent delinquency, this latter result suggests that self-esteem manifests its protective ability only in school environments characterized by low academic achievement or fragmented interpersonal ties.

6.4 SUMMARY

In sum, contrary to predictions derived from developmental theory, friends' delinquency is most strongly associated with an adolescent's delinquency, both violent and property, in early adolescence rather than middle adolescence. During middle and late adolescence, while delinquent peers are less important than they were at younger ages (though still significant), network characteristics emerge as an increasingly important piece of the delinquency peer-group relationship. It is during these latter stages of adolescence that teenagers have found their position and social identity within the peer hierarchy and in which the structural characteristics of friendship groups determine whether and how friends' behavior will be associated with an adolescent's own delinquent behavior.

Despite some subtle differences, network characteristics appear to similarly condition the delinquency-peer group association across the stages of adolescence. This is reassuring since it means that characteristics of peer groups more amenable to change than peer delinquency help to determine when the peer group's behavior is most closely associated with an adolescent's own behavior during the different stages of adolescence.

Table 13. Means and Standard Deviations for Early, Middle, and Late Adolescence.

	Early Adolescence (comparison)			Middle Adolescence Late Adolescence		
Variable	Mean	St. Dev	Percent	Mean	St. Dev	Percent

Delinquency Indices									
Overall Delinquency Index			1.95	3.14	54.4%		2.63*	4.13	58.4%
	2.35*	4.04	53.9%						
Violent Delinquency Index			1.11	1.94	45.8%		1.47*	2.66	47.6%
	1.39*	2.74	43.0%						
Minor Delinquency Index			0.84	1.69	31.5%		1.16*	2.06	38.9%
	0.96*	1.86	34.2%						
Egocentric Network Variables									
Mean Friendship Delinquency Rate			4.11	2.44			5.18*	3.20	
	5.64*	3.15							
"Leading Crowd"			0.10	0.30			0.11	0.31	
	0.08*	0.31							
Centrality			0.90	0.63			0.87	0.64	
	0.76*	0.65							
Density			0.44	0.08			0.43*	0.10	
	0.42*	0.11							
Size			8.82	4.28			8.62	4.39	
	7.81*	4.21							
Reach			0.59	0.41			0.64*	0.49	
	0.54*	0.47							
"Integrated"			0.10	0.30			0.13*	0.33	
	0.11	0.37							
Control Variables									
Male			0.41	0.49			0.47*	0.50	
	0.05*	0.50							
Female			0.58	0.49			0.53*	0.49	
	0.50*	0.50							
White			0.64	0.48			0.63	0.48	
	0.60*	0.49							
Black			0.26	0.44			0.25	0.43	
	0.22*	0.41							
Other Race			0.10	0.30			0.12*	0.35	
	0.18*	0.39							
Age			11.97	0.17			14.21*	0.78	
	16.68*	0.74							
Self-esteem Index			4.02	0.43			3.89*	0.46	
	3.86*	0.45							
Importance Religion			3.19	1.03			3.08*	1.04	
	3.02*	1.05							
Two-Parent Family			0.71	0.45			0.70	0.45	
	0.76	0.46							
Public Assistance Receipt			0.08	0.27			0.07	0.26	
	0.06*	0.23							
Parent Attachment Index			4.79	0.44			4.62*	0.62	
	4.45*	0.92							
GPA			3.00	0.73			2.80*	0.76	
	2.75*	0.74							
Extracurricular Activities			2.68	2.38			2.37*	2.17	
	2.06*	2.07							
School Attachment Index			3.95	0.76			3.82*	0.83	
	3.70*	0.89							
Friends Attachment Index			4.26	0.79			4.25	0.79	
	4.25	0.82							
Friend Involvement			1.89	1.03			1.97*	0.99	
	2.00*	0.97							
Friend Intimacy			10.01	8.31			12.87*	9.41	
	14.48*	9.98							

*Asterisks indicate a significant mean difference between the different age categories compared to early adolescence.

Early adolescence (n=1,017) are those ages 11-12; Middle adolescence (n=6,146) are those between the ages of 13-15; Late adolescence (n=5,585) are those aged 16 and older.

Table 14. Base Models Comparing Early, Middle, and Late Adolescence by Violent and Property Delinquency: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Panel A. Early Adolescence

	Violent Delinquency			Property Delinquency		
	Coeff.		Exp.	Coeff.		Exp.
Intercept (Average Delinquency)	0.27	(0.11)	1.31	-0.22ns	(0.15)	0.80
Friends' Delinquency	**0.08**	**(0.01)**	**1.08**	**0.11**	**(0.02)**	**1.12**
Control Variables						
Black	0.25	(0.11)	1.28	-0.01ns	(0.15)	0.99
Other Race (non-white)	-0.11ns	(0.13)	0.90	0.24ns	(0.15)	1.27
Female	-0.68	(0.09)	0.51	-0.32	(0.11)	0.73
Age	0.30ns	(0.30)	1.35	0.68ns	(0.41)	1.97
Grade Point Average	-0.35	(0.06)	0.70	-0.16	(0.07)	0.85
Friend Attachment	-0.10ns	(0.06)	0.90	-0.09ns	(0.07)	0.91
Friend Involvement	0.14	(0.04)	1.15	0.24	(0.06)	1.27
Friend Intimacy	0.03	(0.00)	1.03	0.04	(0.01)	1.04
Two-Parent Family	-0.13ns	(0.10)	0.88	-0.13ns	(0.12)	0.88
Public Assistance	0.28ns	(0.15)	1.32	-0.12ns	(0.21)	0.89
Parent Attachment Index	-0.24	(0.08)	0.79	-0.09ns	(0.09)	0.91
Self-esteem Index	-0.26	(0.10)	0.77	-0.54	(0.11)	0.58
Importance Religion	-0.10	(0.04)	0.90	-0.12	(0.05)	0.89
School Attachment Index	-0.14	(0.07)	0.87	-0.10ns	(0.09)	0.90
Extracurricular Activities	-0.00ns	(0.02)	1.00	-0.02ns	(0.02)	0.98

Panel B. Middle Adolescence (compared to young adolescence)

	Violent Delinquency				Property Delinquency			
	Coeff.		Exp.	t-value	Coeff.	Exp.		t-value
Intercept (Average Delinquency)	0.50	(0.05)	1.64	1.90	0.13	(0.06)	1.13	2.17
Friends' Delinquency	**0.04**	**(0.01)**	**1.04**	**2.83**	**0.03**	**(0.01)**	**1.03**	**3.58**
Control Variables								
Black	0.33	(0.05)	1.39	0.66	-0.01ns	(0.06)	0.99	0.00
Other Race (non-white)	0.25	(0.05)	1.28	2.58	0.19	(0.05)	1.21	0.31
Female	-0.72	(0.05)	0.49	0.39	-0.51	(0.05)	0.60	1.57
Age	-0.08	(0.03)	0.92	1.26	-0.13	(0.03)	0.88	1.97
Grade Point Average	-0.35	(0.03)	0.70	0.00	-0.20	(0.03)	0.81	0.53
Friend Attachment	-0.03ns	(0.03)	0.97	1.04	-0.10ns	(0.03)	0.90	0.13
Friend Involvement	0.13	(0.03)	1.14	0.20	0.15	(0.02)	1.16	1.42
Friend Intimacy	0.02	(0.00)	1.02	7.07	0.02	(0.00)	1.02	1.99
Two-Parent Family	-0.17	(0.04)	0.84	0.37	0.05ns	(0.05)	1.05	1.38
Public Assistance	0.11ns	(0.06)	1.12	1.05	-0.03ns	(0.08)	0.97	0.40
Parent Attachment Index	-0.15	(0.03)	0.86	1.05	-0.19	(0.03)	0.83	1.05
Self-esteem Index	-0.15	(0.04)	0.86	1.02	-0.26	(0.04)	0.77	2.39
Importance Religion	-0.03	(0.02)	0.97	1.57	-0.11	(0.02)	0.90	0.19
School Attachment Index	-0.23	(0.03)	0.79	1.18	-0.20	(0.02)	0.82	1.08
Extracurricular Activities	0.01ns	(0.01)	1.01	0.49	0.01	(0.01)	1.01	1.34

Table 14 cont.

Panel C. Late Adolescence (compared to middle adolescence)

	Violent Delinquency				Property Delinquency			
	Coeff.		Exp.	t-value	Coeff.		Exp.	t-value
Intercept (Average Delinquency)	0.45	(0.05)	1.57	0.71	0.07ns	(0.06)	1.07	0.71
Friends' Delinquency	**0.04**	**(0.00)**	**1.04**	**0.00**	**0.02**	**(0.01)**	**1.02**	**0.71**
Control Variables								
Black	0.42	(0.05)	1.52	1.27	0.07ns	(0.06)	1.07	0.94
Other Race (non-white)	0.32	(0.05)	1.38	0.99	0.22	(0.05)	1.25	0.42
Female	-0.89	(0.04)	0.41	2.65	-0.58	(0.04)	0.56	1.09
Age	-0.07	(0.02)	0.93	0.28	-0.15	(0.02)	0.86	0.55
Grade Point Average	-0.36	(0.03)	0.70	0.24	-0.20	(0.03)	0.82	0.00
Friend Attachment -0.03ns	(0.02)	0.97	0.00	-0.03ns	(0.02)	0.97	1.94	
Friend Involvement	0.20	(0.03)	1.22	1.65	0.19	(0.02)	1.21	1.41
Friend Intimacy	0.02	(0.00)	1.02	0.00	0.02	(0.00)	1.02	0.00
Two-Parent Family	-0.14	(0.04)	0.87	0.53	0.03ns	(0.04)	1.03	0.31
Public Assistance	0.16	(0.07)	1.17	0.54	-0.13ns	(0.09)	0.88	0.83
Parent Attachment Index	-0.12	(0.02)	0.89	0.83	-0.10	(0.02)	0.90	2.50
Self-esteem Index	-0.14	(0.05)	0.87	0.16	-0.16	(0.06)	0.85	1.39
Importance Religion	-0.02	(0.02)	0.98	0.35	-0.10	(0.02)	0.90	0.35
School Attachment Index	-0.21	(0.03)	0.81	0.47	-0.17	(0.02)	0.84	1.06
Extracurricular Activities	-0.00ns	(0.01)	1.00	1.06	0.02	(0.01)	1.02	0.71

