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The Role of the Peer Group in Adolescence: Effects on Internalizing and Externalizing Symptoms

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THE ROLE OF THE PEER GROUP IN ADOLESCENCE:

EFFECTS ON INTERNALIZING AND EXTERNALIZING SYMPTOMS

by

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THE ROLE OF THE PEER GROUP IN ADOLESCENCE:

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An adolescent's peer group has been theorized to influence the development of psychopathology. However, little research has examined the adolescent peer group using information obtained directly from peers in a longitudinal framework. Research has also been limited on peer group influence on the development of internalizing disorders. The study used Social Network Analysis to examine self-reported anxiety, depression, aggression, and delinquency in the fall and spring of one school year for students in a rural high school. In addition to examining the effect of the peer group on individual reports of psychopathology, the strength of this relation was compared to that of the adolescent's closest friend. Potential moderators (peer group density, grade, and gender) of the relation between the peer group and individual psychopathology were examined. Results suggested that how the peer group variable is constructed affected the findings. When the peer group variable was constructed from reciprocated peer nominations, the peer group level of anxiety or depression predicted later individual changes in these measures. However, when the peer group variable was constructed from all incoming and outgoing nominations, regardless of reciprocation, the level of delinquency reported in the peer group predicted later change in individual delinquency. The peer group's level of aggression was not related to concurrent or later individual aggression. The adolescent's closest friend's level of psychopathology was not related to concurrent or later psychopathology. Peer group density was supported as a moderator of the relation between reciprocated peer group and individual anxiety, such that individuals from less dense peer groups were more influenced by the peer group. Grade was supported as a moderator of the relation between reciprocated peer group and individual level of anxiety, depression, and delinquency, with anxiety and depression showing the expected

negative quadratic moderation effect, and delinquency showing an unexpected, positive moderation effect for grade. Gender was not supported as a moderator. Conceptual and methodological implications are discussed with recommendations for clinical practice and policy.

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CHAPTER 1: Introduction

The Role of the Peer Group in Adolescence:

Effects on Internalizing and Externalizing Symptoms

Adolescence is a period in human development characterized by transition. One of the most important transitions occurring during adolescence is the rise of peer relationships in importance and influence. Peer relationships provide a context not only for the acquisition and maintenance of friendships and friendship networks but also for the development of key social skills, social problem solving skills, and empathy. Peer relationships are not entirely positive, however, and peers may also play a role in the development of negative outcomes, such as poor academic adjustment (Buhs, Ladd, & Herald, 2006), delinquency (Ellis & Zarbatany, 2007; Moffitt, 1993), aggression (Espelage, Holt, & Henkel, 2003; Tolan, Guerra, & Kendall, 1995), depression (Landman-Peters et al., 2005; Shahar & Priel, 2002), or social anxiety (Elizabeth, King, & Ollendick, 2004). While friendship emerges relatively early in childhood, research on peer networks has demonstrated that the influence and importance of peers appears to increase beginning in early adolescence. This trend continues until the influence of peers peaks in middle adolescence and begins a gradual decline into later adolescence (Brown, 1990; Collins & Steinberg, 2006; Rubin, Bukowski, & Parker, 2006). This pattern indicates that adolescence may be an ideal time to study changes in the peer network and implications of these changes for developing youth.

Another area that shows change beginning and extending through adolescence is that of psychopathology. Symptoms of adult psychopathology may originate in the adolescent years, as in the case of substance abuse or disorders of conduct (Dick,

Barman, & Pitkänen, 2006; Loeber, Lahey, & Thomas, 1991). They may also continue through adolescence from a childhood onset, as appears to be the case with anxiety disorders (Kendall & Suveg, 2006) and bullying (Espelage et al., 2003). Finally, symptoms of adult psychopathology may have origins in both periods; for example, depression appears to have a range of common ages of onset including childhood and early adolescence (Steinberg & Morris, 2001). Adolescence has been shown to be an important developmental period for the course of psychopathology. For instance, it appears that the adult gender discrepancy in prevalence of depression may be entirely accounted for by higher rates of adolescent onset depression in teenage girls than in teenage boys (Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993). If nothing else, adolescence is a time of exposure to risk factors for the development of later psychopathology. Epidemiological research has supported that adolescents experience high rates of aggression and delinquency. For example, 36% of adolescents have been in a physical fight over the past year, 6.5% have carried a weapon to school, 19.3% have stolen something of nontrivial value (Centers for Disease Control and Prevention, 2006; McMorris, Hemphill, Toumbourou, Catalano, & Patton, 2007). Depression is also prevalent in adolescence with research suggesting that as many as 8% of adolescents every year experience depression (Angold & Costello, 1993) and 17% of adolescents seriously considered committing suicide in the last year (Centers for Disease Control and Prevention, 2006). Social anxiety is also thought to develop to the level of disorder in early to middle adolescence (Wittchen & Fehm, 2003).

The pattern of increased adolescent symptoms of psychopathology often parallels the rise of influence of peer relationships in early to middle adolescence, which suggests

that peers may play some role in the cause of or maintenance of psychopathology at this age. Research has supported that close friends may play either a protective, buffering role in preventing psychopathology, for example, when a supportive friend helps an adolescent ward off depression (Landman-Peters et al., 2005; Shahar & Priel, 2002), or an exacerbating role as when co-rumination between friends increases the overall level of depressive thinking in the group (Rose, 2002). However, relatively little research has examined the connection between peer networks and these outcomes. A peer network is defined as a large structure of linkages—in this study, friendship linkages—between individuals at a similar developmental stage (e.g., adolescents) who share a common setting (e.g., the neighborhood or school). Within the larger peer network are peer friendship groups to which each individual belongs and which are composed of that individual's friends. While single relationships between members of the peer network (e.g., the best friend) have been researched extensively, the study of friendship networks as a whole has occurred less often. The purpose of the current study is twofold: to explore the role of friendship networks in the development and transmission of various forms of individual psychopathology and to study several potential moderators of the effect of the peer network on the individual.

Research on Peers in Adolescence

The study of peers and peer influence in adolescence has a long history. Throughout this history, friendship has been shown to be important to the development of adolescents (e.g., Bagwell, Newcomb, & Bukowski, 1998; Bukowski, Hoza, & Newcomb, 1991; Hartup, 1993; Ladd, 1990; Newcomb & Bagwell, 1996; Ryan, 2001; Simmons, Burgeson, & Reef, 1988; Updegraff, McHale, Whiteman, Thayer, & Crouter,

2006; for a review see Hartup, 1996). Given the conclusive evidence that friendship is important to adolescents, a natural next step is to investigate more complex structures such as friendship networks to see if these structures aid in the understanding and predicting important aspects of adolescent development, such as the beginnings or worsening of psychopathology, beyond the level of friendships. Briefly the literature that exists on the subject of friendship and the more complex peer network structures that have been studied is reviewed below, along with some of the consequences that can occur for adolescents as a result of negative or poor peer relationship development.

Before reviewing this literature, it should be noted that the current study seeks to understand the role that friends and peer networks play in symptoms of adolescent psychopathology, broadly defined. Specifically, the proposed study will examine adolescent anxiety, depression, delinquency, and aggression. Traditionally, psychopathology has been divided into two categories, called internalizing and externalizing disorders. In the proposed study, anxiety and depression will represent internalizing disorders whereas delinquency and aggression will represent externalizing disorders. In the following literature review, the term "psychopathology" will be used to represent all of these, and more specific language is used whenever relevant.

A great deal of research has examined the intricacies of friendship in adolescence perhaps because it has been so widely believed (and empirically supported) that friends are important to adolescents. However, much of this research has examined only dyadic conceptualizations of friendship. Thus the impact of having, versus not having, friends has been closely researched. For instance, Hartup (1996) describes children with friends as being "more sociable, cooperative, altruistic, self-confident, and less lonely" (p. 4).

Additionally, inspired by Hartup's review, research has shown that the quality of the friendship, both in terms of the relationship between two individuals and the characteristics of the friends themselves, moderates this relation. There is much less research on friendship network structures, which can range from specific friendship triangles to nebulous social crowds.

Additionally, research suggests that adolescents spend much less time with their parents than they spent with them as children (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). Research directly comparing peer and parental influences has determined that while parents continue to provide support for their adolescents during this age, peers appear to become a major source of socialization (Beal, Ausiello, & Perrin, 2001; Collins & Laursen, 2004; Laursen & Bukowski, 1997). The consensus appears to be that friends play a role in adolescent development that is not limited only to the subjective perceptions of the adolescents themselves.

Friendships within larger peer network structures have been studied primarily through several constructs. These constructs, where sufficient research exists to support such claims, have shown excellent utility in helping to understand adolescent friendships and their correlates (e.g. juvenile delinquency, substance abuse, etc.). Two such constructs that have been studied are social crowds and social networks. The study of adolescent social crowds originated in the writings of Dunphy (1963) who examined crowds originally as an explanation of adolescent dating behavior. Crowds are currently defined as "collections of adolescents identified by the interests, attitudes, abilities, and/or personal characteristics they have in common" (Brown, Mory, & Kinney, 1994, p. 123). Adolescent crowds do not necessarily have firm boundaries for the adolescents in

them, and are frequently identified by those outside the crowd rather than those within the crowd. In addition to the physical manifestation of large groups of peers, crowds can also been conceptualized as social types in the social cognition of adolescents. Crowds tend to be ideographically defined for each population of adolescents though some consistencies have emerged. Several crowds tend to exist in some form or another in most US populations (e.g., jocks, populars, brains, normals, druggies, or loners; Brown, Mounts, Lamborn, & Steinberg, 1993). Adolescents seem to have little difficulty classifying their peers into crowds (though they frequently are resistant to being classified themselves, Lesko, 1988; Varenne, 1982), and so it is clear that crowds represent a meaningful construct in the adolescent's social environment.

Crowds, however, do not necessarily contain friendship linkages between all of the adolescents that make up the crowd. In fact, it is likely the case that many members of the same crowd do not know or have contact with each other. Crowd members are joined only by symbolic reputation rather than time spent interacting with each other (Brown et al., 1994). As a result, researchers have also examined the peer network from the perspective of the actual friendship linkages that form a connected social network, analyzed through Social Network Analysis (SNA; Wasserman & Faust, 1994) or the Social Cognitive Map (Cairns, Perrin, & Cairns, 1985). Social networks are made up of reported friendship linkages between adolescents that are combined to create a "map" of the entire set of linkages for a given population. The network, once mapped, can be used to create a dizzying array of characteristics for any one individual or local peer network (see Ennett et al., 2006). The most frequently examined of these is classification of network members into "cliques." Cliques are a special form of peer group defined as a

group of adolescents that are all linked directly to each other in a social network by mutually identifying each other as friends. Adolescents are classified according to their position within the network: as clique members, liaisons (youth who have linkages to two or more cliques), dyads (two youth who are linked only to each other), or isolates (youth who have no linkages at all; Richards, 1995). This classification scheme has been used with fair frequency amongst the studies that have used SNA; however it is by no means the limit of what can be gleaned about adolescent friendship networks from this methodology. Initial research using these groups has shown connections between belonging to a clique and engagement in school (Kindermann, 1993; Kindermann, McCollam, & Gibson, 1996; Ryan, 2001), and substance use (Ennett & Bauman, 1994; Ennett et al., 2006; Pearson & Mitchell, 2000; Urberg, Değirmencioğlu, & Pilgrim, 1997).

Change in the Role of the Peer Group During Adolescence

Research has supported the notion that friendship becomes increasingly important in early to middle adolescence, supplementing and perhaps exceeding the role that parents play (Brown, 2004; Crockett, Losoff, & Peterson, 1984; Hartup & Abecassis, 2002). In a multiple cohort sequential longitudinal design, Crockett and colleagues (1984) interviewed 335 students between the 6th and 8th grades. As these children entered early adolescence (i.e., during 7th grade) they reported increasing perceived importance and prevalence of "cliques" within their schools. Building on these findings, Collins and Steinberg (2006) in a review of the literature suggested that beginning in early adolescence, individual peer networks begin to grow in complexity and size. These structures remain high in complexity during early and middle adolescence and appear to

diminish during later adolescence. These authors hypothesize that friendship structures might serve to help the adolescent transition from an identity linked to his or her parents to one that is defined by friends, and finally, and finally, to an individualized identity.

In one of the earliest works on the changes in the peer network during adolescence, Dunphy (1963) studied the development of friendship groups beginning with the transition from childhood into adolescence and ending in later adolescence. He examined several large peer networks in neighborhoods through observation and other field methods of studying the peer network (e.g., member diaries). Dunphy described a progression of the groups within the peer network beginning with smaller same-sex groups. As the individuals in these groups grew older, the smaller groups together formed larger structures Dunphy called crowds. During early and middle adolescence the groups began to increase in size and to associate with opposite-sex groups. In middle and late adolescence, the same-sex peer groups began to join with the groups composed of members of the opposite sex to create mixed-sex groups, replacing the same-sex groups. Finally, these groups dissipated as individuals formed heterosexual dating pairs in late adolescence.

Connolly, Furman, and Konarski (2000) updated Dunphy's theory by examining the changes in peer network structures and gender make-up during 9th through 11th grades. Their findings supported Dunphy's theory that same-sex peer groups do combine to form mixed-sex groups. However, their data suggested that, despite this merging, peer groups remained largely same-sex throughout middle adolescence and the onset of dating relationships.

While Dunphy predicted that peer groups would dissipate during later adolescence, early research by Shrum and Cheek (1987) found that peer groups reach their maximum prominence in early adolescence and decrease in prevalence from that point forward. In this study the authors examined network nomination data from over 2,000 students spanning grades 3 through 12 in 13 schools. The network data was used to examine the relative prevalence of group members and liaisons, or individuals connecting more than one group. They found that the number of group members increased, peaking in 6th grade and then decreasing over the remaining years. The presence of liaisons continued to increase after this and was taken as a sign that older adolescents tended to have diverse friendships with peers that were not necessarily friends with each other. Shrum and Cheek's results were challenged by results from a more recent study (Urberg, Değirmencioğlu, Tolson, & Halliday-Scher, 1995) that showed no decrease in the number of group members over grade levels. The authors of this study suggested that the methodology used to construct the peer network variables may have accounted for the different results.

Regardless of theoretical perspective, the complex structures of the friendship network do appear to rise and fall during the span of adolescence, and this transience may contribute to the relatively fewer research studies examining them. The present study examines the role of friendships over a large part of the developmental period of adolescence. Having shown that the friendship network changes in influence and complexity over the course of adolescent development, it remains to be shown that the friendship network has any relation to the development of individual levels of psychopathology. The next sections examine the literature showing a clear correlation

between the level of psychopathology reported in a peer group and that in the individual as well as literature that shows this relation longitudinally, supporting the notion that the friendship network exerts an influence on the psychopathology of the individual. Several forms of externalizing psychopathology (delinquency and aggression) as well as internalizing psychopathology (anxiety and depression) are examined.

Peers and Delinquency

Perhaps more so than any other form of psychopathology examined here, previous research has specifically linked the peer network to the development of individual delinquency in late childhood and adolescence (Dishion, 2000; Dishion, McCord, & Poulin, 1999; Ellis & Zarbatany, 2007). In one study of 665 5th through 8th grade children in four Canadian elementary schools (Ellis & Zarbatany, 2007), individual youth's self-reported deviant behavior was significantly predicted by the mean level of deviant behavior reported by the other individuals within their peer network approximately 95 days earlier. This effect remained after taking into account the individual youth's initial report of deviant behavior. The peer network representation in this case was constructed using the Social Cognitive Map procedure which asks all participants to report on the peer networks of themselves as well as the rest of their class/grade. Youth that were liked by their peers more were less influenced by their peer networks than were youth that were disliked by their peers. The authors concluded that this study demonstrated the socializing influence of the peer network on future deviant behavior.

In a different approach to studying the spread of delinquency through the peer network, Dishion and colleagues (1999) examined the long-term outcomes of two

different interventions designed to study and alleviate delinquency in youth. In one intervention, 119 "high risk" youth participated in either a parent intervention, a youth intervention, both, or neither. While initial results were positive for the intervention, the three-year follow-up data indicated that all youth exposed to the youth intervention, and therefore other delinquent youth in that intervention, exhibited significantly more delinquent behavior as rated by their teachers. In the second intervention, 300 boys were matched on demographic and delinquency risk variables to form 150 pairs with one boy in each pair randomly assigned to receive a series of interventions designed to prevent the development of later delinquency. The boys receiving the interventions were not significantly different from those not receiving them after the intervention was concluded. However boys that attended a summer camp, one of the optional interventions, more than once over the course of the six-year intervention period were ten times more likely than their matched controls to have a negative outcome over the next 30 years. The authors conclude that these settings, the youth group intervention in the first case and the multiple exposures to the summer camp in the second case, allowed the at-risk youth to be reinforced by their peers for delinquent behavior and to cement their personal construct as delinquents. Therefore, the authors argue, aggregating delinquent youth into groups of peers can lead to "deviancy training" and iatrogenic effects of interventions designed to decrease such behavior. It is interesting to note that the older youth in the first study described were more susceptible to the group's negative influence than were younger youth, which is counter to the indications that peer groups diminish in influence in later adolescence.