All continuous variables have been centered around their group means.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal >$50, and burglarize.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 15. Early Adolescence: Network Interaction Models of Violent Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	**Model 1 Leading Crowd** Coeff.	Exp	**Model 2 Density** Coeff.	Exp.	**Model 3 Centrality** Coeff.	Exp.
Intercept (Average Delinq.)	1.51 (0.78)	0.22	-1.49ns (0.79)	0.23	-1.47ns (0.79)	0.23
School Alienation	*0.86 (0.37)*	*2.36*	*0.83 (0.37)*	*2.29*	*0.82 (0.37)*	*2.27*
Friends' Delinquency (Minor Delinquency)	**0.08 (0.01)**	**1.08**	**0.07 (0.03)**	**1.07**	**0.06 (0.02)**	**1.06**
Network Characteristic	**-0.26ns (0.40)**	**0.77**	**-0.93ns (0.94)**	**0.39**	**-0.38 (0.15)**	**0.68**
Interaction (Network Characteristic* Friends' Delinquency)	**0.10ns (0.08)**	**0.90**	**0.07ns (0.18)**	**1.07**	**0.05ns (0.03)**	**1.05**
Control Variables						
Black	0.28 (0.11)	1.32	0.26 (0.11)	1.30	0.27 (0.11)	1.31
Other Race (non-white)	-0.11ns (0.13)	0.90	-0.11ns (0.13)	0.90	-0.11ns (0.13)	0.90
Female	-0.68 (0.09)	0.51	-0.66 (0.10)	0.52	-0.66 (0.09)	0.52
Age	0.34ns (0.29)	1.40	0.34ns (0.30)	1.40	0.32ns (0.29)	1.38
Friend Attachment	0.08ns (0.06)	1.08	0.09ns (0.06)	1.09	0.08ns (0.06)	1.08
Friend Involvement	0.14 (0.04)	1.15	0.14 (0.04)	1.15	0.13 (0.04)	1.14
Friend Intimacy	0.02 (0.00)	1.02	0.03 (0.01)	1.03	0.03 (0.00)	1.03
Two-Parent Family	-0.12ns (0.10)	0.89	-0.12ns (0.10)	0.89	-0.12ns (0.10)	0.89
Public Assistance	0.26ns (0.15)	1.30	0.27ns (0.15)	1.31	0.26ns (0.15)	1.30
Parent Attachment Index	-0.24 (0.08)	0.79	-0.24 (0.08)	0.79	-0.24 (0.08)	0.79
Self-esteem Index	-0.26 (0.10)	0.77	-0.26 (0.10)	0.77	-0.25 (0.10)	0.78
Importance Religion	-0.11 (0.04)	0.90	-0.10 (0.04)	0.90	-0.10 (0.04)	0.90
Grade Point Average	-0.32 (0.06)	0.73	-0.33 (0.06)	0.72	-0.32 (0.06)	0.73
School Attachment Index	-0.13ns (0.07)	0.88	-0.13ns (0.07)	0.88	-0.13 (0.07)	0.88
Extracurricular Activities	-0.01ns (0.01)	0.99	-0.00ns (0.02)	1.00	0.00ns (0.01)	1.00
Random Effects	**Variance Component** Model 1		**Variance Component** Model 2		**Variance Component** Model 3	

Intercept (mean delinq.)	0.065	(p=.004)	0.065	(p=.006)	0.069	(p=.003)
School Attachment slope	0.060	(p=.019)	0.061	(p=.023)	0.052	(p=.036)
Level-1 (within school)	1.991		2.000		1.972	

All continuous variables have been centered around their group means.
n=1,017 adolescents.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 15 cont.

Network Characteristic	Model 4 Reach Coeff.	Exp.	Model 5 Size Coeff.	Exp.	Model 6 Integrated Coeff.	Exp.
Intercept (Average Delinquency)	1.55 (0.78)	0.21	-1.45ns (0.78)	0.23	-1.57 (0.79)	0.21
School Alienation	*0.85 (0.37)*	*2.34*	*0.81 (0.37)*	*2.25*	*0.87 (0.37)*	*2.39*
Friends' Delinquency (Minor Delinquency)	**0.05 (0.02)**	**1.05**	**0.05 (0.03)**	**1.05**	**0.08 (0.01)**	**1.08**
Network Characteristic	**-0.69 (0.24)**	**0.50**	**-0.03ns (0.02)**	**0.97**	**-0.17ns (0.37)**	**0.84**
Interaction (Network Characteristic* Friends' Delinquency)	**0.11 (0.04)**	**1.12**	**0.01ns (0.00)**	**1.01**	**-0.04ns (0.07)**	**0.96**
Control Variables						
Black	0.28 (0.11)	1.32	0.28 (0.11)	1.32	0.26 (0.11)	1.30
Other Race (non-white)	-0.11ns (0.13)	0.90	-0.11ns (0.13)	0.90	-0.11ns (0.13)	0.90
Female	-0.66 (0.09)	0.52	-0.67 (0.10)	0.51	-0.67 (0.09)	0.51
Age	0.33ns (0.29)	1.39	0.33ns (0.30)	1.39	0.33ns (0.30)	1.39
Friend Attachment	0.08ns (0.06)	1.08	0.08ns (0.06)	1.08	0.09ns (0.06)	1.09
Friend Involvement	0.14 (0.04)	1.05	0.14 (0.05)	1.15	0.13 (0.04)	1.14
Friend Intimacy	0.03 (0.00)	1.03	0.02 (0.00)	1.02	0.02 (0.00)	1.02
Two-Parent Family	-0.10ns (0.10)	0.90	-0.12ns (0.10)	0.89	-0.12ns (0.10)	0.89
Public Assistance	0.26ns (0.15)	1.30	0.26ns (0.15)	1.30	0.28ns (0.15)	1.32
Parent Attachment Index	-0.22 (0.08)	0.80	-0.24 (0.08)	0.79	-0.24 (0.08)	0.79
Self-esteem Index	-0.28 (0.10)	0.76	-0.26 (0.10)	0.77	-0.26 (0.10)	0.77
Importance Religion	-0.10 (0.04)	0.90	-0.10 (0.04)	0.90	-0.10 (0.04)	0.90
Grade Point Average	-0.32 (0.06)	0.73	-0.33 (0.06)	0.72	-0.34 (0.06)	0.71
School Attachment Index	-0.14 (0.07)	0.87	-0.13ns (0.07)	0.88	-0.13ns (0.07)	0.88
Extracurricular Activities	-0.00ns (0.01)	1.00	-0.00ns (0.01)	1.00	-0.00ns (0.02)	1.00
Random Effects	**Variance Component**		**Variance Component**		**Variance Component**	

	Model 4	Model 5	Model 6
Intercept (mean delinq.)	0.071 (p=.003)	0.063 (p=.006)	0.066 (p=.004)
School Attachment slope	0.047 (p=.048)	0.060 (p=.026)	0.063 (p=.018)
Level-1 (within school)	1.974	2.011	2.004

All continuous variables have been centered around group means.
n=1,017 adolescents.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 16. Early Adolescence: Network Interaction Models of Property Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	Model 1 Leading Crowd Coeff.	Exp.	Model 2 Density Coeff.	Exp.	Model 3 Centrality Coeff.	Exp.
Intercept (Average Delinquency)	2.42 (1.12)	11.24	2.26 (1.11)	9.58	2.16 (1.08)	8.67
School GPA	*-0.90 (0.38)*	*0.41*	*-0.85 (0.38)*	*0.43*	*-0.85 (0.37)*	*0.43*
Friends' Delinquency (Minor Delinquency)	**0.11 (0.02)**	**1.12**	**0.09 (0.03)**	**1.09**	**0.08 (0.02)**	**1.08**
Network Characteristic	**-0.31ns (0.49)**	**0.73**	**-0.54ns (1.05)**	**0.58**	**-0.40 (0.18)**	**0.67**
Interaction (Network Characteristic* Friends' Delinquency)	**0.09ns (0.09)**	**1.09**	**0.20ns (0.20)**	**1.22**	**0.07 (0.03)**	**1.07**
Control Variables						
Black	-0.04ns (0.15)	0.96	-0.04ns (0.15)	0.96	-0.03ns (0.15)	0.97
Other Race (non-white)	0.22ns (0.15)	1.25	0.24ns (0.15)	1.27	0.23ns (0.15)	1.26
Female	-0.33 (0.11)	0.72	-0.32 (0.11)	0.73	-0.31 (0.11)	0.73
Age	0.72 (0.41)	2.05	0.67ns (0.41)	1.95	0.63ns (0.41)	1.88
Friend Attachment	0.08ns (0.07)	1.08	0.07ns (0.07)	1.07	0.07ns (0.07)	1.07
Friend Involvement	0.24 (0.06)	1.27	0.24 (0.06)	1.27	0.24 (0.06)	1.27
Friend Intimacy	0.04 (0.01)	1.04	0.03 (0.01)	1.03	0.03 (0.01)	1.03
Two-Parent Family	-0.12ns (0.12)	0.89	-0.12ns (0.12)	0.89	-0.12ns (0.12)	0.89
Public Assistance	0.14ns (0.21)	1.15	0.15ns (0.21)	1.16	-0.15ns (0.20)	0.86
Parent Attachment Index	-0.12ns (0.10)	0.89	-0.12ns (0.09)	0.89	-0.12ns (0.09)	0.89
Self-esteem Index	-0.53 (0.11)	0.59	-0.54 (0.11)	0.58	-0.53 (0.11)	0.59
Importance Religion	-0.13 (0.05)	0.88	-0.12 (0.05)	0.89	-0.13 (0.05)	0.88
Grade Point Average	-0.11ns (0.08)	0.90	-0.12ns (0.07)	0.89	-0.11ns (0.07)	0.90
School Attachment Index	-0.10ns (0.07)	0.90	-0.10 (0.07)	0.90	-0.09ns (0.07)	0.91
Extracurricular Activities	0.02ns (0.02)	1.02	0.01ns (0.02)	1.01	-0.01ns (0.02)	1.01

Random Effects	Variance Component		Variance Component		Variance Component	
	Model 1		Model 2		Model 3	
Intercept (mean delinq.)	0.131	(p=.000)	0.127	(p=.000)	0.115	(p=.000)
Level-1 (within school)	2.295		2.288		2.265	

All continuous variables have been centered around their group means.
n=1,017 adolescents.
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal >$50, and burglarize.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 16 cont.

Network Characteristic	Model 4 Reach Coeff.		Exp.	Model 5 Size Coeff.		Exp.	Model 6 Integrated Coeff.		Exp.
Intercept (Average Delinquency)	1.92ns	(1.07)	6.82	2.13	(1.10)	8.41	2.32	(1.11)	10.18
School GPA	*-0.75*	*(0.37)*	*0.47*	*-0.82*	*(0.38)*	*0.44*	*-0.86*	*(0.38)*	*0.42*
Friends' Delinquency (Minor Delinquency)	**0.06**	**(0.02)**	**1.06**	**0.07**	**(0.03)**	**1.07**	**0.10**	**(0.02)**	**0.90**
Network Characteristic	**-1.20**	**(0.30)**	**0.30**	**-0.05ns**	**(0.02)**	**0.95**	**-0.48ns**	**(0.42)**	**0.62**
Interaction (Network Characteristic* Friends' Delinquency)	**0.19**	**(0.05)**	**1.21**	**0.01ns**	**(0.00)**	**1.01**	**0.12ns**	**(0.08)**	**1.13**
Control Variables									
Black	-0.02ns	(0.15)	0.98	-0.02ns	(0.15)	0.98	-0.03ns	(0.15)	0.97
Other Race (non-white)	0.23ns	(0.15)	1.26	0.23ns	(0.15)	1.26	0.23ns	(0.15)	1.26
Female	-0.29	(0.11)	0.75	-0.31	(0.11)	0.73	-0.33	(0.11)	0.72
Age	0.66ns	(0.40)	1.93	0.69ns	(0.41)	1.99	0.66ns	(0.41)	1.93
Friend Attachment	0.05ns	(0.07)	1.05	0.07ns	(0.07)	1.07	0.08ns	(0.07)	1.08
Friend Involvement	0.24	(0.06)	1.27	0.24	(0.06)	1.27	0.24	(0.06)	1.27
Friend Intimacy	0.03	(0.01)	1.03	0.04	(0.01)	1.04	0.04	(0.01)	1.04
Two-Parent Family	-0.11ns	(0.12)	0.90	-0.11ns	(0.12)	0.90	-0.11ns	(0.12)	0.90
Public Assistance	0.15ns	(0.20)	1.16	-0.15ns	(0.21)	0.86	-0.17ns	(0.21)	0.84
Parent Attachment Index	-0.09ns	(0.10)	0.91	-0.12ns	(0.09)	0.89	-0.12ns	(0.09)	0.89
Self-esteem Index	-0.55	(0.11)	0.58	-0.53	(0.11)	0.53	-0.53	(0.11)	0.53
Importance Religion	-0.13	(0.05)	0.88	-0.12	(0.05)	0.89	-0.13	(0.05)	0.88
Grade Point Average	-0.10ns	(0.07)	0.90	-0.11ns	(0.08)	0.90	-0.12	(0.07)	0.89
School Attachment Index	-0.10ns	(0.07)	0.90	-0.09ns	(0.07)	0.91	-0.09ns	(0.07)	0.91
Extracurricular Activities	-0.00ns	(0.02)	1.00	-0.01ns	(0.02)	0.99	0.02ns	(0.02)	1.02

Random Effects	Variance Component	Variance Component	Variance Component
	Model 4	Model 5	Model 6

Intercept (mean delinq.)	0.107	(p=.002)	0.119	(p=.000)	0.130	(p=.000)
Level-1 (within school)	2.260		2.286		2.257	

__All continuous variables have been centered around group means.
n=1,017
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal >$50, and burglarize.
All variables are significant at p < .05 unless noted in table (ns).

Table 17. Middle Adolescence: Network Interaction

Models of Violent Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	Model 1 Leading Crowd Coeff.		Exp.	Model 2 Density Coeff.		Exp.	Model 3 Centrality Coeff.		Exp.
Intercept (Average Delinquency)	**-0.27ns**	**(0.42)**	**0.76**	**-0.29ns**	**(0.43)**	**0.75**	**-0.34ns**	**(0.42)**	**0.71**
School Alienation	***0.38***	***(0.20)***	***1.46***	***0.37***	***(0.20)***	***1.45***	***0.39***	***(0.20)***	***1.48***
Friends' Delinquency (Minor Delinquency)	**0.04**	**(0.01)**	**1.04**	**0.01ns**	**(0.01)**	**1.01**	**0.03**	**(0.01)**	**1.03**
Network Characteristic	**-0.26ns**	**(0.15)**	**0.77**	**-1.82**	**(0.43)**	**0.16**	**-0.34**	**(0.06)**	**0.71**
Interaction (Network Characteristic* Friends' Delinquency)	**0.05**	**(0.02)**	**1.05**	**0.22**	**(0.06)**	**1.25**	**0.03**	**(0.01)**	**1.03**
Control Variables									
Black	0.34	(0.05)	1.40	0.33	(0.05)	1.36	0.31	(0.05)	1.36
Other Race (non-white)	0.26	(0.05)	1.30	0.26	(0.05)	1.30	0.26	(0.05)	1.30
Female	-0.84	(0.06)	0.43	-0.84	(0.06)	0.43	-0.85	(0.06)	0.43
Junior High School	*0.41*	*(0.08)*	*1.51*	*0.41*	*(0.08)*	*1.51*	*0.41*	*(0.08)*	*1.51*
Age	0.44ns	(0.23)	1.55	0.46	(0.24)	1.58	0.41ns	(0.24)	1.51
Mutual Friendship Ties	*-1.39*	*(0.62)*	*0.25*	*-1.37*	*(0.63)*	*0.25*	*-1.26*	*(0.63)*	*0.26*
Friend Attachment	0.03ns	(0.03)	1.03	0.04ns	(0.03)	1.04	0.03ns	(0.03)	1.03
Friend Involvement	0.13	(0.03)	1.14	0.13	(0.03)	1.14	0.13	(0.03)	1.14
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	1.02	0.02	(0.00)	1.02
Two-Parent Family	-0.17	(0.04)	0.84	-0.17	(0.04)	0.84	-0.16	(0.04)	0.85
Public Assistance	0.11ns	(0.06)	1.12	0.11ns	(0.06)	1.12	0.11ns	(0.06)	1.12
Parent Attachment Index	-0.14	(0.03)	0.87	-0.14	(0.02)	0.87	-0.14	(0.03)	0.87
Self-esteem Index	-0.15	(0.04)	0.86	-0.15	(0.04)	0.86	-0.15	(0.04)	0.86
Importance Religion	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97
Grade Point Average	-0.14ns	(0.09)	0.87	-0.14ns	(0.09)	0.87	-0.13ns	(0.09)	0.88
School Attachment Index	-1.16	(0.33)	0.31	-1.12	(0.33)	0.33	-1.09	(0.32)	0.34
School Alienation	*0.44*	*(0.15)*	*1.55*	*0.42*	*(0.15)*	*1.52*	*0.41*	*(0.15)*	*1.51*
Extracurricular Activities	0.01ns	(0.01)	1.01	0.01ns	(0.01)	1.01	0.02ns	(0.01)	1.02

Random Effects	Variance Component Model 1		Variance Component Model 2		Variance Component Model 3	
Intercept (mean delinq.)	0.090	(p=.000)	0.090	(p=.000)	0.086	(p=.000)

Female slope	0.087	(p=.007)	0.084	(p=.010)	0.089	(p=.005)
Age slope	0.017	(p=.009)	0.018	(p=.009)	0.020	(p=.007)
Friends' Delinquency slope	0.001	(p=.014)	0.001	(p=.013)	0.001	(p=.016)
Friend Attachment slope	0.028	(p=.006)	0.030	(p=.006)	0.031	(p=.004)
Friend Involvement slope	0.029	(p=.001)	0.028	(p=.001)	0.030	(p=.000)
School Attachment slope	0.027	(p=.001)	0.027	(p=.002)	0.026	(p=.002)
Grade Point Average slope	0.030	(p=.007)	0.031	(p=.005)	0.033	(p=.003)
Level-1 (within school)	2.663		2.659		2.618	

All continuous variables have been centered around their group means.
n=6,146 adolescents.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 17 cont.

Network Characteristic	Model 4 Reach Coeff.		Exp.	Model 5 Size Coeff.		Exp.	Model 6 Integrated Coeff.		Exp.
Intercept (Average Delinquency)	-0.57ns	(0.42)	0.57	-0.24ns	(0.43)	0.79	-0.28ns	(0.42)	0.73
School Alienation	*0.50*	*(0.20)*	*1.65*	*0.35*	*(0.20)*	*1.42*	*0.39*	*(0.20)*	*1.48*
Friends' Delinquency (Minor Delinquency)	**0.02**	**(0.01)**	**1.02**	**0.01ns**	**(0.01)**	**1.01**	**0.04**	**(0.01)**	**1.04**
Network Characteristic	**-0.50**	**(0.08)**	**0.61**	**-0.04**	**(0.01)**	**0.96**	**-0.35**	**(0.13)**	**0.70**
Interaction (Network Characteristic* Friends' Delinquency)	**0.04**	**(0.01)**	**1.04**	**0.01**	**(0.00)**	**1.01**	**0.05**	**(0.02)**	**1.05**
Control Variables									
Black	0.31	(0.05)	1.36	0.34	(0.05)	1.40	0.33	(0.05)	1.36
Other Race (non-white)	0.25	(0.05)	1.28	0.27	(0.05)	1.31	0.26	(0.05)	1.30
Female	-0.84	(0.06)	0.43	-0.85	(0.06)	0.43	-0.84	(0.06)	0.43
Junior High School	*0.38*	*(0.08)*	*1.46*	*0.42*	*(0.08)*	*1.52*	*0.41*	*(0.08)*	*1.51*
Age	0.38ns	(0.23)	1.46	0.40ns	(0.23)	1.49	0.45	(0.23)	1.57
Mutual Friendship Ties	*-1.17ns*	*(0.62)*	*0.31*	*-1.23*	*(0.62)*	*0.29*	*-1.33*	*(0.62)*	*0.26*
Friend Attachment	0.03ns	(0.03)	1.03	0.03ns	(0.03)	1.03	0.03ns	(0.03)	1.03
Friend Involvement	0.13	(0.03)	1.14	0.13	(0.03)	1.14	0.13	(0.03)	1.14
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	1.02	0.02	(0.00)	1.02
Two-Parent Family	-0.15	(0.04)	0.86	-0.17	(0.04)	0.84	-0.17	(0.04)	0.84
Public Assistance	0.10ns	(0.06)	1.11	0.10ns	(0.06)	1.11	0.11ns	(0.06)	1.12
Parent Attachment Index	-0.14	(0.03)	0.87	-0.14	(0.03)	0.87	-0.14	(0.03)	0.87
Self-esteem Index	-0.16	(0.04)	0.85	-0.15	(0.04)	0.86	-0.15	(0.04)	0.86
Importance Religion	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97
Grade Point Average	-0.14ns	(0.09)	0.87	-0.16ns	(0.09)	0.85	-0.15ns	(0.09)	0.86
School Attachment Index	-1.19	(0.32)	0.30	-1.16	(0.33)	0.31	-1.17	(0.33)	0.31
School Alienation	*0.45*	*(0.15)*	*1.57*	*0.43*	*(0.15)*	*1.54*	*0.44*	*(0.15)*	*1.55*
Extracurricular Activities	0.01ns	(0.01)	1.01	0.01ns	(0.01)	1.01	0.01ns	(0.01)	1.01

Random Effects	**Variance Component** Model 4		**Variance Component** Model 5		**Variance Component** Model 6	
Intercept (mean delinq.)	0.090	(p=.000)	0.085	(p=.000)	0.089	(p=.000)