Peers and Aggression

Somewhat less empirical literature has demonstrated the connection between adolescent friendship networks and the individual adolescent's display of aggressive behavior, though aggressive behavior and delinquency are often highly correlated. One study by Xie, Cairns, and Cairns (1999), examined self- and teacher-rated aggression in more than 500 4th through 7th grade children across four schools. The study used the Social Cognitive Map procedure described above to map the peer networks of the youth. Findings suggested that for boys and girls in 6th and 7th grade (i.e., early adolescence), youth were similar to the members of their local peer network in both self- and teacher-rated aggression. The authors conclude that exhibiting aggression did not preclude early adolescents from belonging to peer groups. Instead, aggressive youth tended to be in networks with each other. One weakness of this investigation was that all measures were taken concurrently so that it could not be determined if aggressive youth sought each other out or if youth who were in a network with aggressive peers became more aggressive over time.

Espelage and colleagues (2003) further investigated the relation between the concurrence of aggression in individuals and their friendship network in a longitudinal framework. Using SNA, over 400 students in grades 6 – 8 provided levels of self-reported aggression (defined as both bullying and fighting with others) as well as friendship nominations in the fall and spring semesters of one school year. Results showed that aggression within the friendship network in the fall significantly predicted the youth's report of aggression in the spring after controlling for the youth's self-report of aggression in the fall. The authors concluded that their results showed evidence of the friendship network influencing the individual youths' levels of aggression. It is

interesting to note that the study described above of Canadian 5th through 8th graders (Ellis & Zarbatany, 2007) did not show similar results. These authors found a correlation between initial peer network aggression and later individual level aggression (as nominated by the youth's peers); however this association was no longer significant when the youth's initial level of aggression was included in the model. Therefore, there is evidence to suggest that the peer network has some level of influence on individual levels of aggression, but there is some inconsistency in previous findings. Further study is needed in this area, especially with older adolescent samples.

Peers and Depression and Anxiety

Overall, symptoms of depression and anxiety, in contrast to more externalizing symptoms such as aggression and delinquency, have been studied in friendship networks much less often. In what was likely the first study to examine the influence of the friendship network's level of internalizing symptoms on the individual adolescent's reports of these symptoms, Hogue and Steinberg (1995) examined over 6,000 students in nine high schools (9th through 11th grades) at two time points approximately one year apart. These authors asked youth to list up to five "closest friends" as well as completing a questionnaire that the author's described as measuring general internalizing distress. (A shorter version of this questionnaire is used in the present study as a measure only of depressive symptomatology). Results indicated both that adolescents sought out friendship groups similar to themselves in levels of internalized distress but also that adolescent males became more similar to their friends in terms of internalized distress over time. While the authors failed to find evidence of friend's influence for girls, they did find evidence that individual boys and girls influenced over time the overall mean

internalized distress of their friendship network. Thus their findings indicated that the individual influenced the group but the group did not influence the individual. This study established a role of the friendship network in the spread of internalizing symptoms; however the authors used the uncorrected nominations of each individual to form the friendship network instead of allowing some kind of verification (e.g., using only reciprocated nominations as will be described below).

A later study (Stevens & Prinstein, 2005) showed that using reciprocated nominations of best-friends resulted in stronger relations between the best friend's report of depressive symptoms and later individual depressive symptoms. This study also showed a stronger relation of depression in friends and individuals for girls than for boys, contrary to Hogue and Steinberg's original findings. A more recent study of 100, 11th grade adolescents showed a similar effect of the influence of the closest friend on individual adolescent report of depressive symptoms (Prinstein, 2007). Despite these findings that support the notion of peer influence, nearly no research since Hogue and Steinberg has been published on the effects of the friendship network, rather than closest friend, on the individual's level of depression.

Even less research has examined whether the friendship network's level of anxiety is related to changes in the individual adolescent's report of anxiety, despite the fact that peers have been implicated in the development of anxiety disorders (Elizabeth et al., 2004). In what may be the only study to compare adolescents and their friends on anxiety, Mariano and Harton (2005) cross-sectionally studied 68 friend dyads, defined by reciprocated nomination, and 108 non-friend dyads, defined by no nomination by either individual. The dyads were taken from amongst 234 students in 4th through 9th grades.

These researchers found that friends were more similar than non-friends (and correlations between friends' measures were significantly positive) for self-reported anxiety. They also noted that the strength of this difference became stronger for students in higher grades, indicating that friends were more similar to each other as they entered adolescence. This method of comparing friends to non-friends is an indicator of similarity between dyads, however it does not address whether or not these youth are influenced by their friends or whether the effects of a network of friends might equal or exceed that of the closest friend. Much more research is needed in the domains of anxiety and depression to address these questions.

Overall the study of adolescent friendships has produced a body of research that has identified the importance of peers, friends, and complex peer relationship constructs in the development of many different forms of psychopathology. There are however, several ways in which further research is needed. First, while research has established a role of the friendship network in influencing externalizing psychopathology during adolescence, little research has examined internalizing psychopathology. The present study expands on previous work by investigating the role that an adolescent's friend network's level of internalizing symptoms has on that adolescent's own level of internalizing symptoms. Second, the current study employs a longitudinal procedure to allow for the measurement of change over time. This allows for better determination of the difference between peer influence and individual's selecting peers that are similar to themselves. Finally, the current study employs SNA so that the level of psychopathology reported by each member of the friendship network for all adolescents that have a network is collected across all of the members of the network and used to directly predict

the individual's level of psychopathology. This allows for an examination of the actual report of the friendship group rather than asking the adolescent to report for his or her peers. Relatively few research studies in the past have taken this approach and it will allow for a novel test of different, but related, aspects of the peer group as well as replication and expansion of previously shown relations between psychopathology in the friendship network and in the individual. Should these findings be replicated, the second purpose of the current research is to investigate moderators of these effects. This review now turns to the research evidence supporting the three moderators examined in the present study: density, age, and gender.

Potential Moderators of Peer Group Influence

There are several limitations within the literature on peer networks and psychopathology. First, longitudinal studies of complex friendship constructs are uncommon with adolescents and, as such, the question of causal direction pervades many findings. Second, little is known about how psychopathology is transmitted through or connected with friendship and peer network characteristics, despite evidence that these relations occur. There is a need for further research on the process by which the peer group may exert an influence that is linked to later psychopathology. One theory is that maladaptive behavior, whether it is in the form of delinquency or suicide, is passed among peers who are frequently in close contact with each other. The contagion hypothesis, as it is sometimes referred to, has garnered support with regard to delinquency (Cho, Hallfors, & Sánchez, 2005), self-harm (Taiminen, Kallio-Soukainen, Nosko-Koivisto, Kaljonen, & Kelenius, 1998), depression (Stevens & Prinstein, 2005),

and aggression (Boxer, Guerra, Huesmann, & Morales, 2005) and is a driving theory behind the current study's examination of psychopathology and peer groups.

This proposed study seeks to address these limitations in the literature in several ways. First, a longitudinal design is used to assess the causal relations among initial friendship network psychopathology and later individual adolescent psychopathology. Second, a focus on several potential moderators of these relations is employed to help target when and how the peer group's influence occurs. The moderators to be examined are peer group density, age, and gender. Peer group density, defined below, is examined as evidence of the causal process by which the contagion hypothesis might operate. Age is examined to investigate whether the influence of the friendship network changes across development as has been theorized many times before. And gender is examined to investigate if previous findings regarding the difference in influence between boys and girls' friendships might also apply to the larger friendship network.

Peer Group Density as a Moderator of Peer Influence

Peer group density is one of the many underused characteristics of the peer network available through SNA and is defined as the degree to which one's friends are friends with each other. It can be understood conceptually as how "close knit" or "cohesive" a given group of friends is. Individuals with very dense peer networks will report that many of their friends are friends with each other, while those with low density may report that their friends may not know each other at all. The notion of how close his or her friends are to each other is likely to be salient and important to adolescents who are beginning to develop and experiment with managing more complicated peer relationships, though this has not been empirically verified to date. Peer group density is

represented as a continuous variable ranging from 0, none of the adolescent's friends are friends with each other, to 1, all of the adolescent's friends are friends with each other.

Peer group density has been found in the literature to serve a moderating role in relations between friendship network and individual characteristics. While only a few studies have examined this construct, there is evidence to suggest that denser peer groups are associated with greater influence of peers. For instance, in a study of the more than 13,000 AdHealth Wave 1 adolescents between 7th and 12th grades, Haynie (2001) studied the relation between individual adolescents' reports of their own delinquency and that of their friendship network (as assessed through peer nominations both incoming and outgoing). Consistent with research described above, a significant relation was found between the report of delinquency by the individual adolescent and his or her friendship network's mean level of delinquency. However, the authors also found that this relation was dependent on peer group density such that individuals with denser peer groups showed a stronger relation between group association and delinquent behavior. The authors conclude that density serves as an important moderator of the influence of the peer group's report of delinquency and the individual adolescent's report.

Density may play a direct role in psychopathology as well. Ennett and colleagues (2006) examined over 5,000 adolescents over five time points with ages ranging from 11 to 17. These researchers examined cigarette, alcohol, and marijuana use over the several time points and were able to examine social network effects on the level of use as well as the slope, or increase, in use. Among the many attributes of the friendship network that were significantly related to the development of decreased substance use over time, density emerged as a significant protective factor such that youth who belonged to high

density friendship groups were less likely to smoke cigarettes or marijuana and less likely to have consumed alcohol recently. The density of the peer network has also shown to be cross-sectionally related to adolescents that attempt suicide (Windle & Windle, 1997) and to African-American adolescents' self-concept (Coates, 1985).

Additionally, the extant research on peer group density would suggest a viable and testable hypothesis regarding the process by which the relation between individual psychopathology and friendship network psychopathology occurs. Essentially, through being denser and therefore being composed of adolescents in closer contact with each other, a friendship group may spread psychopathology more readily than a friendship group in which the members are less dense and therefore not in contact with each other as often. This hypothesis, mentioned above, is referred to as the contagion hypothesis (Dishion et al. 1999). This hypothesis would suggest that psychopathology within the friendship network might spread between individual members within that group like a contagious disease and, as such, those individuals who are "closer" to each other (in this case in more dense peer networks) are more likely to "catch" the "disease" (psychopathology) from peers in their group. This contagion effect has been shown in several studies of various treatment programs (e.g., Taiminen et al., 1998 – with self-harm in inpatient female adolescents) and was the subject of a recent special issue in the *Journal of Abnormal Child Psychology* (Lochman, 2005).

The contagion effect has been repeatedly documented when groups of youth that share a form of psychopathology are aggregated, either in friendship or intervention groups. However, the existing empirical literature has been hampered by what Hartup (2005) calls, "the problem of process" (p. 388). In other words, few theorists have put

forward methods by which the contagion effect might operate and even fewer empirical studies have tested those theories that have been put forward.

One of the earliest and most researched proposed methods by which the contagion effect might operate was developed by Dishion and colleagues (1999) in their landmark demonstrations of iatrogenic effects of interventions designed to alleviate deviant behaviors in youth. These researchers proposed "deviancy training" as a process by which deviant children or adolescents are reinforced by the peer group for engaging in deviant behavior, which further increases their exhibition of deviant behavior. These researchers propose two mechanisms through which the peer group reinforces the deviant youth. First, direct positive reinforcement is provided through "laughter, social attention, and interest" (p. 762) in response to deviant behavior. Other authors have added that negative reinforcement may take place as well. For instance when a child is aggressive, he or she is less likely to be victimized by others in the peer group (Warren, Schoppelrey, Moberg, & McDonald, 2005). Second, deviant youth are reinforced over time by deriving "meaning and values" (Dishion et al, 1999, p. 762) from their position in the peer group and the deviant behavior that they exhibit. Additionally, research on deviancy training has also emphasized the social modeling that can take place when deviant or aggressive youth are aggregated into groups. Multiple empirical studies have provided evidence supporting the process of deviancy training to spread aggressive and delinquent behavior amongst groups of peers (Cho et al., 2005; Lavallee, Bierman, Nix, & The Conduct Problems Prevention Research Group, 2005; Magner, Milich, Harris, & Howard, 2005)

An alternative but complementary method to the deviancy training hypothesis is that competition amongst aggressive youth leads to further increases in aggression. According to the competition model, put forward by Warren and colleagues (2005), in an environment where peers are aggressive, individual youth must respond with aggression in order to prevent the loss of status within the group and increasing the chance of being victimized. Thus by competition for respect within the peer group, aggression is increased over time within aggressive peer groups. By contrast, in non-aggressive peer groups, aggression does not produce a competitive advantage and therefore does not increase. This method was empirically tested in a sample of 1st through 4th grade children and results supported the proposed pattern such that for children who were initially rated as not aggressive, the level of aggression in their peer group did not impact their level of aggression two years later. However, for children that were initially rated as high in aggression, the level of aggression in their peer group did influence their level of aggression two years later. The authors conclude that this shows support for the competition method of peer influence and contagion.

The proposed methods of peer contagion described above have been developed to explain the contagion effect as it relates to deviant, observable behavior. These explanations do not take into account the literature demonstrating a contagion effect with internalizing forms of psychopathology. Symptoms of internalizing psychopathology, such as anxiety or depression, are rarely on public display for reinforcement by peers and do not obviously suggest any form of competitive advantage. Instead, they are often characterized by, as the name suggests, internal states, which may require a separate method to spread through the peer group. One possible method by which internalizing

distress may be spread through the friendship network is that of co-rumination (Rose, 2002). This process refers to "excessively discussing personal problems within a dyadic relationship and is characterized by frequently discussing problems, discussing the same problem repeatedly, mutual encouragement of discussing problems, speculating about problems, and focusing on negative feelings" (p. 1830). While the original description of co-rumination describes it occurring in dyadic friendships, it may also occur in larger friendship structures such as those studied here. In this way, by engaging in co-rumination, anxious or depressed youth within an individual adolescent's friendship network might encourage the development of similar symptoms in the target adolescent over time.

Peer network density relates to each of these proposed mechanisms of the contagion hypothesis by potentially strengthening the effect observed. When groups of deviant peers are closer knit, the ability of each to reinforce the deviant behavior of the others and model further deviant behavior is enhanced. For aggressive peer groups, competition may be more salient and intense when all of the members of the peer group are all competing with each other rather, as opposed to less dense aggressive peer groups where individual peers may not be linked to one another and therefore not in competition. Finally, co-rumination between dyads and larger sets of pairs may occur more frequently or in an additive way if more co-ruminating friends are friends with each other. The proposed moderator of peer network density seeks to investigate these possibilities.

In addition to fitting nicely within the contagion hypothesis, the construct of density allows for an addition to the proposed relation between friendship and later outcomes put forward by Hartup (1996). Hartup cautioned that while friendship was

important to development, it is the quality of friends that is more relevant to the influence of that friendship. Hence, while having pro-social friends is associated with significant developmental gains, having delinquent friends is likely to be associated with increased delinquency and less positive developmental gains. The proposed study directly tests this hypothesis by comparing the rate of peer psychopathology (representing one aspect of the "quality" of friends) to that of individual psychopathology. Additionally, the concept of density serves as an extension of Hartup's hypothesis by proposing that the cohesion of the adolescent's network moderates the influence of peer deviance on the individual adolescent. In addition, the present study seeks to examine if peer network variables add prediction above and beyond individual friendships as studied by Hartup and others. This will allow a determination of whether studying the peer network uniquely adds to our understanding of how peer relationships influences adolescent development.

Age as a Moderator of Peer Influence

In addition, age will be examined as a moderator of the influence of friendship network's psychopathology on individual psychopathology. Age has long been hypothesized to play a part in the influence of the peer group on the individual in a variety of domains (Brown, 1990; Rubin et al., 2006). As described above (Collins & Steinberg, 2006; Connolley et al., 2000; Crocket et al., 1984; Dunphy, 1963), adolescent's report of the importance and influence of the peer group increases beginning in late childhood/early adolescence(6^{th} – 8^{th} grade), reaches a peak in middle adolescence (9^{th} -10^{th} grade), and decreases into late adolescence and early adulthood (11^{th} grade and above). It is reasonable to expect that the peer group's change in influence over time applies to the development of psychopathology as well and that this

change would follow a similar trajectory. Additionally, research has shown that age is related to the onset and development of of psychopathology, at least in the cases of delinquncy and aggression (Moffitt, 1993), depression (Landman-Peters et al., 2005; Shahar & Priel, 2002), and some forms of anxiety (Angst, Gamma, Baldwin, Ajdacic-Gross, & Rössler, 2009; Elizabeth et al., 2004; Grisham, Frost, Steketee, Kim, & Hood, 2005; Öst, 1987).

In addition, a few studies have directly examined age as a moderator of the influence of the friendship network on the individual's report of psychopathology. For example, in the research described above regarding the spread of delinquency in two peer interventions (Dishion et al., 1999), the authors reported evidence that both younger (3rd – 5th grade) and older (9th – 12th grade) youth were less succeptible to negative influences of exposure to their peers than were early adolescents (6th – 8th grades). Similarly, while not tested statistically, Xie and colleagues' (1999) findings indicated significant similarities in self-reported aggression between peers and individual youth for 6th and 7th graders but not for 4th and 6th graders. One studydescribed above, however, with a younger sample (5th -8th grades) failed to find a moderating effect of age (Ellis & Zarbatany, 2007)

In the present study, age will be considered equivalent to the individual's grade level in school. In much of the research and theorizing about adolescence, these two variables (age and grade) are used interchangeably. In the present study grade level was selected because of the emphasis on friendship networks. Individuals are considered part of a friendship network when they are able to spend time together. Since adolescents in a school context spend most of their time with others of their own grade level, regardless of

age, it was thought that grade level was likely the more relevant construct for the current study. In addition, in the present sample, age and grade level were very highly correlated which supported the notion that these two constructs are nearly interchangeable here.