Female slope	0.091	(p=.004)	0.082	(p=.029)	0.087	(p=.063)
Age slope	0.019	(p=.011)	0.017	(p=.016)	0.017	(p=.010)
Friends' Delinquency slope	0.001	(p=.035)	0.001	(p=.018)	0.001	(p=.006)
Friend Attachment slope	0.030	(p=.005)	0.030	(p=.007)	0.029	(p=.006)
Friend Involvement slope	0.030	(p=.000)	0.029	(p=.001)	0.029	(p=.001)
School Attachment slope	0.025	(p=.002)	0.028	(p=.003)	0.027	(p=.001)
Grade Point Average slope	0.033	(p=.003)	0.033	(p=.002)	0.030	(p=.005)
Level-1 (within school)	2.626		2.600		2.662	

All continuous variables have been centered around group means.
n=6,146 adolescents.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 18. Middle Adolescence: Network Interaction Models of Property Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	Model 1 Leading Crowd Coeff.		Exp	Model 2 Density Coeff.		Exp.	Model 3 Centrality Coeff.		Exp.
Intercept (Average Delinquency)	0.15	(0.06)	1.16	0.14	(0.06)	1.15	0.14	(0.06)	1.15
Friends' Delinquency (Minor Delinquency)	**0.03**	**(0.01)**	**1.03**	**-0.01ns**	**(0.01)**	**0.99**	**0.01ns**	**(0.01)**	**1.01**
Network Characteristic	**-0.11ns**	**(0.17)**	**0.90**	**-1.49**	**(0.45)**	**0.23**	**-0.23**	**(0.07)**	**0.79**
Interaction (Network Characteristic* Friends' Delinquency)	**0.03ns**	**(0.03)**	**1.03**	**0.31**	**(0.06)**	**1.36**	**0.04**	**(0.01)**	**1.04**
Control Variables									
Black	-0.03ns	(0.06)	0.97	-0.02ns	(0.06)	0.93	-0.03ns	(0.06)	0.97
Other Race (non-white)	0.18	(0.05)	1.20	0.19ns	(0.05)	1.12	0.18	(0.05)	1.20
Female	0.17ns	(0.20)	1.19	0.19ns	(0.20)	1.11	0.18ns	(0.20)	1.20
School Network Density	*-0.97*	*(0.29)*	*0.38*	*-1.02*	*(0.28)*	*0.47*	*-1.03*	*(0.29)*	*0.36*
Age	-0.14	(0.04)	0.87	-0.14	(0.03)	1.02	-0.14	(0.03)	0.87
Friend Attachment	0.01ns	(0.03)	1.01	0.01ns	(0.03)	1.05	0.01ns	(0.03)	1.01
Friend Involvement	0.15	(0.02)	1.16	0.15	(0.02)	1.15	0.15	(0.02)	1.06
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	1.02	0.02	(0.00)	1.02
Two-Parent Family	-0.05ns	(0.05)	0.95	-0.05ns	(0.05)	0.99	-0.05ns	(0.05)	0.95
Public Assistance	0.03ns	(0.08)	1.03	0.02ns	(0.08)	1.04	-0.03ns	(0.08)	0.97
Parent Attachment Index	-0.18	(0.03)	0.84	-0.18	(0.03)	0.85	-0.19	(0.03)	0.83
Self-esteem Index	-0.26	(0.04)	0.77	-0.26	(0.04)	0.73	-0.25	(0.04)	0.79
Importance Religion	-0.11	(0.02)	0.90	-0.11	(0.02)	0.90	-0.11	(0.02)	0.90
School Attachment Index	-0.20	(0.02)	0.82	-0.20	(0.02)	0.84	-0.20	(0.02)	0.82
Extracurricular Activities	0.01ns	(0.01)	1.01	0.01ns	(0.01)	1.01	0.01ns	(0.01)	1.01
Random Effects	**Variance Component**			**Variance Component**			**Variance Component**		

	Model 1		Model 2		Model 3	
Intercept (mean delinq.)	0.068	(p=.000)	0.068	(p=.000)	0.062	(p=.000)
Female slope	0.068	(p=.013)	0.066	(p=.013)	0.069	(p=.013)
Parent Attachment slope	0.009	(p=.054)	0.008	(p=.063)	0.010	(p=.077)
Level-1 (within school)	2.652		2.781		2.788	

All continuous variables have been centered around their group means.
n=6,146 adolescents.
Property delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal > $50, and burglarize.

All variables are significant at $p < .05$ unless noted in table (ns).

Table 18. cont.

Network Characteristic	Model 4 Reach Coeff.		Exp.	Model 5 Size Coeff.		Exp.	Model 6 Integrated Coeff.		Exp.
Intercept (Average Delinquency)	0.14	(0.06)	1.15	0.14	(0.06)	1.15	0.15	(0.06)	1.16
Friends' Delinquency (Minor Delinquency)	**0.01**ns	**(0.01)**	**1.01**	**0.00**ns	**(0.01)**	**1.00**	**0.03**	**(0.01)**	**1.03**
Network Characteristic	**-0.36**	**(0.09)**	**0.70**	**-0.03**	**(0.01)**	**0.97**	**-0.10**ns	**(0.13)**	**0.90**
Interaction (Network Characteristic* Friends' Delinquency)	**0.04**	**(0.01)**	**1.04**	**0.01**	**(0.00)**	**1.01**	**0.03**ns	**(0.02)**	**1.03**
Control Variables									
Black	-0.04ns	(0.06)	0.96	-0.02ns	(0.06)	0.98	-0.03ns	(0.06)	0.97
Other Race (non-white)	0.17	(0.05)	1.19	0.18	(0.05)	1.20	0.18	(0.05)	1.20
Female	0.11ns	(0.21)	1.12	0.10ns	(0.24)	0.90	0.17ns	(0.20)	1.19
School Network Density	*-0.90*	*(0.29)*	*0.41*	*-0.17*ns	*(0.20)*	*0.84*	*-0.97*	*(0.29)*	*0.38*
Age	-0.14	(0.03)	0.87	-0.14	(0.03)	0.87	-0.14	(0.03)	0.87
Friend Attachment	0.01ns	(0.03)	1.01	0.01ns	(0.03)	1.01	0.01ns	(0.03)	1.01
Friend Involvement	0.15	(0.02)	1.16	0.15	(0.02)	1.16	0.15	(0.02)	1.16
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	1.02	0.02	(0.00)	1.02
Two-Parent Family	-0.06ns	(0.05)	0.94	0.05ns	(0.05)	1.05	0.05ns	(0.05)	1.05
Public Assistance	-0.04ns	(0.08)	0.96	-0.03ns	(0.08)	0.97	-0.03ns	(0.08)	0.97
Parent Attachment Index	-0.18	(0.03)	0.84	-0.18	(0.03)	0.84	-0.18	(0.03)	0.84
Self-esteem Index	-0.26	(0.04)	0.77	-0.26	(0.04)	0.77	-0.25	(0.04)	0.77
Importance Religion	-0.11	(0.02)	0.90	-0.11	(0.02)	0.90	-0.11	(0.02)	0.90
School Attachment Index	-0.20	(0.02)	0.82	-0.20	(0.02)	0.82	-0.20	(0.02)	0.82
Extracurricular Activities	0.01ns	(0.01)	1.01	0.01ns	(0.01)	1.01	0.01ns	(0.01)	1.01

Random Effects	**Variance Component** Model 4		**Variance Component** Model 5		**Variance Component** Model 6	
Intercept (mean delinq.)	0.066	(p=.000)	0.066	(p=.000)	0.066	(p=.000)

Female slope	0.071	(p=.011)	0.066	(p=.015)	0.069	(p=.012)
Parent Attachment slope	0.010	(p=.078)	0.010	(p=.071)	0.010	(p=.049)
Level-1 (within school)	2.781		2.787		2.804	

All continuous variables have been centered around group means.
n=6,146 adolescents.
Property delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal > $50, and burglarize.

All variables are significant at $p < .05$ unless noted in table (ns).

Table 19. Late Adolescence: Network Interaction Models of Violent Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	**Model 1 Leading Crowd** Coeff.		Exp	**Model 2 Density** Coeff.		Exp.	**Model 3 Centrality** Coeff.		Exp.
Intercept (Average Delinquency)	1.89	(0.56)	6.62	2.00	(0.60)	7.39	1.91	(0.61)	6.75
% Female in School	*-0.03*	*(0.01)*	*0.97*	*-0.03*	*(0.01)*	*0.97*	*-0.03*	*(0.01)*	*0.97*
Mutual Friendship Ties	*-1.22ns*	*(0.70)*	*0.30*	*-1.58*	*(0.73)*	*0.21*	*-1.65*	*(0.74)*	*0.19*
School Alienation	*0.50*	*(0.15)*	*1.65*	*0.50*	*(0.16)*	*1.65*	*0.51*	*(0.17)*	*1.66*
Friends' Delinquency (Minor Delinquency)	**0.04**	**(0.00)**	**1.04**	**-0.00ns**	**(0.01)**	**1.00**	**0.02**	**(0.01)**	**1.02**
Network Characteristic	**-0.32**	**(0.16)**	**0.73**	**-3.40**	**(0.44)**	**0.03**	**-0.42**	**(0.06)**	**0.66**
Interaction (Network Characteristic* Friends' Delinquency)	**0.04**	**(0.02)**	**1.04**	**0.31**	**(0.06)**	**1.36**	**0.03**	**(0.01)**	**1.03**
Control Variables									
Black	0.41	(0.05)	1.51	0.40	(0.05)	1.49	0.38	(0.05)	1.46
Other Race (non-white)	0.32	(0.05)	1.38	0.32	(0.05)	1.38	0.32	(0.05)	1.38
Female -0.89	(0.04)	0.41	-0.87	(0.04)	0.42	-0.88	(0.04)	0.41	
Age	-0.07	(0.02)	0.93	-0.07	(0.01)	0.93	-0.08	(0.02)	0.92
Friend Attachment	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97
Friend Involvement	0.20	(0.03)	1.22	0.20	(0.03)	1.22	0.20	(0.03)	1.22
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	0.88	0.02	(0.00)	1.02
Two-Parent Family	-0.14	(0.04)	0.87	-0.13	(0.04)	0.88	-0.13	(0.04)	0.88
Public Assistance	0.13	(0.07)	1.14	0.11ns	(0.07)	1.12	0.11ns	(0.07)	1.12
Parent Attachment Index	-1.01	(0.25)	0.99	-0.99	(0.25)	0.37	-0.97	(0.25)	0.38
School Alienation Index	*0.42*	*(0.12)*	*1.52*	*0.41*	*(0.12)*	*1.51*	*0.40*	*(0.11)*	1.49
Self-esteem Index	-1.79	(0.60)	0.17	-1.85	(0.60)	0.16	-1.85	(0.60)	0.16
Mean School G.P.A.	*0.60*	*(0.22)*	*1.82*	*0.62*	*(0.22)*	*1.86*	*0.62*	*(0.22)*	1.86
Importance Religion	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97	-0.02ns	(0.02)	0.98
School Attachment Index	-0.21	(0.03)	0.81	-0.19	(0.03)	0.83	-0.19	(0.03)	0.83
Extracurricular Activities	-0.00ns	(0.01)	1.00	0.00ns	(0.01)	1.02	0.00ns	(0.01)	1.00

Random Effects	Variance Component Model 1		Variance Component Model 2		Variance Component Model 3	
Intercept (mean delinq.)	0.023	(p=.000)	0.028	(p=.001)	0.030	(p=.001)
Friend Involvement slope	0.015	(p=.012)	0.017	(p=.007)	0.017	(p=.006)
Friend Intimacy slope	0.000	(p=.002)	0.000	(p=.003)	0.000	(p=.003)
Self-esteem slope	0.052	(p=.003)	0.056	(p=.003)	0.054	(p=.002)
Extracurricular Activ. slope	0.005	(p=.000)	0.005	(p=.000)	0.005	(p=.000)
School Attachment slope	0.023	(p=.001)	0.022	(p=.001)	0.022	(p=.001)
Parental Attachment slope	0.001	(p=.093)	0.001	(p=.073)	0.001	(p=.074)
Level-1 (within school)	3.234		3.182		3.138	

All continuous variables have been centered around their group means.
n=5,585 adolescents
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 19 cont.

Network Characteristic	Model 4 Reach Coeff.		Exp.	Model 5 Size Coeff.		Exp.	Model 6 Integrated Coeff.		Exp.
Intercept (Average Delinquency)	2.18	(0.62)	8.85	2.01	(0.59)	7.46	1.92	(0.58)	6.82
% Female in School	*-0.03*	*(0.01)*	*0.97*	*-0.03*	*(0.01)*	*0.97*	*-0.03*	*(0.01)*	*0.97*
Mutual Friendship Ties	*-1.67*	*(0.74)*	*0.19*	*-1.46*	*(0.72)*	*0.23*	*-1.18ns*	*(0.72)*	*0.31*
School Alienation	*0.46*	*(0.17)*	*1.58*	*0.49*	*(0.16)*	*1.63*	*0.49*	*(0.16)*	*1.63*
Friends' Delinquenc y (Minor Delinquency)	**0.02**	**(0.01)**	**1.02**	**-0.00ns**	**(0.01)**	**1.00**	**0.03**	**(0.00)**	**1.03**
Network Characteristic	**-0.60**	**(0.08)**	**0.55**	**-0.06**	**(0.01)**	**0.94**	**-0.43**	**(0.13)**	**0.65**
Interaction (Network Characteristic* Friends' Delinquency)	**0.05**	**(0.01)**	**1.05**	**0.01**	**(0.00)**	**1.01**	**0.03ns**	**(0.02)**	**1.03**
Control Variables									
Black	0.38	(0.05)	1.46	0.42	(0.05)	1.52	0.39	(0.05)	1.48
Other Race (non-white)	0.32	(0.05)	1.38	0.33	(0.05)	1.39	0.32	(0.05)	1.38
Female	-0.89	(0.04)	0.41	-0.89	(0.04)	0.41	-0.88	(0.04)	0.41
Age	-0.08	(0.02)	0.92	-0.07	(0.02)	0.93	-0.07	(0.02)	0.93
Friend Attachment	-0.03ns	(0.02)	0.97	-0.03ns	(0.02)	0.97	0.03ns	(0.02)	1.03
Friend Involvement	0.19	(0.03)	1.21	0.20	(0.03)	1.23	0.20	(0.03)	1.23
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	1.02	0.02	(0.00)	1.02
Two-Parent Family	-0.12	(0.04)	0.89	-0.13	(0.04)	0.88	-0.14	(0.04)	0.87
Public Assistance	0.12ns	(0.07)	1.13	0.12ns	(0.07)	1.13	0.13	(0.06)	1.14
Parent Attachment Index	-1.01	(0.25)	0.99	-1.01	(0.25)	0.99	-1.01	(0.25)	0.99
School Alienation	*0.41*	*(0.12)*	*1.51*	*0.42*	*(0.12)*	*1.52*	*0.42*	*(0.12)*	1.52
Self-esteem Index	-1.84	(0.59)	0.16	-1.76	(0.60)	0.17	-1.79	(0.60)	0.17
Mean School G.P.A.	*0.61*	*(0.22)*	*1.84*	*0.58*	*(0.22)*	*1.79*	*0.60*	*(0.22)*	1.82
Importance Religion	-0.02ns	(0.02)	0.98	-0.03ns	(0.02)	0.97	-0.03	(0.02)	0.97
School Attachment Index	-0.19	(0.03)	0.83	-0.20	(0.03)	0.82	-0.21	(0.03)	0.81
Extracurricular Activities	0.00ns	(0.01)	1.00	0.00ns	(0.01)	1.00	-0.00ns	(0.01)	1.00

Random Effects	Variance Component Model 4		Variance Component Model 5		Variance Component Model 6	
Intercept (mean delinq.)	0.029	(p=.000)	0.027	(p=.000)	0.026	(p=.000)
Friend Involvement slope	0.016	(p=.006)	0.016	(p=.012)	0.015	(p=.011)
Friend Intimacy slope	0.000	(p=.002)	0.000	(p=.003)	0.000	(p=.000)
Self-esteem slope	0.053	(p=.002)	0.051	(p=.003)	0.053	(p=.002)
Extracurricular Act. slope	0.005	(p=.000)	0.006	(p=.000)	0.005	(p=.000)
School Attachment slope	0.023	(p=.000)	0.021	(p=.001)	0.024	(p=.000)
Parental Attachment slope	0.001	(p=.075)	0.001	(p=.067)	0.001	(p=.088)
Level-1 (within school)	3.148		3.200		3.201	

All continuous variables have been centered around group means.
n=5,585 adolescents.
Violent Delinquency consists of serious physical fight, seriously injure another, group fight, use or threaten to use a weapon, pulled a knife/gun on someone, shot/stabbed someone, steal a car, and sell drugs. Although the latter two behaviors do not necessarily involve violence, factor analyses indicated that they hung together with the other violent incidents.
All variables are significant at $p < .05$ unless noted in table (ns).

Table 20. Late Adolescence: Network Interaction Models of Property Delinquency*: Hierarchical Generalized Linear Regression of Delinquency Index (Poisson distribution with overdispersion; standard error in parentheses)

Network Characteristic	Model 1 Leading Crowd Coeff.		Exp	Model 2 Density Coeff.		Exp.	Model 3 Centrality Coeff.		Exp.
Intercept (Average Delinquency)	0.16ns	(0.66)	0.17	0.17ns	(0.61)	1.18	0.16ns	(0.60)	1.17
% Female in School	*-0.02*	*(0.01)*	*0.98*	*-0.02*	*(0.01)*	*0.98*	*-0.02*	*(0.01)*	*0.98*
School Sex Segregation	*1.63*	*(0.41)*	*5.10*	*1.62*	*(0.41)*	*5.05*	*1.64*	*(0.41)*	*5.16*
Friends' Delinquency (Minor Delinquency)	**0.02**	**(0.01)**	**1.02**	**-0.01ns**	**(0.01)**	**0.99**	**0.01ns**	**(0.01)**	**1.01**
Network Characteristic	**-0.05ns**	**(0.16)**	**0.95**	**-1.21**	**(0.44)**	**0.30**	**-0.15**	**(0.06)**	**0.86**
Interaction (Network Characteristic* Friends' Delinquency)	**0.02ns**	**(0.02)**	**1.02**	**0.25**	**(0.06)**	**1.28**	**0.03**	**(0.01)**	**1.03**
Control Variables									
Black	0.07ns	(0.06)	1.07	0.09ns	(0.06)	1.09	0.08ns	(0.06)	1.08
Other Race (non-white)	0.21	(0.05)	1.23	0.22	(0.05)	1.25	0.22	(0.05)	1.25
Female	-0.58	(0.04)	0.56	-0.59	(0.04)	0.54	-0.58	(0.04)	0.56
Age	-0.14	(0.02)	0.87	-0.14	(0.02)	0.87	-0.14	(0.02)	0.87
Grade Point Average	-1.01	(0.36)	0.99	-1.04	(0.36)	0.96	-1.01	(0.37)	0.99
School Alienation Index	*0.38*	*(0.17)*	*1.46*	*0.40*	*(0.17)*	*1.49*	*0.38*	*(0.17)*	*1.46*
Friend Attachment	-0.03ns	(0.02)	0.97	-0.02ns	(0.02)	0.98	-0.02ns	(0.02)	0.98
Friend Involvement	0.19	(0.02)	1.20	0.19	(0.02)	1.20	0.19	(0.02)	1.20
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	1.02	0.02	(0.00)	1.02
Two-Parent Family	0.03ns	(0.04)	1.03	0.03ns	(0.04)	1.03	0.03ns	(0.04)	1.03
Public Assistance	-0.12ns	(0.09)	0.89	-0.12ns	(0.09)	0.89	-0.12ns	(0.09)	0.89
Parent Attachment Index	-0.10	(0.02)	0.90	-0.10	(0.25)	0.90	-0.10	(0.25)	0.90

Self-esteem Index	-0.70	(0.22)	0.50	-0.72	(0.22)	0.49	-0.69	(0.22)	0.50
School Network Density	*0.78*	*(0.31)*	*2.18*	*0.80*	*(0.32)*	*2.22*	*0.77*	*(0.31)*	2.16
Importance Religion	-0.10	(0.02)	0.90	-0.10	(0.02)	0.90	-0.10	(0.02)	0.90
School Attachment Index	-0.18	(0.03)	0.84	-0.18	(0.02)	0.84	-0.18	(0.03)	0.84
Extracurricular Activities	0.02	(0.01)	1.02	0.02	(0.01)	1.02	0.02	(0.01)	1.02

Random Effects	**Variance Component** Model 1		**Variance Component** Model 2		**Variance Component** Model 3	
Intercept (mean delinq.)	0.079	(p=.000)	0.080	(p=.001)	0.080	(p=.001)
Self-esteem slope	0.054	(p=.002)	0.055	(p=.002)	0.052	(p=.002)
G.P.A. slope	0.003	(p=.058)	0.003	(p=.048)	0.003	(p=.041)
Level-1 (within school)	2.880		2.870		2.874	

All continuous variables have been centered around their group means.
n=5,585 adolescents.
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal > $50, and burglarize.
All variables are significant at $p < .05$ unless noted in table (**ns**).

Table 20 cont.