Gender as a Moderator of Peer Influence

Finally, gender will be examined as a moderator of the influence of the friendship network on the individual's level of psychopathology. In the study described above by Crockett and colleagues in which 335 6^{th} – 9^{th} graders were interviewed about their friendship characteristics, the authors found differences between boys and girls with regards to the level of intimacy in their relationships. Girls reported more intimacy in their relationships and more self-disclosure than did boys. It is reasonable to think that more intimate relationships between girls and their peers might lead to a stronger influence of the peers on the individual girls when compared to the same process for boys. In their study on similarity between friends among 234 4^{th} – 9^{th} graders, Mariano and Harton (2005) showed that girls aggression was more similar to their peers' aggression compared to boys only when aggression was reported by their peers. The authors hypothesized that perhaps girls formed relationships based on characteristics that "stood-out" from others of their gender and therefore, girls' friends would be more likely to be similar in aggression than boys' friends, for whom aggression is less salient. Hogue and Steinberg (1995) found that, for boys and not girls, friendship networks influenced the level of the individual boy's internalized distress.

In their recent comprehensive literature review of the differences between boys and girls' peer relationships, Rose and Rudolph (2006) describe several consistent

findings regarding how boys and girls behave differently with their friends. For example, girls report caring more about having friends, valuing goals that can be obtained as a group rather than individually, and being more concerned with the status of their relationships and with peer evaluation than are boys. Another recent study (Johnson, 2004), examining nearly 300 adolescents (8th grade through 1st year in college) showed that girls rated their relationships as more close than boys and were more intimate with their friends. These findings suggest that the role of the friendship network is likely to be different for boys and girls, with girls perhaps being more influenced by their friendship network as a result of placing more importance on the cohesion of the entire group or being more intimately involved with group members.

Other research however has not shown a significant difference between boys and girls in the degree to which the friendship network is similar to the individual in psychopathology (Ellis & Zarbatany, 2007; Espelage et al., 2003; Xie et al., 1999), though these studies examined externalizing symptoms rather than internalizing symptoms. The moderating role that gender plays in the influence of the peer network on the development of psychopathology will be examined in the proposed study.

Methodological Issues in Social Network Analysis

While the study of the peer network has been ongoing for many decades, the methodology by which the peer network is studied continues to show considerable variability. The present study seeks to employ several variations on a common method of studying the peer network, Social Network Analysis, in order to examine the effect on the results obtained by various methods of measuring the peer network. SNA is typically cited as described in an influential book by Wasserman and Faust (1994) which outlined

much of the original conceptual and mathematical groundwork of SNA. SNA refers specifically to the process of examining the network of ties between individual nodes (representing anything from individual adolescents, to corporations, to animals, etc.). As an updated text by Scott (2000) defines, there are two ways to consider network data, the ego-centric method and the socio-centric method. The ego-centric method considers, in a bottom-up approach, the characteristics of just those nodes, "alters" that are tied to the target node, the "ego." Put in the context of adolescent peer friendships, the ego-centric method considers only the identified friends of the adolescent and does not include larger structures or concepts, like cliques or other groups. The socio-centric method considers the characteristics of the network as a whole, as well as identifiable subgroups within the network. Thus egos and alters are considered, from a top-down approach, part of the broader structure of the network. In the context of adolescent peer friendships, the socio-centric method considers the position that the target adolescent holds within his/her local friendship network. For instance, whether the target adolescent belongs to a clique or is a liaison or what degree of centrality within his or her local friendship network does the adolescent hold.

Either of these approaches yields important information about the relation between the individual and those to whom they are connected. The studies described above have utilized both methods. For example, in Hogue and Steinberg's (1995) study of the spread of internalized distress through high school students' friends, they employed the ego-centric method by examining how the characteristics of the individual adolescents' nominated friends were influenced and influenced the individuals over time. This study did not examine how these friendships connected with each other to form

groups such as cliques. Meanwhile, Espelage and colleagues (2003) using the socio-centric method examined the similarity between members of middle-school cliques on their report of aggression. This study identified cliques by finding relatively tight groupings of individuals throughout the network as a whole (using computer software) and each member of the clique need not have had a friendship linkage to all of the other members. Each of these studies produce unique information about the role of the peer network in the spread of psychopathology and to date no research has identified one method as superior to the other.

The current study uses the ego-centric method of considering the peer network. This was because the conceptual basis for the hypotheses tested implies direct contact between the youth affected and their peers. While socio-centric methods are capable of identifying valid structures within the overall peer network, these structures do not imply regular, direct contact between all group members. In addition, the socio-centric method cannot be used in the same way to study individuals that are members of more than one group. For example, liaisons were excluded from the socio-centric study described above because it was not possible to generate a "group average" aggression score for liaisons that were not identified as belonging to one group. In the present study these individuals are considered and the scores of the peers linked to them through their ego-centric friendship network are averaged.

Another common methodological difference between studies in the domain of SNA is whether or not to use the nominations provided by the individual subjects or to verify these nominations in some way. The most common method of verifying a subject's nominations is to only count as legitimate friendship links those friendships that

are reciprocated. In other words, only when the target adolescent nominates a peer and that peer also nominates the target adolescent is the link used in the SNA. Relatively no empirical research has examined whether reciprocated nominations are more or less valid than unreciprocated nominations for creating the friendship network. One study that has (Stevens & Prinstein, 2005) showed that the reciprocated best-friends' report of depressive symptoms was more strongly linked to later individual adolescent's report of depressive symptoms as compared to unreciprocated best-friends. One of two reasons is traditionally given to rationalize the use of reciprocated nominations. The first is that, conceptually, these relationships are likely to be stronger since both the target adolescent and his or her peer had to value the relationship highly enough to list the other. The second is more pragmatic and occurs when the software package used to detect groups (in a study employing a socio-centric method) identifies an impractical number of groups, either a few, very large coherent subgroups or many, very small coherent subgroups. The solution to this problem is often to use reciprocated nominations since this, by definition, decreases the number of linkages between individuals and makes the network easier for the software package to process into manageable cliques. As the present study is not socio-centric in nature, this second argument is irrelevant.

Given the lack of empirical evidence supporting the use of reciprocated versus unreciprocated nominations to construct the friendship network variables, the present study sought to use both methods in order to compare their results. In addition, while using reciprocated nominations is by far the most popular method of validating the nominations of an individual, one study described above did use a third method (Haynie, 2001). This study utilized the nomination task administered as a part of the AdHealth

data in which adolescents were allowed to list up to five peers as friends. The researchers in this study constructed the peer network variables based upon both the nominations of the target adolescent and also any of the peers that nominated that target adolescent during their own interviews. This process (termed the inclusive method in the present study) allows for greater inclusion of peers that the target adolescent may have failed to nominate on their own but that may still be important figures in that adolescent's social life. This method is also used in the present study so that results amongst these three techniques of constructing the friendship network variables can be compared directly.

In summary, the present study uses an ego-centric SNA with the above parameters to investigate whether the friendship network's level of psychopathology influences the target adolescent's own level of psychopathology. Following this, several moderators of the relation between the friendship network and the individual will be investigated. These are peer group density, which seeks to more clearly explain the way in which friendship network psychopathology influences individual psychopathology, age, which seeks to show that this relation changes over the developmental period from middle to late adolescence, and gender, which seeks to examine if boys and girls are differentially influence by their friendship networks. These investigations will occur in a cohort-sequential design sampling adolescents in grades 9 through 12. Friendship networks will be defined using several methods of considering individual's nominations, detailed below. First, we turn to the specific hypotheses that will be examined in the proposed study to address the initial questions posed regarding the role of peers in the transmission of individual psychopathology and the changes in these roles as the adolescent develops.

Hypotheses

The hypotheses proposed to address these research questions are as follows:

- First, rates of specific forms of psychopathology (anxiety, depression, delinquency, and aggression) will be related within friendship networks such that individuals in networks containing peers with greater symptoms of a specific form of psychopathology (e.g., anxiety) will be more likely to exhibit symptoms of the same psychopathology.
- Second, to provide a stronger test for a causal link between peer and individual psychopathology, these relations will be examined over time with the expectation that belonging to a peer network with individuals who report symptoms of specific psychopathology will predict later symptoms of the same psychopathology for the individual, after controlling for the individual's initial levels of psychopathology.
- Third, the influence on rates of psychopathology of the individual adolescent's closest friend will be compared to the influence of the peer network, with the expectation that, when considered together, both the adolescent's closest friend's symptomatology and the average symptomatology of his or her larger peer network will contribute significantly to prediction of the individual's later level of symptomatology.
- Fourth, the density of the individual's peer network will moderate the previous relations between peer and individual psychopathology such that, for individuals belonging to denser peer network, the relation between peer and individual

psychopathology will be stronger than for individuals belonging to a less dense peer network.

- Fifth, the strength of these relations between peer and individual psychopathology will be examined for youth across grade cohorts with the expectation that the strength of these relations will be the strongest in middle adolescence (9^{th} and 10^{th} grade) and will diminish in later adolescence (11^{th} and 12^{th} grade).
- Finally, the relations between peer and individual psychopathology will be analyzed based on the gender of the adolescent with the expectation that the relations between peers' psychopathology and later individual psychopathology will be stronger for females than for males.

CHAPTER 2: Method

Participants

Participants were recruited from a small high school that drew students from several surrounding towns in a rural county of a Midwestern state. Of the 190 students on the school roster during the fall semester, 172 students (91%) participated in the fall data collection and 155 (82%) participated in the spring data collection for a total of 182 participants (96%) completing some portion of the study materials. Because of the consent/assent procedure used, it was not possible to determine each student's reason for not participating. Likely reasons included: illness/excused absence, parental refusal of consent, and, in some cases, adolescent refusal to assent (6 adolescents during T1 and 12 adolescents during the T2 collection refused to participate). A make-up day to allow absent youth to participate was not conducted due to concerns of contamination of the peer nomination task. For instance, it was possible that peers would discuss the study following the initial data collection day and pressure their absent peers to change future responses.

Participating adolescents ranged in age from 14 – 18 (*M* age at T1 = 15.71, *SD* = 1.21) and included 90 females (51%, 7 adolescents did not identify a gender at either time point). During the year of the study, 48 participants identified themselves as freshmen (26%), 39 as sophomores (21%), 55 as juniors (30%), and 40 as seniors (23%). Participants primarily identified Caucasian (91%) as their racial or ethnic classification, though a small number did identify as biracial or multi racial (5.5%), Latino/a or Hispanic (2.2%), Native American (.5%), or Black/African American (.5%). Additional demographic information for each time point is presented in Table 2.1.

Table 2.1

Summary Demographic Data for T1 (Fall), T2 (Spring), and Total Samples.

Demographic variable	Fall sample (N = 172) M (SD) or n (%)	Spring sample (N = 155) M (SD) or n (%)	Total sample (N = 182) M (SD) or n (%)
Age	15.76 (1.20)	16.13 (1.25)	15.71 (1.21)
Typical Grades [a]	1.92 (0.69)	1.89 (0.69)	
Gender			
Male	82 (49%)	72 (46%)	85 (49%)
Female	84 (51%)	83 (54%)	90 (51%)
Race / Ethnicity			
White / Caucasian	158 (92%)	151 (95%)	166 (91%)
Black / African American	0 (0%)	1 (0.6%)	1 (0.5%)
Latino(a) / Hispanic	4 (2.3%)	1 (0.6%)	4 (2.2)
Asian / Asian American	0 (0%)	0 (0%)	0 (0%)
Native American / American Indian	1 (0.6%)	0 (0%)	1 (0.5%)
Bi-racial / Multi-racial	7 (4.1%)	6 (3.8%)	10 (5.5%)
Other	2 (1.2%)	0 (0%)	0 (0%)
Grade in School			
Freshmen	43 (25%)	43 (28%)	48 (26%)

Sophomore	38 (22%)	29 (19%)	39 (21%)
Junior	51 (30%)	48 (31%)	55 (30%)
Senior	40 (23%)	35 (23%)	40 (22%)

[a] Grades are coded: 1 = "A", 5 = "F."

Measures

During the T1 and T2 (fall and spring) data collections, participants were given a questionnaire packet containing the following self-report measures on the first day of data collection and the peer nomination form on the second day of the data collection. All measures were self-report in format and the same packets were administered at T1 and T2.

Demographic Questionnaire

Immediately after completing written assent forms, participants completed a one-page demographic questionnaire which asked about birth date, gender, preferred race or ethnicity, current year in school, number of years in high school, and typical grades received (see Appendix A). Birth date and years in high school were free response items. Gender was asked through a forced choice *M* or *F* option. Race or ethnicity options included: White/Caucasian, Black/African American, Latino(a)/Hispanic, Asian/Asian American, Native American/American Indian, Bi-racial/Multi-racial, and Other. Current year in school was asked through the forced choice options: Freshmen, Sophomore, Junior, and Senior. Finally, typical grades were asked through the forced choice options: A's, B's, C's, D's, and F's. Participants were allowed to choose up to two typical grades and their responses were averaged to give a typical grade score.

Center for Epidemiological Studies – Depression Scale (CES-D)

The CES-D is a 20-item self-report measure of depressive symptomatology originally designed for use with the general adult population (Radloff, 1977; see Appendix B). It was later validated in adolescent and young adult samples (Radloff, 1991; Roberts, Andrews, Lewinsohn, & Hops, 1990). This measure asks youth to rate how often they have felt symptoms over the past week on a 4-point Likert scale that includes numeric guidelines (e.g., *0 Rarely or none of the time [Less than 1 day]* to *3 Most or all of the time [5 – 7 days]*). Symptoms include: I felt depressed, I did not enjoy life, My sleep was restless. When validating the CES-D in several large samples of high school adolescents, Roberts and colleagues found very good internal consistency (average $\alpha = .88$). Test-retest correlations over one month were above $r = .50$ in nearly all samples. The CES-D has been validated in many diverse samples, including with adolescents (e.g., Crockett, Randall, Russell, & Driscoll, 2005; Cuijpers, Boluijt, & van Straten, 2008; Radloff, 1977, 1991)

In the current study, the CES-D was used as a measure of depressive symptomatology experienced by adolescents. The total score used in analyses was calculated by averaging the responses from each item. Total scores were considered missing for participants who did not answer more than two items (80% or better completed). For the current sample, internal consistency was high for the CES-D total score (Cronbach's $\alpha = .92$ at T1 and .93 at T2). In order to create a cut-off score, responses were summed and raw scores at or above 16 were considered to represent a problem with depression for each individual. The cut-off score of 16 has been repeatedly used in prior research (e.g., Roberts et al., 1990) as indicative of "psychological distress

that involves a large component of depressive symptomatology" (p. 126).

Multidimensional Anxiety Scale for Children (MASC)

The MASC (March, 1997) is a brief 39-item self-report measure of anxiety designed for children and adolescents (see Appendix C). It has been well validated in research and clinical settings and asks youth to rate on a 4-point Likert scale (0 to 3) how much they feel certain statements are true for them. Statements include: I feel tense or uptight, I try to stay near my mom and dad, and I worry about what other people will think of me. The MASC produces a total score, indicating overall level of anxiety, as well as several specific subscale scores indicating physical symptoms, harm avoidance, social anxiety, and separation/panic. March, Parker, Sullivan, Stallings, and Conners (1997) demonstrated good internal consistency of the MASC total score ($\alpha = .90$) and of the subscales (*alphas* ranging from .74 to .85). The MASC has shown excellent test-retest reliability at three weeks and three months ($r = .88$ and .87, respectively). Additionally, the MASC has been found to be moderately correlated with the Revised Children's Manifest Anxiety Scale ($r = .63$; March et al., 1997), thus demonstrating good concurrent validity.

In the present study, the MASC total score was used as a measure of the level of anxiety experienced by adolescents. The total score was calculated as the average score on each of the completed items of the measure. Total scores were considered missing for participants who did not answer more than nine items (80% or better completed), however of the participants with a non-missing total score, the highest number of missing items was three. In the current sample, internal consistency was high for the MASC total score (Cronbach's $\alpha = .90$ at both T1 and T2). In addition to using the raw scores on this

measure, the MASC's age and gender based norms were used to create T-scores that indicate each adolescent's level of anxiety relative to a nation-wide normative sample. A T-score at or above 60 was used as the cut-off for an anxiety problem for that individual.

Child Behavior Checklist – Youth Self Report (CBCL)

The CBCL (Achenbach & Rescorla, 2001) is a well validated and widely used measure of child and adolescent psychopathology (see Appendix D). It has generally demonstrated strong psychometric properties, including good internal consistency and test-retest reliability, as well as strong content and criterion-related validity. The CBCL contains 112-items that ask the individual to rate how true each statement is for him or her on a three point scale ranging from 0 (*Not true)* to 2 (*Very true*). In the present study, only the 30-item externalizing symptoms subscale, which assesses rates of aggressive and noncompliant behavior, was administered. Sample items include: I get in many fights, I am mean to others, and I steal things at home. A previous version of the externalizing scale has shown a high internal reliability (Cronbach's $\alpha = .89$ for boys and girls). The externalizing scale additionally breaks down into the Aggression and Delinquency subscales which have both shown high reliability in previous research ($\alpha > .80$; Achenbach, 1991).

In the present study, the CBCL-Aggression and CBCL-Delinquency subscales were used as measures of externalizing behavior by adolescents. The total score was calculated as the average score on each of the completed items of the measure. Total scores were considered missing for participants who did not answer more than two items on each subscale (80% or better completed). In the current sample, internal consistency was good for the CBCL – Aggression subscale score (Cronbach's $\alpha = .83$ at T1 and .82 at

T2) and adequate for the CBCL – Delinquency subscale score (Cronbach's α = .74 at T1 and .65 at T2). In addition to using the raw scores on this measure, cut-off scores that indicated a problem with aggression or delinquency were calculated. Adolescents with scores greater than one standard deviation above the grand mean on the subscale were considered above cut-off on either subscale.