Network Characteristic	**Model 4 Reach** Coeff.		Exp.	**Model 5 Size** Coeff.		Exp.	**Model 6 Integrated** Coeff.		Exp.
Intercept (Average Delinquency)	0.18ns	(0.60)	1.20	0.18	(0.60)	1.20	0.16	(0.60)	1.17
% Female in School	*-0.02*	*(0.01)*	*0.98*	*-0.02*	*(0.01)*	*0.98*	*-0.02*	*(0.01)*	*0.98*
School Sex Segregation	*1.63*	*(0.41)*	*5.10*	*1.63*	*(0.41)*	*5.10*	*1.63*	*(0.41)*	*5.10*
Friends' Delinquency (Minor Delinquency)	**0.01**	**(0.01)**	**1.01**	**0.00ns**	**(0.01)**	**1.00**	**0.02**	**(0.01)**	**1.02**
Network Characteristic	**-0.19**	**(0.09)**	**0.83**	**-0.02**	**(0.01)**	**0.98**	**-0.11ns**	**(0.12)**	**0.90**
Interaction (Network Characteristic* Friends' Delinquency)	**0.03**	**(0.01)**	**1.03**	**0.01**	**(0.00)**	**1.01**	**0.03ns**	**(0.02)**	**1.03**
Control Variables									
Black	0.07ns	(0.06)	1.07	0.08ns	(0.05)	1.08	0.08ns	(0.06)	1.08
Other Race (non-white)	0.21	(0.05)	1.23	0.22	(0.05)	1.25	0.21	(0.05)	1.23
Female -0.59	(0.04)	0.54	-0.58	(0.04)	0.56	-0.59	(0.04)	1.25	
Age	-0.15	(0.02)	0.86	-0.14	(0.02)	0.87	-0.14	(0.02)	0.86
G.P.A.	-1.07	(0.37)	0.93	-1.04	(0.36)	0.96	-1.01	(0.36)	0.99
School Alienation	*0.41*	*(0.17)*	*1.51*	*0.40*	*(0.17)*	*1.49*	*0.38*	*(0.17)*	*1.46*
Friend Attachment	-0.02ns	(0.02)	0.98	-0.03ns	(0.02)	0.97	0.02ns	(0.02)	1.02
Friend Involvement	0.19	(0.02)	1.20	0.19	(0.02)	1.20	0.19	(0.02)	1.20
Friend Intimacy	0.02	(0.00)	1.02	0.02	(0.00)	1.02	0.02	(0.00)	1.02
Two-Parent Family	0.03ns	(0.04)	1.03	0.03ns	(0.04)	1.03	0.03ns	(0.04)	1.03
Public Assistance	-0.13ns	(0.09)	0.88	-0.12ns	(0.09)	0.89	-0.12ns	(0.09)	0.89
Parent Attachment Index	-0.10	(0.02)	0.90	-0.10	(0.02)	0.90	-0.10	(0.02)	0.90
Self-esteem Index	-0.71	(0.22)	0.49	-0.71	(0.22)	0.49	-0.70	(0.22)	0.50
School Network Density	*0.79*	*(0.31)*	*2.20*	*0.79*	*(0.22)*	*2.20*	*0.78*	*(0.32)*	*2.18*
Job submitted. ion	-0.09	(0.02)	0.91	-0.10	(0.02)	0.90	-0.10	(0.02)	0.90
School Attachment Index	-0.18	(0.02)	0.84	-0.18	(0.02)	0.84	-0.18	(0.02)	0.84

Extracurricular Activities	0.02	(0.01)	1.02	0.02	(0.01)	1.02	0.02	(0.01)	1.02

Random Effects	Variance Component Model 4		Variance Component Model 5		Variance Component Model 6	
Intercept (mean delinq.)	0.079	(p=.000)	0.080	(p=.000)	0.080	(p=.000)
Self Esteem slope	0.050	(p=.002)	0.053	(p=.002)	0.054	(p=.002)
GPA slope	0.003	(p=.046)	0.003	(p=.043)	0.003	(p=.051)
Level-1 (within school)	2.879		2.877		2.876	

All continuous variables have been centered around group means.
n=5,585 adolescents.
Property Delinquency consists of paint graffiti, damage property, shoplift, steal < $50, steal > $50, and burglarize.
All variables are significant at $p < .05$ unless noted in table (ns).

CHAPTER SEVEN

CONCLUSION

In this project the delinquency-peer group association was explored guided by the premise that a more complete understanding of peer influence requires an examination of the characteristics of friendship networks that adolescents are embedded in. By incorporating a social network approach, this research contributes to research and theory on 1) the specific ways peer group characteristics condition the delinquency-peer group association, 2) how these processes change over the adolescent's lifespan, and 3) the role of school context in delinquent behavior. Although few adolescents report participation in many delinquent activities, the majority of adolescents report participation in at least one delinquent activity, with a minority reporting high levels of delinquent involvement. Overall, the findings present a picture more complex than that provided by social control theory and differential association theory alone and suggest that a network perspective can provide a coherent and powerful framework for addressing adolescent delinquency.

7.1 SUMMARY OF MAJOR FINDINGS

Five major findings emerge from this research. *First, friends' delinquency, as measured by responses from friends who compose the adolescent's friendship network, is robustly associated with an adolescent's own delinquency involvement.* This relationship holds whether the focus is on violent or property offending. It is an important finding because the delinquency-peer group association found in prior research has been criticized for inadequate and potentially mis-specified measures of peers' behaviors. Since prior research incorporates a measure of peer delinquency based on responses from the respondents rather than the peers themselves, Jussim and Osgood (1989) argue that peer delinquency simply measures the respondent's own delinquent behavior due to processes of assumed similarity. In contrast, measures used in the present research incorporate the responses of friends themselves and indicate that the delinquency-peer group association exists and remains robust regardless of controls for numerous other factors. The significant association consistently evidenced in this project gives credence to the idea that delinquency is best understood in the context of the peer group where common norms and behaviors emerge from locations in structured patterns of relationships (Wellman, 1988).

A second important finding emerging from this project is that network characteristics of the peer group condition the delinquency-peer group association. Specifically, delinquent friends have a lesser association with delinquency (and occasionally no association) when adolescents are located in a peripheral position within their peer group (low centrality), when their peer group is not very cohesive (low density), when they have little access to others in the network (reach), and when they have few friends (size). Conversely, peers' delinquency has a stronger association with an

adolescent's delinquency when the adolescents are located in a central position in their network, when their friendship group is very dense, when they can reach many others, and when the friendship group is larger.

While all network characteristics were found to condition the delinquency-peer group association to some degree, some network characteristics exerted stronger influences than others. Specifically, network density and size were more important peer group attributes having stronger interactions with peer delinquency, whereas, network reach was less important in this regard. Because network density represents the number of ties present in the friendship network divided by the number of possible ties in the network, it serves as an ideal measure of peer group cohesion. Greater group cohesion better facilitates a common group identity as either delinquent or non-delinquent, and subsequently places more constraint on the behavior of peer group members to be consistent with the group's behavioral disposition.

Network size, another important network characteristic, represents the number of possible peer influences on the adolescent. Larger peer networks in conjunction with peer delinquency are associated with greater reported delinquency levels. One possibility for the importance of network size is that in situations where adolescents have large peer networks engaging in high levels of delinquency, the behavior of the peer group may be more normative and representative of the larger behavioral norms operating in the school. With increased social support for delinquent behavior, adolescents in this situation have even greater incentive to display patterns of behavior that more closely resemble behavior prevalent within their peer group.

In contrast, network reach is a network property that played a smaller role in conditioning the delinquency-peer group association. Recall that network reach indicates

the number of other adolescents in the school network that the respondent has access to either directly or indirectly via other friendship ties. One explanation for the weaker interaction between reach and peer delinquency is that reach is indicative of the permeability of peer group boundaries. That is, the extent to which members have contact with individuals outside their immediate peer group. Therefore, a adolescent who is located in a delinquent peer group, but also has high reachability is well connected to other adolescents outside of his or her immediate peer group, resulting in mediated influence of the immediate peer group.

Overall, this set of findings suggests that the patterning of adolescent relationships helps explain when peer delinquency is most and least important. Not all adolescents are influenced to the same degree by their peer associations, and when the patterning of relationships amongst adolescents provide more opportunities for interactions amongst members, peer delinquency plays a larger role in the adolescent's own delinquent behavior. Thus, positioning in the peer network provides different opportunities for peer interaction and affects exposure to delinquent behavioral models, communication of delinquent norms, access to information on delinquency opportunities, and opportunities for rewards or deterrents for delinquency. Examining properties of peer networks, therefore, helps elucidate when the peer group is more or less effective in constraining the behavior of adolescents to be similar to that of their peers.

The finding that peer network structure conditions the delinquency-peer group association indicates that network concepts are integral to the consideration of adolescent delinquency in the context of peer influence. This conclusion is consistent with the current emphasis on the significance of social contexts (e.g. community, neighborhood, schools) and suggests that an important context with implications for adolescents'

behaviors are the peer networks youth are embedded in.

The third important finding emerging from this project is that the delinquency-peer group association is not age invariant over adolescence. Contrary to expectations from developmental theorists (e.g., Zani, 1993) and Thornberry's (1987) interactional theory, results from this study indicate that the delinquency-peer group association is strongest in early adolescence (ages 11-12), followed by smaller associations in middle and late adolescence (though still significant associations). Thus, adolescents appear most susceptible to peer influence when they first enter junior high school. Navigating a new peer hierarchy and searching for their position in the emerging peer crowds (see Brown, 1990) may entail more difficulty for younger adolescents as they try to separate their behavior from that of their peers. However, the capacity of network characteristics to condition the delinquency-peer group association appears to be age-invariant. That is, at all stages of adolescence, being located in a dense peer network, holding a central position within the group, having many friends, or having access to many others in the peer network are important structural characteristics of peer relations that are associated with stronger relationships between peer delinquency and an adolescent's own delinquency involvement.

Fourth, results indicate that *some school characteristics are associated with delinquency levels.* The school characteristics that are associated consistently with delinquency include school network density, school grade point average, and school alienation. While the first two characteristics are associated with reduced levels of delinquency, school alienation is associated with higher levels of delinquency. Whereas school density represents the structural constraint of connectiveness, school alienation represents the perceptual constraint of connectiveness. According to Coleman (1990),

connectiveness can be viewed as a form of social capital (also see Sampson, forthcoming). This suggests that the density of school ties and the school environment serve as indicators of the potential resources that schools can draw on to promote positive outcomes such as lowered delinquency risks.

Other school characteristics that were related to delinquency levels were age and sex segregation of the school network, the percent mutual friendship ties in the school, and whether or not the school was a junior high or senior high school. In regard to the latter, it was found that delinquency levels were often higher in junior high schools. One reason offered for greater delinquency levels in junior high schools is that middle school students are more likely to be suspended than expelled due to laws requiring compulsory school attendance. Thus, these schools contain many problematic students who are disengaged from the school but too young to leave school legally (Toby, 1980). Interestingly, delinquency levels were not associated with whether the school was a public or private institution, the urbanicity of the school, or the region of the country where the school is located.