Peer Group Variables

Peer group variables were assessed through a peer nomination task (see Appendix E). All participating youth were asked to nominate peers in response to the question "Who are the kids at school that you hang out with the most?" Consistent with prior research that indicates better psychometric characteristics when an unlimited nomination task is used (Holland & Leinhardt, 1973; Terry, 2000), youth were allowed to list as many of their peers as they would like on this questionnaire. All nominations were compiled and organized within a SNA framework (Wasserman & Faust, 1994) in order to create a social map of the peer network for the entire sample. Nominations for each time point were entered into separate Microsoft Excel spreadsheets in a columnar, or NEGOPY style, format. They were then translated into adjacency matrices using the Neg2Adj program (Richards, 1999). UCINet (Borgatti, Everett, & Freeman, 2002) was then used to create and analyze the resulting networks. An adjacency matrix is a square matrix of 1's and 0's with one row and column for each participant in the sample. When adolescent i nominates peer j, a 1 is entered into the i^{th} row and j^{th} column, with all other columns left at 0, indicating no nominations. The UCINet program then takes this matrix and, using definitions of network ties defined in Chapter 3 below, determines which peers constitute each adolescent's peer group representation. For example, if a friendship tie is

defined as whichever peer the target adolescent i nominates (as is the case for the ego-nominated peer group described below), then the peer group representation is composed of each of the peers whose columns have a 1 in row i of the adjacency matrix. UCINet can then combined the information about the peer group represented in the adjacency matrices with the psychopathology measure data. The program used the psychopathology measure scores for individuals within a target adolescent's peer group to create a mean score on that psychopathology measure for each adolescent's peer group.

Two pieces of information were used from the network analyses. The first was the rates of externalizing and internalizing behaviors (operationalized using the measures described above) within the peer group of each individual youth. Second, the density of each youth's peer group was calculated by dividing the number of links between friends of the youth by the maximum number of such links that were possible given the number of friends in the youth's peer group. UCINet was specifically chosen over other similar programs for the current study because, in addition to creating the network variables as described, it calculates characteristics of each adolescent's peer group. Most importantly, the program offers the ability to calculate the density of the peer group. This is accomplished by first determining each adolescent's peer group, as described above. Then, for the peer group (unique to each individual adolescent), the friendship links between the peers that compose that peer group (not including the target individual) are counted. For instance if a youth identified four friends, only two of which identified each other as friends, then the density for the youth was 1 (the number of friendship linkages between individuals in the peer group) over 6 (the total possible links between the

youth's identified friends) or approximately 17%. This calculation served as an objective measure of peer group density for the present study. During the nomination task, youth were also asked to identify the person on his/her list who he/she was closest to. Data from the measures collected from the individual the youth identified were used to represent the level of psychopathology of the closest friend.

Friendship Questionnaire

A second method of assessing an individual's peer group density was used. The Friendship Questionnaire (Veed & Inderbitzen-Nolan, 2005) is a 25-item self-report measure that asks adolescents to answer questions on their friendship network(s) (see Appendix F). It is designed to assess peer group density in a self-report format. The majority of questions are answered on a four-point Likert scale ranging from 0 (*This does not describe me at all*) to 3 (*This is completely true for me*). A sample item is I think any two of my friends would be comfortable going to a movie together. The measure has shown adequate psychometric characteristics in an initial investigation (Veed & Inderbitzen-Nolan, 2005) and was developed in a study similar to the present investigation. Initial results from the validation study of this measure were promising (α = .69 - .72). The Friendship Questionnaire is included as a measure of the adolescent's perceived or subjective network density (as opposed to the objective measure of peer group density described above).

While the measure does not yet have a standardized scoring system, a total score was derived from a subset of the items for the present study. To begin this process, the 25 items on the Friendship Questionnaire were reviewed and the seven items that were judged to be most related to the concept of peer group density were selected (Items 3, 8,

11, 16, 18, 19, and 22). These seven items were then entered into two exploratory factor analyses, the first examining these items using the T1 data and the second examining these items using the T2 data. A one-factor solution was forced for both T1 and T2 and the component matrix for each was considered. Four items strongly loaded (loadings greater than .40) on the one-factor solution at both T1 and T2. These items were: 3) Are most of your friends also good friends with each other?, 11) I have friends that do not like each other very much, 16) I think any two of my friends would be comfortable going to a movie together, and 18) I have friends who do not know each other at all. The total score was calculated by taking the mean across all four items. Any missing items resulted in a missing value for the total score (80% or better completed). One item (item 3) had a five-point Likert scale format and was multiplied by 4/5 before being included to place it on the same metric as the other four-point Likert scale items. One item (item 16) had to be reversed scored as its factor loadings were consistently negative. Once the mean score was calculated, it was reverse scored so that higher scores would indicate higher peer group density. Internal consistency for these items was adequate (Cronbach's $\alpha = .58$ at T1 and .61 at T2).

Procedures

Data collection was conducted on two consecutive days in both the fall and spring semesters approximately five months apart. Three to four weeks prior to the date of each data collection, a letter (see Appendix G) was mailed to the parents of all high school (grades 9 – 12) students enrolled in the chosen high school informing them of the study and providing them with the opportunity to disallow their children from participating. One challenge inherent in studying the peer network is the large amount of participation

required. Some research has suggested that at least 75% of the entire network is required for a nomination task, similar to the one used here, to produce valid results (Crick & Ladd, 1989). Therefore it was essential to capture as much of the in-school portion of the social network as possible. In order to accomplish this, prior research has employed passive consent procedures to increase the rate of consent from youth's parents. Passive consent alone is no longer considered acceptable under IRB policy due to the possibility of false consent. However, a waiver of consent is permitted for research meeting specific criteria, such as minimal risk to the participants and that the research is not possible without the waiver. The IRB granted a waiver of consent for the current study and the high school administration screened and approved of all procedures. Although not required given the waiver, passive consent procedures were additionally employed to give parents who did not want their adolescent to participate the opportunity to withdraw (this was documented in only one case).

On the days of the data collection, participating high school students were asked to assemble by grade level in their regular homeroom classrooms during a 20-minute study period. On the first day of data collection each semester, adolescents were fully informed of the study's goals and procedures and provided their own assent (see Appendix H). Once assent was obtained, the questionnaire packet containing the demographic questionnaire, CES-D, MASC, CBCL subscales, and Friendship Questionnaire was distributed by trained graduate and undergraduate research assistants. Research assistants were present each day to read standardized instructions to the participants, answer any questions or clarify any questionnaire item, and to monitor students to ensure that confidentiality was maintained. Participants were asked to quietly

complete each questionnaire and were allowed to work on other projects once they were finished. On the second day of data collection, participating adolescents completed the friend nomination task. When this was completed, any adolescent who had been absent the previous day was asked to complete the questionnaire packet; otherwise participants were allowed to work on other projects. Adolescents were not compensated for their participation.

Following each semester's data collection, questionnaires and nomination forms were assigned identification numbers, a key linking names and identification numbers was made, and the participants' names were removed from the questionnaire packets. Data entry commenced with the peer nomination forms as these still contained participants' names. Using the key, these names were converted into identification numbers and entered. The peer nomination forms were then stored in a locked location apart from other data related to the study and will be destroyed five years following the completion of the study. All data entry was performed by the primary investigator. To ensure accurate data entry of the nominations, a random sample of 25% of the nomination forms from the fall data collection were also entered by a graduate student unfamiliar with the research project. For this subsample of cases, inter-rater consistency was 98.5%. As a result of this high level of consistency, no further data verification was completed.

Further investigation into adolescents who completed T1 questionnaires but not T2 questionnaires revealed that adolescents missing at T2 had equivalent MASC and CES-D total scores ($F(1, 169) \leq .66$, $p \geq .42$) but higher CBCL - Aggression ($F(1, 167) =$

4.78, $p = .03$) and Delinquency ($F(1, 168) = 17.18$, $p < .001$) scores compared to adolescents that had complete data at both time points.

Analysis Plan

The proposed hypotheses were examined in two chapters separated by the core purpose of each set of hypotheses. In the first chapter of the results, the relation between peer group psychopathology and individual psychopathology was investigated in several ways. First, the relation between specific individual psychopathology, assessed via the internalizing and externalizing measures described above, and the level of similar psychopathology in the peer network was investigated cross-sectionally (e.g., whether individuals with peer networks containing peers high in anxiety also reported high levels of anxiety) twice at both T1 and T2. For these analyses the level of peer group member psychopathology was operationalized in two ways. The first approach used the mean of peer group members' scores for each psychopathology measure. The second examined the percentage of the individuals within the peer group demonstrating presence/absence of psychopathology based on cut-off values on each psychopathology measure. These analyses attempted to replicate similar relations found throughout the literature.

Second, the relations between individual symptomatology and peer network symptomatology were examined longitudinally between the two time points. Therefore the relation between an adolescent's peers' report of psychopathology at T1 and that adolescent's report of psychopathology at T2 was examined. These relations were controlled for the adolescent's report of psychopathology at T1 in order to examine only the change in psychopathology across the school year as it is related to peer report of

psychopathology. This second set of analyses allowed a better test of the causal link between peer group member psychopathology and later individual psychopathology.

Third, the T1 closest friend's report of psychopathology was added to the previous model in order to examine the comparative predictive strength of group versus friendship level predictors. If group level variables remained significant predictors of T2 individual psychopathology after the closest friend variables were added to the model, this was interpreted as a sign that the group level variables uniquely added to the prediction of individual psychopathology above the influence of the closest friend's psychopathology.

In the second results chapter, several moderators of the relation between peer group psychopathology and the change in individual psychopathology over time were explored. First, peer network density was investigated as a moderator of these relations by including it as an interaction term in the regression model, in order to assess if denser peer groups were related to a stronger relation between peer psychopathology at T1 and individual psychopathology at T2 (e.g., whether the association between T1 peer group psychopathology and T2 individual psychopathology was stronger for adolescents in denser peer groups). By assessing the role that peer network density played in the transmission of psychopathology from peers to individuals, a mechanism by which peers may spread psychopathology to individuals, namely the cohesion or amount of interconnectedness of the group members, was examined in more detail. These analyses were conducted using "objective" peer network density (e.g., obtained from the peer network map) and "subjective" peer network density (e.g., the total score of the Friendship Questionnaire).

Second, the strength of the relation between individual and peer group member psychopathology was examined across age and grade cohorts in order to test the hypothesis that the peer group's role was stronger in early and middle adolescence and then decreased in later adolescence. These analyses were conducted by including age and/or grade as an interaction term in the regression models that predicted individual psychopathology at T2 from peer group psychopathology at T1 and individual report of psychopathology at T1. Curvilinear effects of grade were examined as well.

Finally, the moderating effect of gender was tested in a similar fashion (by adding it as an interaction term to the regression model that predicted individual psychopathology at T2 from peer group psychopathology at T1 and individual report of psychopathology at T1) in order to test the hypothesis that the influence of the peer group on an individual's level of psychopathology was different between boys and girls.

CHAPTER 3: Results I

In this chapter, the first three of the six hypotheses will be examined. These hypotheses relate to the question of whether or not the level of psychopathology existing in the peer group is related to and potentially influential to the level of psychopathology reported by the individual adolescent. The first set of analyses investigates this question cross-sectionally, under the hypothesis that peer group psychopathology will be consistently related to individual psychopathology at both time points of the current study. In addition to attempting to replicate much of the literature on the role of the adolescent peer group in psychopathology, these analyses build the foundation of methodological and statistical steps, described below, upon which the other analyses are conducted. The second set of analyses investigates the hypothesis that the peer group influences the individual adolescent over time. While the first set of analyses establishes a relation between the peer group and individual levels of psychopathology, the second examines this relation longitudinally. After first computing the bivariate correlations between initial peer group and later individual report of psychopathology, each analysis in the second set is controlled for the individual adolescent's initial level of reported psychopathology in order to control for selection effects caused by adolescents choosing peer groups similar to themselves in level of psychopathology. Finally, the third set of analyses complements the first two by investigating the comparative strength of the relation between the individual and his/her peer group and the relation between the individual and his/her self-identified closest friend. This hypothesis for these analyses is that both closest friend and peer group level of psychopathology will be influential but

that the influence of the peer group will uniquely adds to the understanding of the individual once the influence of the closest friend is considered.

Preliminary Analyses

All quantitative dependent and independent variables were first examined for the presence of significant skewness or outliers to ensure that the assumptions of the methods used for more advanced analyses were met. Outliers were identified through cut-offs created by calculating the interquartile range (IQR) between the 1st and 3rd quartile, multiplying the IQR by 1.5, and subtracting the resulting value from the 1st quartile value (lower bound) and adding it to the 3rd quartile value (upper bound). For the CES-D total score, CBCL Aggression score, and CBCL Delinquency score at T1 as well as the CBCL Delinquency score at T2, several outliers existed and these were Winsorized to the nearest acceptable value (the lower or upper bound). For the CES-D total score at T2, evidence of skewness was found (skewness statistic = 1.18). This skewness was corrected through a square-root transformation. These cleaned variables were then used to compute network characteristics.

The internal consistency of these measures at both T1 and T2 was largely consistent with what has been found in previous research (Cronbach's alpha ranged from .82 to .93). For the CBCL Delinquency subscale the internal consistency was slightly lower than previous research, though still adequate to good (α = .74 / .65 for T1/T2 respectively). Means and standard deviations for each measure and percentages of scores falling above the cut-off values at T1 and T2 are presented in Table 3.1 along with the results of within groups (repeated measures) ANOVA significance tests comparing these values across T1 and T2. As this table shows, total scores on the MASC decreased from

T1 to T2, while scores on the CBCL Aggression and Delinquency subscales increased. The CES-D scores remained relatively constant over the school year. The frequency of above cut-off cases remained stable for the MASC and CES-D over the school year. For the CBCL Aggression and Delinquency subscales, the cut-off was determined by adding one standard deviation to the mean for each time point and as a result no change in rate of cases above the cut-off was expected. Surprisingly, a significant increase in the number of adolescents falling above the cut-off was found for the CBCL Delinquency subscale. This likely reflects the fact that the most delinquent adolescents at T1 completed the CBCL at T2 less often than did their less delinquent peers, as described above in the discussion of attrition between the two time points. As a result, when complete data at both time points are required, such as when comparing means across time points, the rate of delinquency at T1 is artificially deflated (10% as opposed to the observed 15% reported in Table 3.1).

Table 3.1

Means and Standard Deviations for Psychopathology Variables at T1 and T2

Psychopathology Variable	T1 (Fall) *M* (*SD*) or *n* (%)	T2 (Spring) *M* (*SD*) or *n* (%)	*F*
MASC Total Score	.99 (.37)	.94 (.38)	$F(1, 147) = 4.95$*
Number Above MASC Cut-off	19 (12%)	12 (8%)	$F(1, 145) = 2.01$
CES-D Total Score	.68 (.48)	.78 (.35)†	$F(1, 147) = 2.32$
Number Above CES-D	61 (36%)	54 (34%)	$F(1, 145) = .03$

Cut-off			
CBCL – Aggression Total Score	.46 (.28)	.49 (.29)	$F(1, 144) = 5.50$*
Number Above CBCL – Aggression Cut-off	28 (17%)	25 (16%)	$F(1, 144) = .39$
CBCL - Delinquency Total Score	.34 (.25)	.35 (.24)	$F(1, 146) = 4.76$*
Number Above CBCL – Delinquency Cut-off	26 (15%)	26 (16%)	$F(1, 146) = 3.93$*

† Square-root transformation. Significance testing performed on un-transformed variable.

* $p < .05$

As would be expected, the correlations between measures collected at T1 and the corresponding measure collected at T2 were high. For the MASC total score, $r(148) = .72$, $p < .001$. For the CES-D total score, $r(148) = .65$, $p < .001$. For the CBCL – Aggression score, $r(145) = .70$, $p < .001$. And for the CBCL – Delinquency subscale, $r(147) = .63$, $p < .001$. These test-retest results over a 5-month interval are similar to or higher than have been reported for each measure in prior literature.

Correlations among the four measures are shown in Table 3.2. As can be seen, the MASC and CES-D total scores were strongly positively correlated at each time point as were the CBCL – Aggression and Delinquency subscales. The MASC total score only positively correlated with the CBCL – Aggression subscale at T1 and was not correlated with the CBCL subscales at T2. However, the CES-D was significantly positively correlated with the CBCL-Aggression and Delinquency subscales consistently at each time point.

Table 3.2

Correlations between Primary Psychopathology Measures at T1 and T2

	MASC Avg	CES-D Avg	CBCL – Aggression	CBCL - Delinquency
MASC Avg	-	.55***	.13	.07
CES-D Avg	.57***	-	.39***	.42***
CBCL – Aggression	.20**	.43***	-	.66***
CBCL - Delinquency	.05	.40***	.66***	-

Note. T1 cross-sectional correlations shown below the diagonal. T2 cross-sectional correlations shown above the diagonal.

* $p < .05$, ** $p < .01$, *** $p < .001$

Of the 158 adolescents that listed at least one valid friend nomination at T1, 138 (87%) selected a valid closest friend. A friend nomination was considered valid if the name was recognizable as another subject in the sample and had been assigned a subject number. A closest friend's nomination was considered valid if the name was

recognizable as another subject in the sample and had been assigned a subject number and only one name was chosen as the closest friend. Of the 126 adolescents that listed at least one valid friend nomination at T2, 100 (79%) selected a valid closest friend. The means and standard deviations and percentages of scores falling above the cut-off values for each measure for those adolescents identified as closest friends by their peers are presented in Table 3.3 for T1 and T2. Visual inspection reveals that means for closest friends did not greatly differ from the mean values of the sample as a whole and the percent of closest friends that fell above the cut-off scores was roughly equivalent to that of the main sample. This is not surprising given the closest friends were drawn from the main sample. In addition, the means and percentages of above cut-off scores did not significantly change from T1 to T2 for closest friends.

Table 3.3

Means and Standard Deviations for Psychopathology Variables at T1 and T2 for Closest Friends

Psychopathology Variable	Fall sample *M* (*SD*) or *n* (%)	Spring sample *M* (*SD*) or *n* (%)	*F*
MASC Total Score	.99 (.38)	.93 (.38)	$F(1, 78) = 2.93$
Number Above MASC Cut-off	14 (10%)	5 (5%)	$F(1, 76) = .69$
CES-D Total Score	.71 (.46)	.77 (.37) †	$F(1, 77) = .44$
Number Above CES-D Cut-off	53 (38%)	37 (37%)	$F(1, 78) = 1.65$

CBCL – Aggression Total Score	.45 (.27)	.47 (.28)	$F(1, 76) = .28$
Number Above CBCL – Aggression Cut-off	17 (12%)	13 (13%)	$F(1, 78) = .60$
CBCL - Delinquency Total Score	.33 (.24)	.35 (.25)	$F(1, 76) = .08$
Number Above CBCL – Delinquency Cut-off	24 (17%)	18 (18%)	$F(1, 78) = 0$

† Square-root transformation. Significance testing performed on un-transformed variable.

* $p < .05$

Peer Network Preliminary Analyses

When conducting Social Network Analyses, there are several ways to construct the social network variables, in this case, the peer group, each of which has implications for the network's basic characteristics as well as the network level predictor variables. The three ways to construct the peer group variables described here are termed the ego-nominated, the inclusive, and the reciprocated networks. Each is explained here along with the characteristics of the peer network when defined in each way. The diagram in Figure 3.1 displays the way in which these three methods of constructing the peer group variables relate to each other and how both outgoing (peers that the individual nominates) and incoming (times in which the individual is nominated by peers) nominations combine

to form the three different peer groups. The ego-nominated way of constructing the peer group variables uses the adolescent's nominations as the sole source of information about the peer group. For example, if Joe nominates Alina, Matt, and John as friends, Joe's peer group is said to consist of these three individuals, regardless of whether or not Alina, Matt, or John nominated Joe as a friend and regardless of the fact that Isla nominated Joe as a friend.

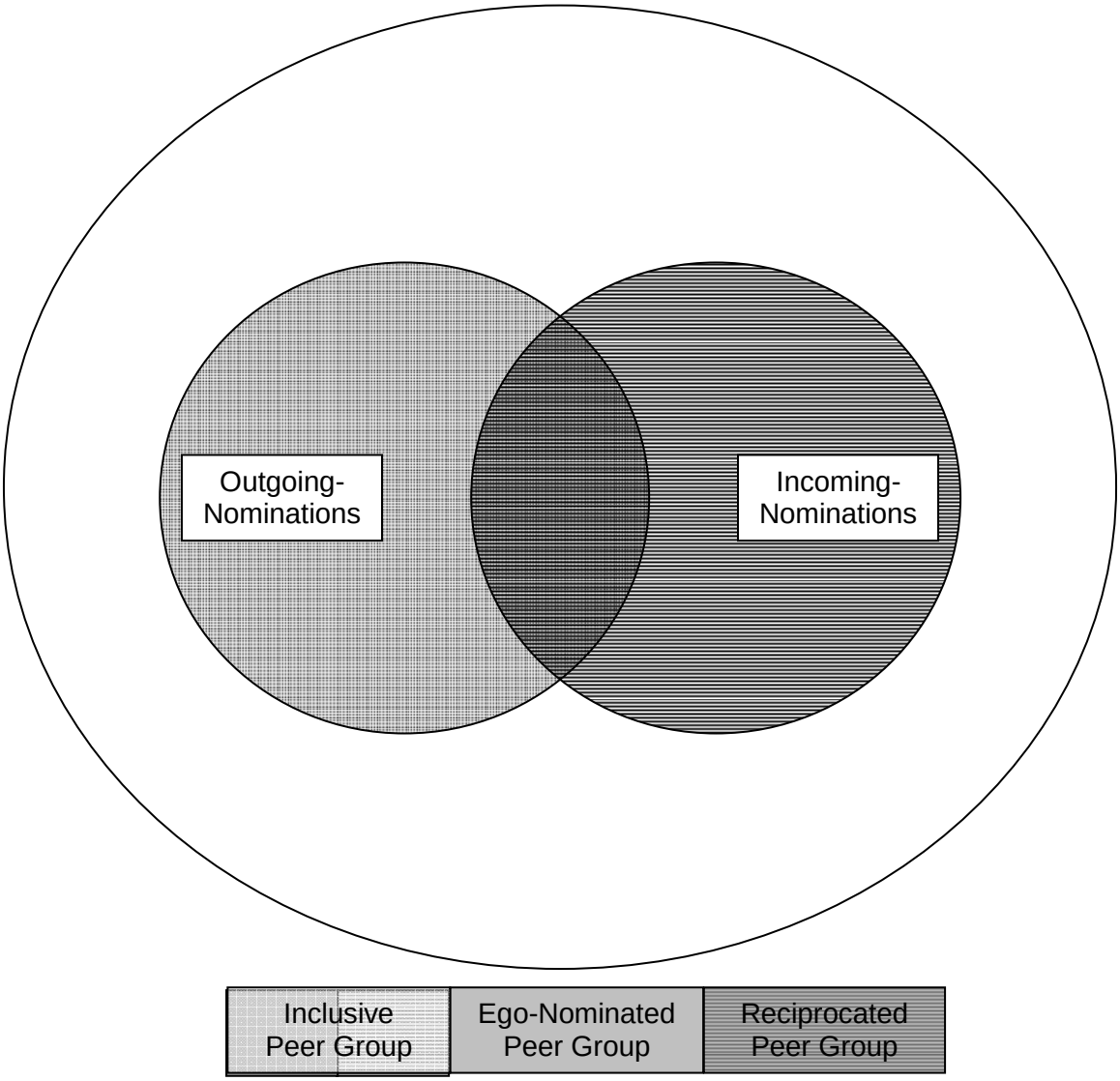

Figure 3.1

Venn Diagram of Relation Between the Peer Network and Different Methods of Constructing the Peer Group Variables.

When constructing the T1 peer group variables using the ego-nominated method, a total of 158 adolescents belonged to the total network (i.e., listed at least one valid friend nomination) which was composed of 2,486 friendship ties, or links between individual adolescents regardless of whether these links were reciprocated. Adolescents had between one and 50 valid friends in their peer group, with a mean value of 15.73 (*SD* = 8.76) friends per adolescent. Within each individual peer group, a mean of 96.42 (*SD* = 91.36) friendship ties existed between the friends of each individual (range 0 – 498). Thus the overall mean network density (calculated as the number of ties that are reported divided by the number of ties possible) was 37.43 (*SD* = 16.80). Peer group means and standard deviations for psychopathology measures are presented in Table 3.4. The percentage of the individuals within each peer group that scored above cut-off for each measure is also presented in Table 3.4. As an example, on average 11% of the individuals within an adolescent's peer group fell above cut-off on the MASC. An alternative way of considering the cut-off variable in the peer group is to consider the peer groups that have at least one member who scored above the cut-off on a given measure. This occurred frequently in the ego-nominated network, with 78% of peer groups having at least one person above cut-off on the MASC, 95% having at least one person above cut-off on the CES-D, 89% having at least one person above cut-off on the CBCL-Aggression subscale, and 79% having at least one person above cut-off on the CBCL-Delinquency subscale.

Table 3.4

Means and Standard Deviations for Psychopathology Variables at T1 for Various Ways of Creating the Social Network

Psychopathology Variable	Inclusive *M* (*SD*)	Ego-nominated *M* (*SD*)	Reciprocated *M* (*SD*)
MASC Total Score	.99 (.12)	.98 (.14)	1.00 (.19)
MASC Above Cut-off Rate	.11 (.07)	.11 (.08)	.11 (.12)
CES-D Total Score	.70 (.16)	.67 (.20)	.70 (.26)
CES-D Above Cut-off Rate	.36 (.17)	.34 (.19)	.34 (.25)
CBCL – Aggression Total Score	.49 (.09)	.48 (.13)	.49 (.16)
CBCL – Aggression Above Cut-off Rate	.18 (.12)	.17 (.15)	.18 (.20)
CBCL - Delinquency Total Score	.34 (.08)	.34 (.19)	.34 (.13)
CBCL – Delinquency Above Cut-off Rate	.15 (.13)	.16 (.17)	.15 (.21)

The ego-nominated method of constructing the peer group variables is the most susceptible to response bias when attempting to construct an accurate representation of the "true" social network since adolescents may not remember to nominate all of the individuals in their peer group or may deliberately not nominate peers that belong in their

group. One approach designed to counter any potential underinclusion, is the inclusive method of constructing the peer group representation. The inclusive method of constructing the peer group variables uses both the target adolescent's nominations as well as any other adolescents that may have nominated the target adolescent. To continue with the example from above, Joe had nominated Alina, Matt, and John as friends. However, Isla had nominated Joe on her questionnaire. Using the inclusive way of constructing the peer group variables, Joe's group is said to consist of all four individuals.

When constructing the T1 peer group variables using the inclusive method, a total of 178 adolescents belonged to the total network (i.e., listed at least one valid friend nomination or were listed by a peer) which was composed of 3,648 friendship ties, or links between individual adolescents regardless of whether these links were reciprocated. Adolescents had between one and 52 valid friends in their peer group, with a mean value of 20.49 (*SD* = 10.35) friends per adolescent. Within each individual peer group, a mean of 146.46 (*SD* = 127.05) friendship ties existed between the friends of each individual with each other (range 0 – 549). Thus the overall mean network density (calculated as the number of ties that are reported divided by the number of ties possible) was 32.38 (*SD* = 13.29). Not surprisingly, given the inclusive method's more liberal friendship criteria, many of these values are higher than those from the ego-nominated network. Density, however, is slightly lower since a more inclusive network creates a greater possible number of linkages in the denominator of the density calculation. Peer group means and standard deviations for psychopathology measures are presented in Table 3.4. The percentage of the individuals within each peer group that scored above cut-off is also

presented in Table 3.4. As an example, on average 36% of the individuals within an adolescent's peer group fell above cut-off on the CES-D. Rates of having at least one peer group member who scored above the cut-off on a given measure were also high in the inclusive network, with 84% of peer groups having at least one person above cut-off on the MASC, 98% having at least one person above cut-off on the CES-D, 93% having at least one person above cut-off on the CBCL-Aggression subscale, and 83% having at least one person above cut-off on the CBCL-Delinquency subscale.

Just as the ego-nominated method of constructing the peer group representation is susceptible to underinclusion, it is also susceptible to overinclusion as adolescents may nominate peers that do not legitimately belong in their peer group or who do not consider the adolescent to be their friend. One approach designed to counter any potential overinclusion is the reciprocated method of constructing the peer group variables (Wasserman & Faust, 1994). The reciprocated method of constructing the peer group variables requires both the target adolescent to nominate an individual *and* that individual to nominate the target adolescent. Again continuing with the example from above, Joe has nominated Alina, Matt, and John. However, only Alina and Matt have nominated Joe in return. John has not. Using the reciprocated method of constructing the peer group variables, Joe's group is said to consist of only two individuals (Alina and Matt). Isla is not included since Joe did not nominate her to begin with.

When constructing the T1 peer group variables using the reciprocated method, a total of 155 adolescents belonged to the total network (i.e., had at least one valid friend nomination that was reciprocated). Unfortunately, the UCINet program does not calculate basic attributes of the network when the reciprocated method is used. Therefore

only characteristics of the psychopathology measures are reported here. Peer group means and standard deviations for psychopathology measures are presented in Table 3.4. The percentage of the individuals within each peer group that scored above cut-off is also presented in Table 3.4. As an example, individuals within an adolescent's peer group reported an average score of 1.00 on the MASC. Rates of at least one member who scored above the cut-off on a given measure were lower but still reasonably high in the reciprocated network, with 60% of peer groups having at least one person above cut-off on the MASC, 87% having at least one person above cut-off on the CES-D, 76% having at least one person above cut-off on the CBCL-Aggression subscale, and 61% having at least one person above cut-off on the CBCL-Delinquency subscale.

Hypothesis One: Cross-Sectional Analyses

In order to examine the question of whether an adolescent's rate of specific forms of psychopathology (anxiety, depression, aggression, and delinquency) was associated with the rate of these forms of psychopathology within their peer group (not including the target adolescent's report), a series of cross-sectional analyses was conducted on both the T1 and T2 data. Three approaches were used to address this question and these are each explained in turn. First, to examine whether the individual's total score on a psychopathology measure was associated with the average total score of his/her peer group on that measure, a series of correlations was computed. These results are shown in Table 3.5 (for the complete correlation matrix, see Appendix I). Individual scores could be correlated with peer group scores in three different ways, each corresponding to the methods of constructing the peer group variables described above (inclusive, ego-nominated, and reciprocated). Results are presented in tables with these methods

organized from left to right, from most inclusive to least inclusive (i.e., inclusive, ego-nominated, reciprocated).

Table 3.5

Correlations between Individual and Mean Peer Group Psychopathology Measures at T1 and T2 Organized by Method of Constructing the Peer Group Variables

	MASC Total			CES-D Total			CBCL – Agg			CBCL - Del		
Peer Group Variables	1	2	3	1	2	3	1	2	3	1	2	3
					T1 (Fall)							
MASC Total	.09	.19*	.21**									
CES-D Total				.15*	.20*	.26**						
CBCL – Agg							.20**	.11	.12			
CBCL - Del										.27**	.14	.16*
					T2 (Spring)							
MASC Total	.21*	.22*	.24**									
CES-D Total				.09	.13	.21*						
CBCL – Agg							.06	.06	.01			
CBCL - Del										.06	.05	.11

Note. [1] Inclusive, [2] Ego-Nominated, [3] Reciprocated.

* $p < .05$, ** $p < .01$

Relations Between Individual Mean Scores and Peer Group Mean Scores

At T1, individual total scores on the MASC were significantly correlated with peer group average MASC scores only for the ego-nominated and reciprocated peer groups (see Table 3.5). Individual total scores on the CES-D were significantly correlated with peer group average CES-D scores for the inclusive, ego-nominated, and reciprocated peer groups. Individual scores on the CES-D were also significantly correlated with peer group average MASC scores for the ego-nominated and reciprocated peer groups. Individual scores on the CBCL – Aggression subscale were significantly correlated with peer group average CBCL – Aggression and CBCL – Delinquency scores only for the inclusive peer group. Finally, individual scores on the CBCL – Delinquency subscale were significantly correlated with peer group average CBCL – Delinquency scores only for the inclusive and reciprocated peer groups. Individual scores on the CBCL – Delinquency subscale were also significantly correlated with the peer group average CES-D scores and CBCL – Aggression scores only for the inclusive peer group. All correlations, when significant, were positive and fell between small and medium sized according to Cohen's criteria (1988). These results showed mixed support for the hypothesis that individual psychopathology would be associated with peer group level psychopathology. Support for this hypothesis appeared to be related to the way in which the peer group variables were constructed.

At T2, individual total scores on the MASC were significantly correlated with peer group average MASC and CES-D scores for the inclusive, ego-nominated, and reciprocated peer groups. Individual total scores on the CES-D were significantly correlated with peer group average CES-D and MASC scores only for the reciprocated

peer groups. Individual scores on the CBCL – Aggression and CBCL – Delinquency subscale were not significantly correlated with any peer group average psychopathology, regardless of the method used to construct the peer group variables. Again all significant correlations were positive and fell between small and medium sized effects. The only findings that were consistently significant at both T1 and T2 were that the individual MASC scores positively correlated with the peer group average MASC scores for the ego-nominated and reciprocated peer groups and that individual CES-D scores positively correlated with peer group average MASC and CES-D scores for the reciprocated peer group.

Relations Between Individual Mean Scores and Percentage of the Peer Group Falling Above the Cut-Off

Second, to examine whether or not the individual's total score on a psychopathology measure was associated with a greater frequency of above cut-off scores in their peer group, a series of correlations between the individual's total scores and the percentage of his/her peer group falling above the cut-off on the various measures was computed. These results are shown in Table 3.6. Again, each different method of constructing the peer group variables is shown in decreasing order of inclusiveness. At T1, individual scores on the MASC were not significantly correlated with the percentage of the individual's peer group that fell above the cut-off on the MASC, regardless of the method used to construct the peer group variables. Individual scores on the CES-D were significantly correlated with the percentage of the individual's peer group that fell above the cut-off on the CES-D only for the ego-nominated and reciprocated peer groups. Individual scores on the CBCL – Aggression subscale were not significantly correlated

with the percentage of the individual's peer group that fell above the cut-off on the CBCL – Aggression subscale, regardless of the method used to construct the peer group variables. Individual scores on the CBCL - Delinquency subscale were significantly correlated with the percentage of the individual's peer group that fell above the cut-off on the CBCL – Delinquency subscale for the inclusive, ego-nominated, and reciprocated peer groups. All correlations, when significant, were positive and fell between small and medium sized according to Cohen's criteria.