Finally, contrary to expectations, *school characteristics, especially sociometric network characteristics, did not moderate the delinquency-peer group association.* One possible reason for this finding is that delinquent groups remain isolated from other friendship groups in the school network and are thus not influenced by characteristics of the school network. Some evidence supporting the relative social isolation of peer groups involved in delinquency comes from a study of students' perceptions of common crowd types (e.g., jocks, brains, druggies, and toughs). Students in this survey reported that

"druggies" and "toughs" were more likely to be socially disruptive, to hang out together in isolated places in the school, and to be less involved in extracurricular activities as compared to adolescents in less delinquent crowds (Brown, Lohr, and Trujillo, 1990). School characteristics, while not moderators of the delinquency-peer group association (which had unvarying effects across schools), did emerge as moderators of the gender-delinquency association, school attachment-delinquency association, and occasionally other background variables association with delinquency levels. For example, girls' levels of delinquency more closely resembled boys' in junior high school; however, in schools with more cohesion in terms of friendship relations (i.e., high levels of school density) the gender gap in delinquency was even larger.

7.2 THEORETICAL IMPLICATIONS

These results highlight the generally constraining influence of peer networks on individual behavior. With a friendship network centered around delinquent activities, adolescents are even more likely to report self-involvement in delinquency when they are located in a very cohesive peer network. Conversely, when peer networks do not incorporate peer delinquency, cohesion in the network is associated with lower risk of self-involvement in delinquency. This finding, if properly interpreted, is consistent in part with social control's emphasis on the constraining influence of social bonds, although, it appears more compatible with differential association's and social learning theories emphasis on the importance of the context of peer groups. It is in this group context where social norms and values regarding delinquency are shared and validated. According to differential association and learning theories and consistent with this

research, when delinquent peer groups are very cohesive group members are at heightened exposure to definitions and behavioral patterns favorable to delinquency involvement.

However, an alternative explanation is offered for the influence of network structure on adolescent delinquency. Critics of differential association and social learning theories argue that the observed delinquency-peer group association is not due to peer influence, but rather to self-selection into delinquent peer groups based on prior behavioral dispositions. The cross-sectional data on which this study is based do not allow explicit determination of whether the observed associations reflect network influences on adolescent behavior or whether they reflect the tendency of youth with similar behaviors to select each other as friends. However, studies with longitudinal data have found that both influence and selection processes are responsible for similarities in adolescent behavior (Bauman and Ennet, 1996; Elliott and Menard, 1992; Kandel, 1978; Krohn et al., 1996; Matsueda and Anderson, 1998; Thornberry, 1987). Although the precise mechanism underlying the delinquency-peer group associations can not be specified with the available data, the findings do suggest that personal networks with members who are delinquent provide, at a minimum, a supportive environment for delinquency involvement.

With this in mind, it is important to point out that if selection were mainly responsible for the association between delinquent peers and self-involvement in delinquency then we would not expect to find that network characteristics of the peer group condition the delinquency-peer group association. For example, being located in a

very dense peer group or in a very central position within the group, should not influence the strength of the delinquency-peer group association if adolescents are selecting peer groups to join which most closely match up with their own delinquent tendencies. Therefore, the strength and consistency of the pattern of network properties conditioning the delinquency-peer group association suggest explanations more consistent with a differential association or social learning approach to peer influence. However, to explicitly test this, longitudinal data on social networks of adolescents is necessary. In addition to longitudinal data on adolescent peer networks, a theory of delinquency is needed which incorporates an understanding of peer group formation. Such a theory would explain processes underlying selection into and out of peer networks.

7.3 CAVEATS

The findings presented in this project should be considered in light of the following limitations. As noted earlier, the data that this project are based on are cross-sectional which limits the causal inferences we can make about the relationships between network characteristics and delinquent behavior. Longitudinal data that allow measurement of changes in network characteristics and delinquency behavior over time would be extremely valuable. Such a data design would allow determination of whether delinquent behavior precedes selection into peer groups or whether incorporation into peer groups occurs prior to delinquency involvement. Moreover, another reason for the use of longitudinal data for investigating peer networks, as well as the difficulty with such analyses, involves the constantly changing nature of social networks. The dynamic nature

of network structures suggests that it is rare for peer groups to remain unchanged even in a short period of time. Capturing and modelling these changing network structures remains a challenge for longitudinal analyses.

The ideal longitudinal network analysis of peer groups would also have included complete network data on a wide range of delinquency items including more serious delinquency items. As indicated earlier, a drawback of the present study is that friends' involvement in minor delinquency is used to predict the respondent's more serious delinquency involvement. Unfortunately, this strategy tends to underestimate the strength of the actual relationship between friends' serious delinquency and the respondent's own involvement in serious delinquency.

My findings also depend on the definition of density, centrality, reach, size, and popularity adopted here. Although the definitions used here generally coincide with those favored in the network literature, other definitions might have resulted in different findings. Additionally, while this study drew attention to common properties of peer networks other network characteristics may be important and worthy of future investigation. For example, age, sex, and race heterogeneity of the peer group, and the percent of reciprocated friendship ties in the peer group are a few additional properties of peer networks which may condition the delinquency-peer group association.

Despite these limitations, the present study's results show that the approach of identifying and examining peer social networks provides a coherent and promising framework for investigating a variety of ways that social relationship might be associated with adolescent delinquency. This framework's emphasis on the social connections

among adolescents goes considerably beyond that of prior research which viewed individuals as essentially separate from their social structure.

7.4 POLICY IMPLICATIONS

Implied in findings from this project is that schools have great potential as a focus of crime prevention. Schools provide consistent access to adolescents throughout the developmental years, as well as regular access to large numbers of the most crime-prone young children in the early school years--a time when adolescents are most influenced by their delinquent peers. Some of the more important precursors of delinquency are school-related and thus likely to be amenable to change with school-based intervention (Gottfredson, Sealock, and Kroper, 1996). Findings from this project have potentially important policy implications which can be used to launch programs to reduce the risks of delinquency in adolescence. For example, because school alienation was consistently associated with increased levels of delinquency while greater school network density was associated with reduced levels of delinquency, policies which target both feelings of inter-connectivenes and actual structural patterns of connectiveness can be devised to provide an environment less conducive to delinquent behavior. In addition, because peers were found to be more influential on delinquent behavior in young adolescence, risk intervention can be targeted towards youth entering junior high school. Although delinquency is embedded in the adolescent peer group context, commonly proposed prevention and treatment strategies largely ignore the peer friendship network as a specific target of intervention (Elliott et al., 1985). Findings from this study can be used to target programs aimed specifically at peer interactions as an important arena of

delinquency prevention. Since the association between network density, reach, integration, and centrality with delinquency risk depended upon levels of friends' delinquency, increasing network integration with non-delinquent peers should be a priority.

7.5 FUTURE RESEARCH

7.5.1 Gender Differences

Although this project presented some interesting findings related to gender, its aim was not to unravel the complexities involved in understanding the "gendered" nature of delinquency. Nevertheless, this is an important area in need of investigation, as there is preliminary evidence that the structure and meaning of friendship networks differ greatly for males and females. For example, based on descriptions from adolescents, Giordano and colleagues (1986) find that females report similar or greater levels of friend involvement than males. Specifically, females describe spending as much time with their friends as males, and report similar levels of rewards from these friendships. Other studies indicate that girls report more intimacy tied up in their friendships than boys (Berndt, 1982). Another important difference which has emerged and carries special relevance for delinquency involvement is that male adolescents report greater influence via peer pressure than female adolescents (Giordano et al., 1986).

Rather than describing friendship characteristics and peer involvement as a facet of delinquency involvement, it is necessary to examine more of the differential dynamics occurring within peer networks for boys and girls which may amplify delinquency in the

case of boys but inhibit it among girls (Giordano et al., 1986). One interesting avenue to understanding gender differences in friendship networks involves an incorporation of biological factors related to physical maturity. For example, the occurrence of early and late biological development may have different implications for males and females. For girls, early pubertal changes appears especially relevant for their adjustment during adolescence, including greater involvement in mixed sex peer networks composed of older adolescents. Evidence linking this outcome to delinquency comes from studies which find that responses of others to girls undergoing early developmental changes leads to differential association with peers who encourage precocious social behaviors including delinquency (Caspi and Moffit, 1991; Silbereisen and Todt, 1994). However, more recent research finds that school context tempers this association so that early-maturing girls are no more likely to engage in delinquency than late-maturing girls if they attend all-female schools (Caspi et al., 1993). While less research has examined the issue of timing of physical development for boys, there is reason to expect that among boys early and late maturation will lead to differential incorporation into peer networks with varying consequences for delinquency involvement.

7.5.2 Race Differences

Another avenue of future research needs to focus on race differences in adolescent networks and the consequences for delinquency involvement. As pointed out by Cernkovich and Giordano (1992:283), "blacks are surprisingly under-represented in research on the school and delinquency. This is due in part to the politically sensitive nature of the race issue in American society...[and] due also to the [neglect] of the role of

race in major delinquency theories." In fact, no research to my knowledge has examined the relationship of social networks and delinquency for blacks. However, understanding the role of peer influence in regard to the delinquency involvement of minority youth requires a recognition of racial segregation of friendship patterns which continue to characterize the social structure of most racially mixed high schools in the U.S. (Darling and Steinberg, 1997). Segregated peer networks limit the choice of peer group membership for minority youth, often with negative consequences. For example, Darling and Steinberg (1997) find that white students who had parents supportive of academic success were also likely to belong to peer groups supportive of such success. In contrast, African American students found it more difficult to join peer groups supportive of academic success regardless of support provided by parents. African Americans' bind between performing well in school and being popular and well-liked among their peers has also been highlighted by Fordham and Ogbu (1986), who note that many African American students who do well in school are accused of "acting white" by their peers. Perhaps this explains, in part, why Giordano, Cernkovich, and Demaris (1993) find that African American adolescents reported being less peer-oriented and placing less emphasis on having friends in school who were similar to themselves than did white adolescents, (although this latter finding may also result from the constraint that minority youth face in regard to friendship choices in the typical high school). Regardless, it suggests that incorporating the dynamics of peer networks may enable a better understanding of racial differences in delinquency involvement.

7.6 SUMMARY

The purpose of this project was to provide a more complete understanding of peer influence in regard to the delinquency-peer group association. Perhaps in no area of youth problem behavior is the immediacy of this need more apparent than in regard to delinquency, especially violent offending. Of all the problems confronting adolescents today, no set of issues has attracted as much public concern and public fear as violent crimes committed by young persons. As highlighted in this project, individual, peer group, and school-level variables combine to influence the adolescent's engagement in delinquency. This project's combination of methodology and data are unique to the criminological field and provide considerable insight into how adolescents' relationships among peers, and the school context in which these relationships occur, affect an individual's risk of delinquency through the structural positions they occupy via friendship ties.