Table 3.6

Correlations between Individual Psychopathology Measures and Rate of Peers Falling Above Cut-off at T1 and T2 Organized by Method of Constructing the Peer Group Variables

	MASC Total			CES-D Total			CBCL – Agg			CBCL - Del		
Percentage of Peers Above Cut-off	1	2	3	1	2	3	1	2	3	1	2	3
						T1 (Fall)						
MASC	-.13	.06	.10									
CES-D				.14	.21**	.32**						
CBCL – Agg							.11	.10	.04			
CBCL - Del										.28**	.19 *	.21*

				T2 (Spring)								
MASC	-.08	.05	.14									
CES-D				.12	.13	.11						
CBCL – Agg							-.07	-.09	-.13			*
CBCL - Del										.06	.12	.20

Note. [1] Inclusive, [2] Ego-Nominated, [3] Reciprocated.

* $p < .05$, ** $p < .01$, *** $p < .001$

At T2, individual scores on the MASC were not significantly correlated with the percentage of the individual's peer group that fell above the cut-off on the MASC, regardless of the method used to construct the peer group variables. Individual scores on the CES-D and CBCL – Aggression subscale were not significantly correlated with the percentage of the individual's peer group that fell above the cut-off on these measures, regardless of the method used to construct the peer group variables. Individual scores on the CBCL-Delinquency subscale were significantly positively correlated with the percentage of the individual's peer group that fell above the cut-off on the CBCL-Delinquency subscale for the reciprocated network. This was the only finding that was consistently significant at both T1 and T2.

Mean Differences Between Individuals Falling Above and Below the Cut-Off for Percentage of the Peer Group Falling Above the Cut-Off

Third, to examine if an individual who fell above the cut-off on a psychopathology measure had a peer group with a greater frequency of above cut-off

scores than an individual who fell below the cut-off, a series of ANOVA's was computed comparing the percentage of peers falling above the cut-off for individuals who did and did not fall above the cut-off themselves. These results are shown in Table 3.7 for the inclusive peer group, Table 3.8 for the ego-nominated peer group, and Table 3.9 for the reciprocated peer group.

Table 3.7

Means for Percentage of Inclusive Peer Group Above Cut-off on Psychopathology Variables For Individuals Above and Below Cut-off at T1 and T2

Psychopathology Variable	*M* (*SD*)	*df*	*F*	*p*
		T1 (Fall)		
MASC Cut-off		1, 162	12.26	< .001
Above	.06 (.04)			
Below	.12 (.07)			
CES-D Cut-off		1, 168	6.86	.01
Above	.40 (.16)			
Below	.34 (.16)			
CBCL – Aggression Cut-off		1, 166	.49	.49
Above	.20 (.12)			
Below	.18 (.12)			
CBCL – Delinquency Cut-off		1, 167	13.71	< .001
Above	.23 (.13)			
Below	.13 (.12)			
		T2 (Spring)		
MASC Cut-off		1, 155	.69	.41
Above	.05 (.06)			
Below	.07 (.06)			
CES-D Cut-off		1, 154	.90	.35
Above	.35 (.12)			

Below	.32 (.16)			
CBCL – Aggression Cut-off		1, 153	5.17	.02
Above	.13 (.08)			
Below	.19 (.12)			
CBCL – Delinquency Cut-off		1, 155	2.78	.10
Above	.19 (.16)			
Below	.14 (.12)			

Table 3.8

Means for Percentage of Ego-Nominated Peer Group Above Cut-off on Psychopathology Variables For Individuals Above and Below Cut-off at T1 and T2

Psychopathology Variable	*M* (*SD*)	*df*	*F*	*p*
		T1 (Fall)		
MASC Cut-off		1, 150	3.82	.05
Above	.08 (.06)			
Below	.12 (.08)			
CES-D Cut-off		1, 155	9.43	< .01
Above	.40 (.18)			
Below	.31 (.18)			
CBCL – Aggression Cut-off		1, 153	.35	.55
Above	.19 (.14)			
Below	.17 (.15)			
CBCL – Delinquency Cut-off		1, 154	3.25	.07
Above	.23 (.13)			
Below	.15 (.18)			
		T2 (Spring)		
MASC Cut-off		1, 123	.26	.61
Above	.04 (.05)			
Below	.05 (.06)			
CES-D Cut-off		1, 122	2.64	.11
Above	.35 (.14)			

Below	.30 (.17)			
CBCL – Aggression Cut-off		1, 122	4.92	.03
Above	.12 (.10)			
Below	.17 (.09)			
CBCL – Delinquency Cut-off		1, 123	3.03	.08
Above	.19 (.16)			
Below	.14 (.11)			

Table 3.9

Means for Percentage of Reciprocated Peer Group Above Cut-off on Psychopathology Variables For Individuals Above and Below Cut-off at T1 and T2

Psychopathology Variable	*M* (*SD*)	*df*	*F*	*p*
		T1 (Fall)		
MASC Cut-off		1, 146	.28	.60
Above	.10 (.10)			
Below	.11 (.12)			
CES-D Cut-off		1, 152	22.11	< .001
Above	.47 (.28)			
Below	.28 (.21)			
CBCL – Aggression Cut-off		1, 150	.02	.88
Above	.19 (.18)			
Below	.18 (.20)			
CBCL – Delinquency Cut-off		1, 151	5.69	.02
Above	.25 (.29)			
Below	.13 (.19)			
		T2 (Spring)		
MASC Cut-off		1, 120	.02	.88
Above	.05 (.08)			
Below	.05 (.09)			
CES-D Cut-off		1, 119	1.42	.24
Above	.39 (.19)			

	Below	.34 (.24)		
CBCL – Aggression Cut-off		1, 119	2.65	.11
	Above	.11 (.12)		
	Below	.18 (.18)		
CBCL – Delinquency Cut-off		1, 120	4.22	.04
	Above	.23 (.26)		
	Below	.13 (.16)		

At T1, percentages of peers falling above cut-off on the MASC were not significantly different for individuals who fell above or below the cut-off on the MASC for the ego-nominated and reciprocated peer groups. For the inclusive peer group, individuals who scored above the cut-off on the MASC had a smaller percentage of their peer group that fell above the cut-off than individuals who scored below the cut-off. This result was in the opposite direction of what was predicted and may have been related to the low frequency with which individuals fell above the cut-off on the MASC. Percentage of peers falling above cut-off on the CES-D was significantly higher for individuals who fell above the cut-off on the CES-D than for individuals who scored below the cut-off for the inclusive, ego-nominated, and reciprocated peer groups. Percentage of peers falling above cut-off on the CBCL – Aggression subscale was not significantly different for individuals who fell above or below the cut-off on the CBCL – Aggression regardless of the method used for constructing the peer group variables. Percentage of peers falling above cut-off on the CBCL – Delinquency subscale was significantly higher for individuals who fell above the cut-off on the CBCL –

Delinquency subscale than for individuals who scored below the cut-off for the inclusive and reciprocated peer groups. There was no significant difference between individuals scoring above or below the cut-off on the CBCL – Delinquency subscale for the ego-nominated peer group.

At T2, percentages of peers falling above cut-off on the MASC were not significantly different for individuals who fell above or below the cut-off on the MASC regardless of the method used for constructing the peer group variables. Percentages of peers falling above cut-off on the CES-D were not significantly different for individuals who fell above or below the cut-off on the CES-D regardless of the method used for constructing the peer group variables. For the inclusive and ego-nominated peer groups, individuals who scored above the cut-off on the CBCL – Aggression subscale had a smaller percentage of their peer group that fell above the cut-off than individuals who scored below the cut-off. This result was in the opposite direction of what was predicted. There was no significant difference between individuals scoring above or below the cut-off on the CBCL – Aggression subscale for the reciprocated peer group. Finally, there was no significant difference between individuals scoring above or below the cut-off on the CBCL – Delinquency subscale for the inclusive and ego-nominated peer groups. Percentage of peers in the reciprocated peer group falling above cut-off on the CBCL – Delinquency subscale was significantly higher for individuals who fell above the cut-off on the CBCL – Delinquency subscale than for individuals who scored below the cut-off. This was the only finding that was consistently significant at both T1 and T2.

Overall, these results show mixed support for the hypothesis that individual adolescent psychopathology measures would be associated with peer group level

psychopathology measures. Inconsistency between T1 and T2 was observed for all but a very few results. The consistent results were the correlations between individual and peer group average MASC scores for the ego-nominated and reciprocated peer groups, the correlation between the individual and peer group average CES-D scores for the reciprocated peer group, and the relation between the percentage of the reciprocated peer group that fell above the cut-off scores and individual scores, whether operationalized as a cut-off or mean score, on the CBCL – Delinquency subscale. It is noteworthy that only in the reciprocated peer group were significant results supportive of the hypothesis found consistently across time and form of psychopathology. In addition at T1, support for the hypothesis appeared to be related to the way in which the peer group variables are constructed. For example, for internalizing measures (i.e., the MASC and CES-D), stronger and more consistent relations were observed for the ego-nominated and reciprocated peer groups. On the other hand, for externalizing measures (primarily on the CBCL – Delinquency subscale), relations generally appeared for the inclusive peer group at T1.

Hypothesis Two: Longitudinal Analyses

In order to better test a causal link between peer group member psychopathology and later individual psychopathology, this relation was examined longitudinally in regression models. The same three approaches described in the above cross-sectional analyses are again examined in turn (i.e., do individual psychopathology measures correlate with average peer group psychopathology measures, do individual psychopathology measures correlate with the percentage of the peer group falling above the cut-off, and do individuals who fall above cut-off on a psychopathology measure have

peer groups with a higher percentage of their peer group who also fall above the cut-off). For each analysis, a step-wise progression is followed. First, the bivariate relation between peer group psychopathology measures at T1 and the individual's psychopathology measures at T2 is examined. If this relation is significant, then the individual's psychopathology measure at T1 is included as a control in the regression model. This allows for a test of whether the peer group psychopathology measures at T1 are associated with a change in an individual's psychopathology measures, and therefore whether the peer group influences the individual's report of psychopathology.

Relations Between Individual Mean Scores and Peer Group Mean Scores

First, bivariate correlations between T1 average peer group psychopathology measure scores and T2 individual psychopathology measure scores are presented in Table 3.10 (the complete correlation matrix is presented in Appendix J). As before, results are presented for each of the three methods of constructing the peer group variables, organized from left to right moving from most inclusive to least inclusive. Peer group average MASC scores at T1 were significantly positively correlated with T2 individual MASC scores for both the ego-nominated and reciprocated peer groups. The correlation was not significant for the inclusive peer group. Peer group average CES-D scores at T1 were significantly positively correlated with T2 individual CES-D scores for the inclusive, ego-nominated, and reciprocated peer groups. Peer group average CBCL – Aggression scores at T1 were not significantly correlated with T2 individual CBCL – Aggression scores regardless of the method used to construct the peer group variables. Finally, peer group average CBCL – Delinquency scores at T1 were significantly positively correlated with T2 individual CBCL – Delinquency scores for both the

inclusive and ego-nominated peer groups. The correlation was not significant for the reciprocated peer group.

Table 3.10

Correlations between Peer Group Psychopathology Measures at T1 and Individual Psychopathology Measures at T2 Organized by Method of Constructing the Peer Group Variables

	MASC Total			CES-D Total			CBCL – Agg			CBCL - Del		
Peer Group Variables	1	2	3	1	2	3	1	2	3	1	2	3
MASC Total	.15	.23**	.31**									
CES-D Total				.22**	.27**	.33**						
CBCL – Agg							.14	.12	.05			
CBCL - Del										.24**	.21*	.13

Note. [1] Inclusive, [2] Ego-Nominated, [3] Reciprocated.

* $p < .05$, ** $p < .01$

For those relations with significant bivariate correlations, a linear regression framework was used to test if the T1 peer group predictors continued to be significant after adding the T1 individual level psychopathology measure to the model (The strong positive correlations between T1 and T2 individual level psychopathology measures were described in the preliminary analyses above). For the MASC, linear regression models were calculated for both the ego-nominated and reciprocated peer groups. For the ego-nominated peer group, once the T1 individual level MASC score was included, the

regression model had an $R^2 = .56$, $F(2, 138) = 89.20$, $p < .001$, though peer group average MASC score was not a significant predictor. For the reciprocated group, once the T1 individual level MASC score was included, the regression model had an $R^2 = .57$, $F(2, 135) = 91.01$, $p < .001$, though peer group average MASC score was not a significant predictor.

For the CES-D, linear regression models were calculated for the inclusive, ego-nominated, and reciprocated peer groups. For the inclusive group, once the T1 individual level CES-D score was included, the regression model had an $R^2 = .43$, $F(2, 145) = 53.67$, $p < .001$, though peer group average CES-D score was not a significant predictor. For the ego-nominated group, once the T1 individual level CES-D score was included, the regression model had an $R^2 = .43$, $F(2, 138) = 51.51$, $p < .001$, though peer group average CES-D score was not a significant predictor. For the reciprocated group, once the T1 individual level CES-D score was included, the regression model had an $R^2 = .43$, $F(2, 135) = 50.61$, $p < .001$, and peer group average CES-D score was a significant positive predictor, $\beta = .16$, $t = 2.31$, $p = .02$.

No regression analyses were calculated for the CBCL – Aggression subscale as this measure failed to show any bivariate correlation between T1 peer group scores and T2 individual level scores. For the CBCL – Delinquency score, linear regression models were calculated for the inclusive, and ego-nominated peer groups. For the inclusive group, once the T1 individual level CBCL – Delinquency score was included, the regression model had an $R^2 = .42$, $F(2, 144) = 52.37$, $p < .001$, and peer group average CBCL – Delinquency score was a significant positive predictor, $\beta = .17$, $t = 2.65$, $p = .01$. For the ego-nominated group, once the T1 individual level CBCL – Delinquency score

was included, the regression model had an $R^2 = .40$, $F(2, 137) = 45.58$, $p < .001$, though peer group average CBCL – Delinquency score was not a significant predictor.

Relations Between Individual Mean Scores and Percentage of the Peer Group Falling Above the Cut-Off

Second, bivariate correlations between T1 percentage of the peer group falling above cut-off on a psychopathology measure and T2 individual psychopathology measure scores are presented in Table 3.11 (the complete correlation matrix is presented in Appendix K). Percentage of peers falling above cut-off on the MASC at T1 was significantly positively correlated with T2 individual MASC scores for only the reciprocated peer group. Percentage of peers falling above cut-off on the CES-D at T1 was significantly positively correlated with T2 individual CES-D scores for the inclusive, ego-nominated, and reciprocated peer groups. Percentage of peers falling above cut-off on the CBCL – Aggression subscale at T1 was not significantly correlated with T2 individual CBCL – Aggression scores regardless of the method used to construct the peer group variables. Finally, percentage of peers falling above cut-off on the CBCL – Delinquency subscale at T1 was significantly positively correlated with T2 individual CBCL – Delinquency scores for both the inclusive and ego-nominated peer groups. The correlation was not significant for the reciprocated peer group.

Table 3.11

Correlations between Rate of Peers Falling Above Cut-off at T1 and Individual Psychopathology Measures at T2 Organized by Method of Constructing the Peer Group Variables

	MASC Total			CES-D Total			CBCL – Agg			CBCL - Del		
Percentage of Peers Above Cut-off	1	2	3	1	2	3	1	2	3	1	2	3
MASC	-.01	.13	.22**									
CES-D				.19*	.25**	.28**						
CBCL – Agg							.05	.14	.04			
CBCL - Del										.24**	.24**	.15

Note. [1] Inclusive, [2] Ego-Nominated, [3] Reciprocated.

* $p < .05$, ** $p < .01$

For those relations with significant bivariate correlations, a linear regression framework was used to test if the T1 peer group predictors continued to be significant after adding the T1 individual level psychopathology measure to the model. For the MASC, a linear regression model was calculated for the reciprocated peer group. Once the T1 individual level MASC score was included, the regression model had an $R^2 = .58$,

$F(2, 135) = 91.75$, $p < .001$, and the percentage of peers falling above the cut-off on the MASC was a significant predictor, $\beta = .12$, $t = 2.13$, $p = .04$. For the CES-D, linear regression models were calculated for the inclusive, ego-nominated, and reciprocated peer groups. For the inclusive group, once the T1 individual level CES-D score was included, the regression model had an $R^2 = .43$, $F(2, 145) = 55.40$, $p < .001$, though the percentage of peers falling above the cut-off on the CES-D was not a significant predictor. For the ego-nominated group, once the T1 individual level CES-D score was included, the regression model had an $R^2 = .42$, $F(2, 138) = 50.29$, $p < .001$, though the percentage of peers falling above the cut-off on the CES-D was not a significant predictor. For the reciprocated group, once the T1 individual level CES-D score was included, the regression model had an $R^2 = .41$, $F(2, 135) = 47.46$, $p < .001$, though the percentage of peers falling above the cut-off on the CES-D was not a significant predictor.

No regression analyses were calculated for the CBCL – Aggression subscale as this measure failed to show any bivariate correlation between T1 percentage of peers falling above the cut-off and T2 individual level scores. For the CBCL – Delinquency score, linear regression models were calculated for the inclusive and ego-nominated peer groups. For the inclusive group, once the T1 individual level CBCL – Delinquency score was included, the regression model had an $R^2 = .41$, $F(2, 144) = 49.41$, $p < .001$, though the percentage of peers falling above the cut-off on the CBCL – Delinquency subscale was not a significant positive predictor. For the ego-nominated group, once the T1 individual level CBCL – Delinquency score was included, the regression model had an R^2

= .40, $F(2, 137) = 45.26$, $p < .001$, though again the percentage of peers falling above the cut-off on the CBCL – Delinquency subscale was not a significant predictor.

Predicting the Likelihood of an Individual Falling Above the Cut-Off Based on the Percentage of the Peer Group Falling Above the Cut-Off

Third, bivariate ANOVA's were calculated comparing the percentage of peers falling above cut-off on psychopathology measures at T1 by whether or not the individual fell above cut-off at T2. Individuals falling above the cut-off on the MASC at T2 did not have significantly higher percentages of peers falling above the cut-off compared to individuals who fell below the cut-off, regardless of the method used to construct the peer group variables (all F's ≤ 1.46, $p \geq .23$). Individuals falling above the cut-off on the CES-D at T2 had significantly higher percentages of peers falling above the cut-off for the reciprocated peer group compared to individuals who fell below the cut-off, $F(1, 136) = 7.90$, $p < .01$. For the inclusive and ego-nominated peer groups, no significant difference was found between individuals who scored above and below the cut-off (F's ≤ 3.39, $p \geq .07$). Individuals falling above the cut-off on the CBCL – Aggression subscale at T2 did not have a significantly higher percentage of their peer groups falling above the cut-off compared to individuals who fell below the cut-off, regardless of the method used to construct the peer group variables (all F's $\leq .47$, $p \geq .50$). Individuals falling above the cut-off on the CBCL – Delinquency subscale at T2 had significantly higher percentages of peers falling above the cut-off for the inclusive peer group, $F(1, 154) = 6.54$, $p = .01$, and the ego-nominated peer group, $F(1, 140) = 10.35$, $p < .01$, compared to individuals who fell below the cut-off. For the reciprocated peer group, no significant difference was

found between individuals who scored above and below the cut-off, $F(1, 137) = 2.79$, $p = .10$.

For those relations with significant bivariate relations, a binary logistic framework predicting the likelihood that an adolescent would fall above cut-off was used to test if the T1 peer group predictors continued to be significant after the individual's T1 cut-off status was added to the model. No regression analyses were calculated for the MASC as this measure failed to show the bivariate relation between the T1 percentages of peers falling above the cut-off and whether or not the individual fell above the cut-off at T2. For the CES-D, a binary logistic regression model was calculated for the reciprocated peer group which had a Cox and Snell $R^2 = .21$, $\chi^2(2) = 31.87$, $p < .001$, though the percentage of peers falling above the cut-off on the CES-D was not a significant predictor.

No regression analyses were calculated for the CBCL – Aggression subscale as this measure failed to show the bivariate relation between the T1 percentage of peers falling above the cut-off and whether or not the individual fell above the cut-off at T2. For the CBCL – Delinquency score, logistic regression models were calculated for the inclusive and ego-nominated peer groups. For the inclusive group, once the individual's T1 cut-off status was included, the regression model had a Cox and Snell $R^2 = .14$, $\chi^2(2) = 22.08$, $p < .001$, with having a greater percentage of peers falling above the cut-off significantly, $B = 4.30$, $S.E. = 1.91$, $p = .03$, increasing the probability that the individual would fall above the cut-off at T2, after considering the individual's cut-off status at T1. For the ego-nominated group, once the individual's T1 cut-off status was included, the regression model had a Cox and Snell $R^2 = .13$, $\chi^2(2) = 19.95$, $p < .001$, with having a

greater percentage of peers falling above the cut-off significantly, *B* = 3.36, *S.E.* = 1.47, *p* = .02, increasing the probability that the individual would fall above the cut-off at T2, after considering the individual's cut-off status at T1.

Overall, these results show mixed support for the hypothesis that peer group level psychopathology would be associated with the change in individual psychopathology over time. First, these results continued the trend of the cross-sectional analyses that the method by which the peer group variables were constructed appeared to influence the support for the hypothesis. The reciprocated peer group mean level or rates of above cut-off scores were related to the change in individual psychopathology measure scores for the internalizing measures, but not the externalizing measures. Meanwhile, the inclusive peer group mean level or rates of above cut-off scores were related to the change in individual scores for the CBCL – Delinquency subscale.

Second, these results indicate that the influence of the peer group differed for different psychopathology measures. Within the internalizing domain, the reciprocated peer group's rate of above cut-off scores on the MASC was significantly related to the change in individual scores on the MASC while the peer group's average MASC score was not. Meanwhile the opposite finding appeared for the CES-D in the reciprocated peer group. Unfortunately, as seen in the cross sectional and bivariate results, the peer group's scores on the CBCL – Aggression subscale were not related to individual scores on this measure.

Finally, these results indicate that the several different methods of operationalizing the level of psychopathology within the peer group produce differing results. As shown in the MASC and CES-D example described above, the hypotheses

were supported for some measures (i.e., the CES-D and CBCL – Delinquency subscale) by operationalizing the peer group's scores as the mean and the hypotheses were supported by other measures by operationalizing the peer group's scores as the percentage of the peer group that fell above the established cut-off (e.g., the MASC and CBCL – Delinquency subscale). Operationalizing the individual's scores as a mean compared to a binary cut-off produced differing results as well, though this did not meaningfully affect the results presented in Chapter 4 and are not presented in Chapter 4 for simplicity.

Hypothesis Three: Closest Friend Analyses

Having established several relations between peer group member psychopathology and change over time in individual psychopathology, the comparative predictive strength of group versus friendship level (i.e., closest friend) predictors was next examined. First, given that 34 individuals either did not indicate a closest friend, indicated more than one closest friend, or indicated a closest friend with missing data, an exploration of the characteristics of these individuals was conducted. This was to ensure that these individuals did not represent a unique population in a way that might have influenced the study results. Following this, bivariate relations between the closest friend psychopathology measures at T1 and individual psychopathology measures at T2 were examined. If this relation was significant, then the closest friend psychopathology measure was added as a predictor in regression models along with the individual's psychopathology measure at T1 and peer group psychopathology measure at T1. If, after the closest friend variables are added to the model, group level variables remain significant predictors of T2 individual psychopathology, this would be a sign that the

group level variables uniquely added to the prediction of individual psychopathology above that of the influence of the closest friend's report of psychopathology.

Individuals whose closest friend data was missing (for any of the reasons described above) were compared to the rest of the sample on all demographic variables shown in Table 2.1 as well as all individual and network psychopathology measures. Individuals whose closest friend data were missing reported significantly lower grades at both T1 and T2 (at T1, 2.21 compared to 1.85 where 1 = "A", $F(1, 168) = 7.53$, $p = .01$ and at T2, 2.26 compared to 1.78, $F(1, 157) = 14.69$, $p < .001$) than did the rest of the sample. In addition, at T1 individuals whose closest friend data were missing had a lower inclusive network density, $F(1, 168) = 6.00$, $p = .02$ (but no difference for ego-nominated network density), higher average ego-nominated peer group CBCL – Aggression scores, $F(1, 155) = 4.31$, $p = .04$, higher percentages of their ego-nominated peer group falling above the cut-off on the CBCL – Aggression, $F(1, 155) = 5.59$, $p = .02$, and higher percentages of their reciprocated peer group falling above the cut-off on the CES-D, $F(1, 152) = 4.90$, $p = .03$. Finally, at T2 individuals whose closest friend data were missing had a lower average ego-nominated peer group CBCL – Aggression scores, $F(1, 124) = 3.96$, $p < .05$, and a lower percentage of their ego-nominated peer group falling above the cut-off on the CBCL – Aggression, $F(1, 124) = 4.05$, $p < .05$. Individuals whose closest friend data were missing were not significantly different from the remainder of the sample on all other variables investigated, including grade level, gender, individual psychopathology (MASC, CES-D, and CBCL – Aggression and Delinquency subscales), and size of the peer group (for the inclusive and ego-nominated methods of constructing the peer group variables). Overall, the individuals whose closest

friend data are similar to the larger sample in most respects assessed, though they report consistently lower average grades and their peer groups differ in the frequency and level of some of the psychopathology measures.

Bivariate relations between closest friend psychopathology measures at T1 and the individual adolescent's psychopathology measures at T2 were first examined as a precursor to comparing the strength of the relation between closest friend and peer group relations with later individual psychopathology. Bivariate correlations were calculated between the mean psychopathology measure score reported by the closest friend at T1 and the individual at T2. ANOVA's were calculated comparing the mean psychopathology measure reported by the closest friend at T1 by whether or not the individual fell above cut-off on the psychopathology measure at T2. Finally, chi-square analyses were calculated comparing the number of closest friends falling above or below the cut-off on a psychopathology measure at T1 to the number of individuals who fell above or below the cut-off measure at T2.

Closest friend psychopathology measures at T1, regardless of how they were characterized (means and cut-off status), never showed a significant relation with individual psychopathology measures at T2. Results are shown in Appendix L for the correlation between the mean psychopathology measure score reported by both the closest friend at T1 and the individual at T2. Results for the other two described methods of comparing closest friend measures to later individual measures were comparable and non-significant. Despite the fact that bivariate analyses did not indicate further investigation, closest friend psychopathology measures were added to the previous regression models predicting T2 individual psychopathology measures from T1 peer

group and individual psychopathology measures. Closest friend psychopathology measures continued to be non-significant in all regression models. Therefore these analyses support the hypothesis that the peer group level of psychopathology would outperform closest friend psychopathology measures in the prediction of change in individual psychopathology over time. Closest friend's psychopathology measures did not significantly correlate with any individual psychopathology measure while the peer group psychopathology measures did, at least for the MASC, CES-D, and CBCL – Delinquency subscale as reported above.

In summary, the current chapter set out to examine the first three hypotheses investigating the possibility of connection and influence between the level of psychopathology in the peer group and the level of psychopathology reported by the individual. This was examined through three sets of analyses testing this relation cross-sectionally (Hypothesis 1), longitudinally (Hypothesis 2), and in comparison to the relation between the closest friend's level of psychopathology and the individual adolescent (Hypothesis 3). For each of these sets of analyses the peer group variables were created from three different methods of constructing the peer group variables: the inclusive, ego-nominated, and reciprocated methods (see Figure 3.1). In addition, the level of psychopathology reported by the individual adolescent or the peer group was operationalized in two ways: as a mean score or as whether or not the individual and/or his/her peers fell above the cut-off. For hypothesis one, the proposed positive relation between the peer group and the individual adolescent was found to be significant cross-sectionally at both T1 and T2 within the reciprocated peer group for the MASC and CES-D when the mean level of peer group psychopathology was used. This relation was

found to be significant for the CBCL – Delinquency subscale at both T1 and T2 within the reciprocated peer group when the percentage of the peer group that fell above the cut-off was used.

For hypothesis two, the proposed positive relation between the initial level of peer group psychopathology and later individual psychopathology was found to be significant for the MASC within the reciprocated peer group when the percentage of the peer group falling above cut-off was used to predict the individual adolescent's mean score. This relation was found to be significant for the CES-D within the reciprocated peer group when the peer group mean level was used to predict the individual adolescent's mean score. Finally, the relation was found to be significant for the CBCL – Delinquency subscale within the inclusive peer group when the variables were both operationalized as mean values and when they were operationalized as falling above the cut-off score. For hypothesis three, the closest friend's initial scores were not related to later individual scores for any psychopathology measure. Having established several relations between the peer group level of psychopathology and later individual psychopathology, the following chapter examines potential moderators of these relations in an effort to better understand them.

CHAPTER 4: Results II

In the previous chapter, three sets of analyses were conducted to examine the relation between the peer group's level of psychopathology and that of the individual. In this chapter, several sets of regression analyses are conducted to test the possibility that the density of the peer group, grade level in school, and gender moderate the relations established in the first chapter. Each moderator has the potential to provide more detailed information concerning the significant findings from the first chapter. Additionally, moderators may reveal relations between the peer group and individual psychopathology that were not detected in the first chapter, as would be the case if this relation is stronger under certain moderating conditions (e.g., for girls as opposed to boys). Thus, the examination of moderators adds greatly to the results obtained regarding the initial hypotheses.

The final three of the six hypotheses will be tested in this chapter. The fourth hypothesis proposed peer group density as a moderator, stating that individuals whose peer groups are more tight knit, or denser, will be more influenced by their peers. Peer group density is represented here in two ways. Objective peer group density is derived from the linkages within the peer group as defined by the nomination task. Subjective peer group density is derived from the total score on a self-report measure designed to assess the adolescent's perception of density within their peer group. The fifth hypothesis proposed the grade level of the adolescent as a moderator. Previous research and theorizing has shown that the influence of the peer group peeks in early and middle adolescence and decreases into late adolescence. The present sample encompasses middle and late adolescence and analyses empirically test the proposed change in peer

influence on individual psychopathology during this time. Finally, hypothesis six proposed the gender of the adolescent as a moderator. Some research has suggested that girls may be more influenced by their peer group than boys and that this may have important implications for the development of psychopathology that continues into adulthood. This set of analyses investigates this possibility.

Baseline Model for Analyses of Moderating Variables

In order to begin to investigate the moderators of the relation between peer group psychopathology and change in individual psychopathology over time, analyses were conducted separately with each of the three proposed moderators. For each analysis, the dependent variable in the model was the individual's score on one of the measures of psychopathology reported at T2 (i.e., MASC total score, CES-D total score, CBCL – Aggression subscale score, and CBCL – Delinquency subscale score). (Analyses were conducted using whether or not the individual fell above the cut-off for each measure of psychopathology as a dependent variable and results were largely comparable to those described below.)

The independent, or predictor, variables in the baseline regression model were the peer group's T1 score on the psychopathology measure and the individual's psychopathology measure score at T1, which was included to allow for the investigation of change over time. Based on the results described in Chapter 3, the closest friend's scores on the psychopathology measures were not included in the baseline model as they were not significantly related to the dependent variable. The peer group's scores based on each of the different methods of constructing the peer group variables were examined separately because the results reported in Chapter 3 showed that the method used for

construction of the peer group variables influenced the results. In addition, both the mean peer group scores on the psychopathology measure and the percentage of the peer group falling above the cut-off on the psychopathology measure were used as independent variables because the results from Chapter 3 showed that these different methods of operationalizing the peer group scores produced distinct results. As a result of these choices for each psychopathology measure, each moderator started with six initial baseline models, 3 (methods of constructing the peer group variables) X 2 (methods of operationalizing the peer group scores).

Hypothesis Four: Peer Group Density as a Moderator

Peer group density was investigated as a moderator of the relations between peer group psychopathology and change in individual psychopathology. Peer group density was operationalized in several ways: objective ego-nominated peer group density, objective inclusive peer-group density, and subjective peer group density. Objective peer group density was calculated once from the ego-nominated peer network and once from the inclusive peer network resulting in two density variables. No density variable was calculated from the reciprocated peer group because the UCINet data analysis software was not able to do this. As a result, when one objective density variable was used in a model, the peer group psychopathology measure variables created from the same method of constructing the peer network variables was used as well. Since reciprocated peer network psychopathology measures did not have a corresponding density variable, they were tested with both inclusive and ego-nominated peer group density variables. Subjective peer group density was represented by the Friendship Questionnaire total score described in Chapter 2. Correlations between the three measures of peer group

density showed that inclusive and ego-nominated peer group density were significantly positively correlated with each other, $r(179) = .41$, $p < .001$. Subjective density was significantly positively correlated with ego-nominated density, $r(161) = .25$, $p < .01$, as would be expected, but was not significantly correlated with inclusive density, $r(162) = .07$, $p = .36$.

Objective Peer Group Density

A linear regression framework was employed to examine whether objective peer group density operated as a moderator of the relation between peer group psychopathology and later individual psychopathology. All variables were grand mean centered before being included as criterion or predictors in the model. First, a model predicting the T2 individual psychopathology score from the T1 individual psychopathology score, peer group psychopathology measure, and peer group density was calculated (Step 1). Next, the interaction between peer group density and the peer group psychopathology measure was added to the model (Step 2). In all models calculated, the T1 individual psychopathology score was a significant predictor of the T2 individual psychopathology score. However, this finding was not considered pertinent to the moderator hypotheses and is not reported below, although it is included in the tables. Additionally, only regression models that produced significant results for peer group psychopathology measures, peer group density, or the interaction term are presented in the regression tables.

The bivariate correlations between T1 ego-nominated and inclusive peer group densities and the various individual psychopathology measures at T2 are shown in Table 4.1. No specific relation was expected between density and the psychopathology

variables. Inclusive density was not significantly correlated with any of the psychopathology measures, while ego-nominated density was significantly negatively correlated with both the CES-D and the CBCL – Aggression subscale score.