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Appendix A. Characteristics of Three Schools Illustrated by Sociograms (Schools 002, 088, 008)

School Characteristics	School 002	School 088	School 008
School Density	0.86	0.84	0.60
Grade Segregation	0.71	0.61	0.63
Sex Segregation	0.19	0.08	0.15
Percent Black	0.00	0.00	0.02
Percent Female	0.53	0.53	0.51
Public/Private	Private School	Public School	Public School
Urbanicity	Rural School	Rural School	Rural School
Region	West	North East	Midwest
Mean School GPA	3.21	3.02	2.62
Mean School Delinquency	2.40	5.51	.7.31

Appendix B. Correlation Matrix

						1	2	3	4	5		
7	8	9	10	11	12	13	14	15	16			
1. Overall Delinquency Index	1.00											
2. Violent Delinquency Index	0.91	1.00										
3. Property Delinquency Index	0.83	0.53	1.00									
4. Friends' Delinquency	0.16	0.14	0.14	1.00								
5. Leading Crowd Member	-0.00	-0.01	0.01	0.02	1.00							
6. Centrality in Network	-0.07	-0.10	-0.02	-0.05	0.25	1.00						
7. Network Density	-0.00	-0.01	0.01	-0.03	-0.21	**-0.32**	1.00					
8. Network Size	-0.04	-0.05	-0.01	0.02	**0.62**	**0.68**	**-0.57**	1.00				
9. Reach in Network	-0.08	-0.09	-0.03	0.03	0.18	**0.66**	**-0.44**	**0.61**	1.00			
10. "Integrated" in Network	-0.03	-0.05	0.01	-0.01	-0.01	**0.32**	0.10	0.12	0.22	1.00		
11. Female	-0.18	-0.19	-0.12	-0.07	0.00	0.06	0.03	0.04	0.05	0.05	1.00	
12. Black	0.01	0.06	-0.05	-0.20	-0.04	-0.10	-0.05	-0.08	-0.11	-0.09	0.05	1.00
13. Other Race	0.06	0.04	0.06	-0.07	-0.07	-0.02	0.05	-0.10	-0.16	-0.04	-0.01	-0.20
14. Age	-0.01	0.01	-0.03	0.12	-0.05	-0.11	0.06	-0.12	-0.09	-0.02	-0.06	-0.04
15. Self-esteem Index	-0.10	-0.07	-0.11	-0.03	0.04	0.07	-0.06	0.09	0.03	0.02	-0.12	0.06
16. Importance Religion	-0.12	-0.08	-0.13	-0.16	0.03	0.05	-0.04	0.06	0.03	-0.01	0.06	-0.17
17. Two-Parent Family	-0.07	-0.10	-0.01	-0.02	0.05	0.12	-0.01	0.11	0.11	0.07	0.02	-0.23
18. Public Assistance	0.04	0.06	-0.00	-0.01	-0.05	-0.05	0.02	-0.07	-0.05	-0.03	0.03	0.01

19. Parental Attachment Index	-0.10	-0.08	-0.09	-0.07	0.03	0.07	-0.02	0.06	0.05	0.03	-0.08
0.04	-0.05	-0.16	0.25	0.11							
20. Grade Point Average	-0.21	-0.23	-0.14	-0.17	0.10	0.17	-0.01	0.17	0.13	0.10	0.13
21. Extracurricular Activities	-0.03	-0.04	-0.01	-0.08	0.13	0.17	-0.09	0.22	0.14	0.07	0.06
22. School Attachment Index	-0.18	-0.17	-0.14	-0.11	0.09	0.19	-0.09	0.18	0.12	0.05	-0.03
23. Friend Attachment	-0.07	-0.08	-0.04	0.00	0.08	0.10	-0.03	0.13	0.07	0.07	0.15
24. Friend Involvement	0.14	0.12	0.13	0.11	0.06	0.04	-0.02	0.07	0.00	0.02	-0.06

25. Friend Intimacy	0.10	0.07	0.10	0.16	0.17	0.30	-0.13	0.32	0.26	0.12	0.15	-0.06
26. Density School Network	-0.05	-0.05	-0.02	0.13	0.15	0.01	-0.12	0.30	0.40	0.12	-0.01	-0.12
27. Grade Segregation	0.02	-0.01	0.05	-0.05	-0.01	0.01	0.07	-0.03	-0.14	0.01	-0.01	-0.05
0.09	-0.43	0.04	-0.04									-0.12
28. Sex Segregation	0.05	0.03	0.06	-0.11	-0.09	-0.02	0.12	-0.18	-0.31	-0.06	-0.00	-0.01
0.04	-0.25	0.00	0.03									-0.12
29. Mutual Friendship Ties	-0.04	-0.03	-0.05	0.01	0.07	0.01	0.09	0.11	-0.02	0.03	0.00	-0.03
0.06	-0.16	-0.18	0.05	0.04								-0.20
30. School Alienation Index	0.05	0.05	0.04	0.16	0.04	0.00	-0.08	0.09	0.21	0.03	-0.01	-0.03
0.11	-0.15	0.08	-0.02	-0.06								-0.03
31. School Grade Point Average	-0.06	-0.07	-0.03	0.00	0.08	0.00	-0.01	0.14	0.13	0.05	-0.00	-0.03
0.14	-0.09	-0.24	0.03	0.01								
32. Junior High School	0.02	0.02	0.00	-0.09	0.02	0.02	-0.05	0.04	-0.04	-0.02	0.02	
0.13	-0.06	-0.59	0.09	0.07								

Appendix B (cont.).

	17	18	19	20	21	22	23	24	25	26	27	28 29 30 31 32

1. Overall Delinquency Index
2. Violent Delinquency Index
3. Property Delinquency Index
4. Friends' Delinquency
5. Leading Crowd Member
6. Centrality in Network
7. Network Density
8. Network Size
9. Reach in Network
10. "Integrated" in Network
11. Female
12. Black
13. Other Race

14. Age												
15. Self-esteem Index												
16. Importance Religion												
17. Two-Parent Family	1.00											
18. Public Assistance	-0.17	1.00										
19. Parental Attachment Index	0.03	0.00	1.00									
20. Grade Point Average	0.16	-0.10	0.04	1.00								
21. Extracurricular Activities	0.07	-0.06	0.04	0.24	1.00							
22.School Attachment Index	0.07	-0.02	0.18	0.18	0.14	1.00						
23. Friend Attachment	0.07	-0.06	0.10	0.12	0.07	0.21	1.00					
24. Friend Involvement	-0.01	-0.01	0.01	-0.07	0.02	0.02	0.10	1.00				
25. Friend Intimacy	0.09	-0.06	-0.04	0.07	0.20	0.02	0.16	0.18	1.00			
26. Density School Network	0.11	-0.08	0.01	0.15	0.13	0.02	0.07	-0.00	0.10	1.00		
27. Grade Segregation	0.05	-0.04	0.06	0.12	0.12	0.05	0.04	0.02	-0.04	0.00	1.00	
28. Sex Segregation	-0.02	0.02	0.03	-0.03	-0.05	0.01	-0.02	0.02	-0.10	-0.47	0.50	1.00
29. Mutual Friendship Ties	0.04	-0.00	0.03	0.09	0.11	0.08	0.02	-0.02	-0.04	0.37	0.05	0.19 1.00
30. School Alienation Index	0.01	-0.01	-0.04	-0.07	-0.03	-0.10	0.01	0.03	0.08	0.27	-0.22	0.21 -0.15 1.00
31. School Grade Point Average	0.12	-0.10	0.03	0.30	0.18	0.08	0.08	0.01	0.05	0.51	0.40	0.11 0.31 -0.22 1.00
32. Junior High School	-0.05	0.03	0.10	0.06	0.06	0.04	-0.01	-0.00	-0.12	0.04	0.56	0.42 0.11 -0.06 0.19 1.00

n=12,725

Appendix C. Factor Solutions for Delinquency Indicators (Varimax Rotation)

Delinquency Indicators	Violent Delinquency	Property Delinquency
Shoplift	0.09	**0.83**
Steal < $50	0.06	**0.84**
Steal > $50	0.30	**0.46**
Graffiti	0.33	**0.36**
Damage Property	0.34	**0.43**
Burglarize	0.25	**0.49**
Steal a Car	0.34	0.24
Sell Drugs	0.43	0.29
Serious Physical Fight	**0.52**	0.22
Group Fight	**0.59**	0.21

Use or Threaten with Weapon	**0.54**	0.20
Pulled Knife/Gun on Someone	**0.67**	0.07
Seriously Injure Another	**0.60**	0.19
Shot/Stabbed Someone	**0.59**	0.04

Apendix D: Percent of Respondents by Age Engaging in Different Delinquent Activities

	Ages		
	Early Adolescence	Middle Adolescence	Late Adolescence
Delinquent Act			
Paint Graffiti	7.4%	10.0%	7.2%
Damage Property	15.7%	20.2%	15.2%
Shoplift	20.5%	15.7%	23.3%
Steal < $50	17.4%	17.4%	18.5%
Steal > $50	1.8%	4.7%	5.1%
Burglarize	3.2%	5.5%	4.2%
Steal Car	3.3%	10.1%	10.8%
Sell Drugs	1.3%	6.0%	8.8%
Serious Physical Fight	33.0%	31.7%	26.7%
Seriously Injure Another	17.2%	18.4%	15.7%

Group Fight	20.4%	20.1%	16.8%
Use or Threaten Use Weapon	2.5%	4.2%	3.6%
Pulled Knife/Gun on Someone	2.0%	4.3%	4.4%
Shot/Stabbed Someone	1.8%	1.5%	1.9%
Sample Size	1,017	6,146	5,585

VITA

Dana L. Haynie

Dana Haynie's research focuses on two broad areas in the study of criminology: adolescent delinquency and city-level correlates of crime rates. Her study of adolescent delinquency emphasizes the role of peer group associations, contextual influences (such as school characteristics), gender differences, and developmental changes in the process of peer influence.

Drawing on these various interests, a recent research project applies a social network perspective and examines whether characteristics of peer groups, such as size and cohesion, help explain when peer influence is more or less strongly associated with an adolescent's delinquency. The second major focus of Professor Haynie's work investigates the association between structural disadvantage (e.g., poverty, joblessness, family disruption) and city-level crime rates. In particular, she questions whether a stratification framework can be applied to female crime rates as it has been to male criminality. Beyond her criminology research, Professor Haynie has general interests in gender stratification and quantitative research methods.

Representative Publications

"Gender, Structural Disadvantage, and Urban Crime: Do Macro Social Variables Also Explain Female Offending Rates." *Criminology* (forthcoming). (With D. Steffensmeier)

"Explaining the Gender Gap in Fear of Crime Over Time, 1970-1995: A Methodological Approach." *Criminal Justice Review* (forthcoming).

"A Gendered Context of Opportunity: Female Poverty Across Labor Markets." *Sociological Quarterly* 40 (1999). (With B. Gorman)

"Using Repeated Surveys to Study Aging and Social Change." In M. Hardy (ed). *Conceptual and Methodological Issues in the Study of Aging and Social Change*. Sage Publications, (1997). (With G. Firebaugh)