Table 4.1

Correlations between Peer Network Density at T1 and Individual Psychopathology Measures at T2

	Inclusive Density	Ego-Nominated	Subjective
MASC Total	-.06	-.12	-.01
CES-D Total	-.09	-.25**	-.25**
CBCL – Agg	-.11	-.16*	-.19*
CBCL – Del	-.09	-.15	-.28**

* $p < .05$, ** $p < .01$, *** $p < .001$

Results for the MASC. For ego-nominated density, regression analyses conducted on the MASC showed mixed results (see Table 4.2 for significant hypotheses-related results). When the mean peer group score on the MASC was included as a predictor in Step 1 and Step 2, all models were significant, $R^2 \geq .57$, $F(3\text{-}4, 133\text{-}137) \geq 44.55$, $p < .001$. However ego-nominated peer group density, mean peer group scores on the MASC (ego-nominated or reciprocated), and the interaction between peer group mean scores and density were not significant predictors. When the percentage of the ego-nominated peer group that fell above cut-off on the MASC was included as a predictor in Step 1, as seen in Table 4.2, the model was significant, $R^2 = .57$, $F(3, 137) = 59.74$, $p < .001$, but not ego-nominated density or the percentage of the ego-nominated peer group that fell above

cut-off. However, when the interaction between percentage of the ego-nominated peer group falling above cut-off and peer group density was added to the model, the model improved significantly, $R^2 = .59$, $F(4, 136) = 49.83$, $p < .001$, $\Delta R^2 = .02$, $F(1, 136) = 9.28$, $p < .01$, and both the percentage of the ego-nominated peer group falling above cut-off and the interaction between the percentage of the peer group falling above cut-off and density were significant predictors. This model showed that as the percentage of the peer group falling above the cut-off at T1 increased, the individual's change on the MASC over time increased as well. Furthermore, the significant interaction term indicated that contrary to expectation, for individuals with denser peer groups, the influence of the peer group is diminished. See Figure 4.1 for a graphical depiction of this interaction for adolescents with an average MASC score at T1. Table 4.2 shows similar results and the same unexpected moderation effect for peer group density when the percentage of the reciprocated peer group that fell above the cut-off was examined. In the initial model (Step 1), $R^2 = .58$, $F(3, 134) = 61.94$, $p < .001$, the percentage of the reciprocated peer group falling above the cut-off was a significant predictor. This remained true once the interaction term was added to the model (Step 2), $R^2 = 60$, $F(4, 133) = 50.77$, $p < .001$, $\Delta R^2 = .02$, $F(1, 133) = 7.82$, $p < .01$, and the interaction term was significant as well.

Table 4.2

Hierarchical Linear Regression Investigating Peer Group Density as a Moderator of Peer Group Variables Predicting Individual Score on the MASC at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Ego-Nominated Peer Group Percentage Above Cut-Off:				
Step 1	.57			
MASC Score		.76	.06	< .001
Ego-Nominated Peer Group MASC – Percentage		.23	.27	.40
Ego-Nominated Peer Group Density		-.00	.00	.28
Step 2	.59[a]			
MASC Score		.76	.06	< .001
Ego-Nominated Peer Group MASC – Percentage		.70	.30	.02
Ego-Nominated Peer Group Density		-.00	.00	.09
Peer Group MASC X Density		-.05	.02	< .01
Using Reciprocated Peer Group Percentage Above Cut-Off:				
Step 1	.58			
MASC Score		.74	.06	< .001
Reciprocated Peer Group MASC – Percentage		.42	.19	.03
Ego-Nominated Peer Group Density		-.00	.00	.22

Step 2	.60[b]			
MASC Score		.75	.06	< .001
Reciprocated Peer Group MASC – Percentage		.59	.19	< .01
Ego-Nominated Peer Group Density		-.00	.00	.18
Peer Group MASC X Density		-.03	.01	< .01
Using Reciprocated Peer Group Percentage Above Cut-Off:				
Step 1	.58			
MASC Score		.75	.06	< .001
Reciprocated Peer Group MASC – Percentage		.40	.19	.03
Inclusive Peer Group Density		-.00	.00	.49
Step 2	.59[c]			
MASC Score		.75	.06	< .001
Reciprocated Peer Group MASC – Percentage		.37	.18	.04
Inclusive Peer Group Density		-.00	.00	.52
Peer Group MASC X Density		-.03	.02	.04

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .02$, $F(1, 136) = 9.28$, $p < .01$. [b] $\Delta R^2 = .02$, $F(1, 133) = 7.82$, $p < .01$. [c] $\Delta R^2 = .01$, $F(1, 133) = 4.26$, $p < .05$

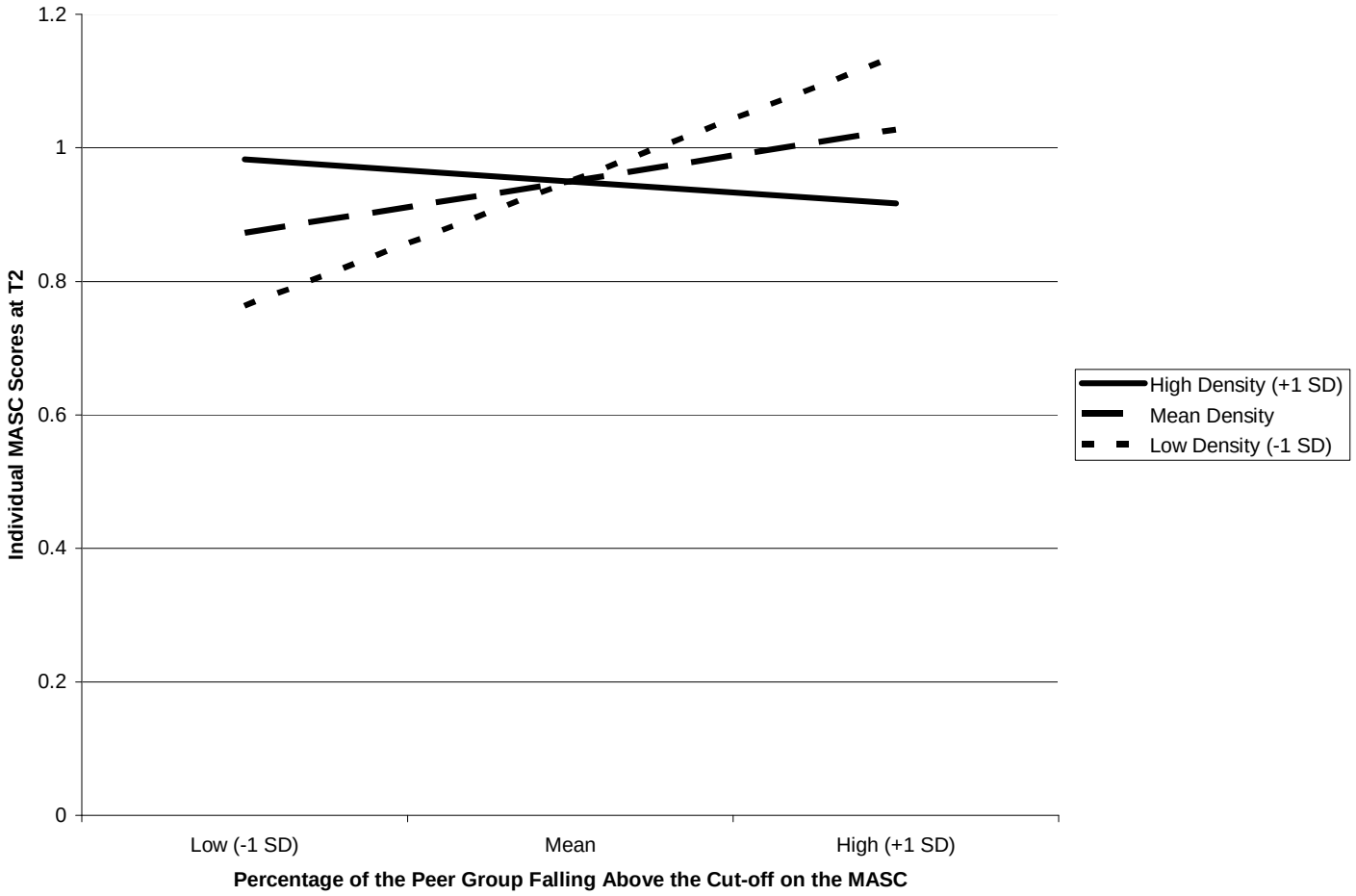

Figure 4.1. Graphical Depiction of Moderating Role of Peer Group Density on the Relation Between the Percentage of the Peer Group Falling Above the Cut-off on the MASC and the T2 Individual MASC Score.

For inclusive density, regression analyses conducted on the MASC showed mixed results (see Table 4.2 for significant hypotheses-related results). Just as with ego-nominated density, when the mean peer group score on the MASC was included as a predictor in Step 1 and Step 2, all models were significant, $R^2 \geq .53$, $F(3\text{-}4, 134\text{-}143) \geq 40.46$, $p < .001$. However inclusive peer group density, inclusive or reciprocated mean peer group scores on the MASC, and the interaction between peer group mean scores and density were not significant predictors. When the percentage of the reciprocated peer group that fell above cut-off on the MASC was included as a predictor in Step 1, as seen in Table 4.2, the model with peer group density was significant, $R^2 = .58$, $F(3, 134) = 61.08$, $p < .001$, with the percentage of the reciprocated peer group falling above the cut-off being a significant predictor. Thus, as the percentage of the reciprocated peer group falling above the cut-off at T1 increased, the individual's change on the MASC over time increased as well. In Step 2, when the interaction between percentage of the reciprocated peer group falling above cut-off and density was added to the model, the model improved significantly, $R^2 = .59$, $F(4, 133) = 47.99$, $p < .001$, $\Delta R^2 = .01$, $F(1, 133) = 4.26$, $p < .05$, and both the percentage of the peer group falling above cut-off and the interaction between the percentage of the peer group falling above cut-off and density were significant predictors. The significant interaction term indicated, similar to the interaction described above, that for individuals with denser peer groups, the influence of the peer group is diminished. When the percentage of the inclusive network that fell above cut-off on the MASC was included in the model, Step 1 and Step 2 models were significant, $R^2 \geq .53$, $F(3\text{-}4, 142\text{-}143) \geq 42.34$, $p < .001$, however percentage of the inclusive peer group falling above the cut-off, inclusive peer group density, and the

interaction between the percentage of the inclusive peer group that fell above the cut-off and density were not significant predictors.

Results for the CES-D. For ego-nominated density, analyses conducted on the CES-D showed no results supportive of density as a moderator. Coefficients for Step 1 models that exhibited significant peer group CES-D variables are presented in Table 4.3. When the reciprocated peer group mean score on the CES-D was included as a predictor in Step 1, the model was significant, $R^2 = .43$, $F(3, 134) = , p < .001$, and a significant effect of the peer group score mean was observed. However for Step 2, when the interaction between the peer group and density was added, the model did not improve, $R^2 = .44$, $F(4, 133) = 25.80$, $p < .001$, $\Delta R^2 = .01$, $F(1, 133) = 1.13$, $p > .05$, and the effect of the peer group mean score was no longer significant. For the ego-nominated peer group mean CES-D scores, though all Step 1 and Step 2 models were significant, $R^2 \geq .43$, $F(3\text{-}4, 136\text{-}137) \geq 27.22$, $p < .001$, peer group density, ego-nominated peer group mean scores, and the interaction between density and the ego-nominated peer group mean scores were not significant predictors. When the percentage of the reciprocated or ego-nominated peer groups falling above the cut-off on the CES-D was included as a predictor in Step 1 and Step 2, all models were significant, $R^2 \geq .42$, $F(3\text{-}4, 133\text{-}137) \geq 24.51$, $p < .001$. However, ego-nominated peer group density, percentages of the ego-nominated or reciprocated peer groups falling above the cut-off, and the interaction between density and the percentage of the peer group falling above the cut-off were not significant predictors

Table 4.3

Hierarchical Linear Regression Investigating Peer Group Density as a Moderator of Peer Group Variables Predicting Individual Scores on the CES-D at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Reciprocated Peer Group Mean Scores:				
Step 1	.43			
CES-D Score		.42	.05	< .001
Reciprocated Peer Group CES-D – Average		.23	.10	.03
Ego-Nominated Peer Group Density		-.00	.00	.36
Using Reciprocated Peer Group Mean Scores:				
Step 1	.43			
CES-D Score		.42	.05	< .001
Reciprocated Peer Group CES-D – Average		.23	.10	.03
Inclusive Peer Group Density		.00	.00	.87
Step 2	.44 [a]			
CES-D – Average		.42	.05	< .001
Reciprocated Peer Group CES-D – Average		.25	.10	.02
Inclusive Peer Group Density		.00	.00	.90
Peer Group CES-D X Density		.01	.01	.14

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .01$, $F(1, 133) = 2.17$, $p > .05$

Results were similar for inclusive density and the CES-D. When the mean reciprocated peer group score on the CES-D was included as a predictor, the Step 1 model was significant, $R^2 = .43$, $F(3, 134) = 33.51$, $p < .001$, and a significant effect of the mean peer group score was observed (see Table 4.3). For step 2, when the interaction term was added, the model did not improve, $R^2 = .44$, $F(4, 133) = 25.89$, $p < .001$, $\Delta R^2 = .01$, $F(1, 133) = 2.17$, $p > .05$, though the mean peer group score remained significant. No predictors aside from initial individual CES-D scores were significant for the inclusive peer group mean CES-D scores, though all Step 1 and Step 2 models were significant, $R^2 \geq .43$, $F(3\text{-}4, 142\text{-}143) \geq 27.70$, $p < .001$. When the percentage of the reciprocated or inclusive peer groups falling above the cut-off on the CES-D was included as a predictor, no significant predictors aside from initial individual CES-D scores were observed, though all Step 1 and Step 2 models were significant, $R^2 \geq .41$, $F(3\text{-}4, 133\text{-}143) \geq 24.01$, $p < .001$.

Results for the CBCL Aggression and Delinquency subscales. Consistent with all previous analyses, no significant predictors aside from initial individual CBCL-Aggression scores were observed across all Step 1 and Step 2 models. All models were significant, $R^2 \geq .50$, $F(3\text{-}4, 130\text{-}140) \geq 33.52$, $p < .001$.

For ego-nominated density, results for the CBCL – Delinquency score did not support density as a moderator. As shown in Table 4.4 at Step 1, only ego-nominated peer group mean scores were a significant predictor of later individual CBCL – Delinquency scores. This Step 1 model was significant, $R^2 = .40$, $F(3, 136) = 30.20$, $p < .001$; however at Step 2, no predictors aside from the initial individual CBCL – Delinquency score were significant and the overall model was not improved, $R^2 = .40$,

$F(4, 135) = 22.73$, $p < .001$, $\Delta R^2 = .003$, $F(1, 135) = .59$, $p > .05$. No significant predictors aside from initial individual CBCL – Delinquency score were observed for the reciprocated peer group mean CBCL – Delinquency subscale scores in Step 1 and Step 2, though all models were significant, $R^2 \geq .43$, $F(3\text{-}4, 132\text{-}133) \geq 25.83$, $p < .001$. When the percentage of the reciprocated or ego-nominated peer groups falling above the cut-off on the CBCL – Delinquency was included as a predictor in Step 1 and Step 2, no predictors were significant aside from the initial individual CBCL – Delinquency score were observed though all models were significant, $R^2 \geq .40$, $F(3\text{-}4, 132\text{-}136) \geq 22.54$, $p < .001$.

Table 4.4

Hierarchical Linear Regression Investigating Peer Group Density as a Moderator of Peer Group Variables Predicting Individual Score on the CBCL – Delinquency Subscale at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Ego-Nominated Peer Group Mean Scores:				
Step 1	.40			
CBCL – Del Score		.64	.07	< .001
Ego-Nominated Peer Group CBCL – Del – Average		.33	.17	< .05
Ego-Nominated Peer Group Density		.00	.00	.80
Using Inclusive Peer Group Mean Scores:				
Step 1	.43			
CBCL – Del Score		.64	.07	< .001
Inclusive Peer Group CBCL–Del – Average		.53	.20	< .01
Inclusive Peer Group Density		.00	.00	.63
Step 2	.43 [a]			
CBCL – Del Score		.64	.07	< .001
Inclusive Peer Group CBCL–Del – Average		.47	.23	.04
Inclusive Peer Group Density		.00	.00	.61
Peer Group CBCL – Del X Density		-.01	.01	.55
Using Inclusive Peer Group Percentage Above Cut-Off:				
Step 1	.42			
CBCL – Del Score		.64	.07	< .001

Inclusive Peer Group CBCL–Del – Percentage	.28	.14	.04
Inclusive Peer Group Density	.00	.00	.72

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .001$, $F(1, 141) = .36$, $p > .05$.

Finally, for inclusive density results for the CBCL – Delinquency score did not support density as a moderator. As shown in Table 4.4 at Step 1, only inclusive peer group mean scores and the percentage of the inclusive peer group falling above cut-off were significant predictors of later individual CBCL – Delinquency scores in their respective models. For inclusive peer group mean scores, the Step 1 model was significant, $R^2 = .43$, $F(3, 142) = 35.68$, $p < .001$, and the inclusive peer group mean scores remained significant at Step 2, $R^2 = .43$, $F(4, 141) = 26.73$, $p < .001$, $\Delta R^2 = .001$, $F(1, 141) = .36$, $p > .05$; however the model fit was not improved. For the percentage of the peer group falling above the cut-off, the Step 1 model was significant, $R^2 = .42$, $F(3, 142) = 34.21$, $p < .001$; however at Step 2, no predictors aside from the initial individual CBCL – Delinquency score were significant, and the overall model was not improved, $R^2 = .42$, $F(4, 141) = 25.70$, $p < .001$, $\Delta R^2 = .002$, $F(1, 141) = .51$, $p > .05$. No significant predictors aside from the initial individual score were observed for the reciprocated peer group mean CBCL – Delinquency subscale scores or the percentage of the reciprocated peer group falling above the cut-off, though all Step 1 and Step 2 models were significant, $R^2 \geq .43$, $F(3\text{-}4, 132\text{-}133) \geq 25.35$, $p < .001$.

Summary. Overall, objective peer group density was never a significant predictor of the change in psychopathology measures over time. Peer group density fulfilled the

hypothesized moderating relation with density only in the case of the MASC and then only when the percentage of the ego-nominated or reciprocated peer groups falling above the cut-off was used to represent the influence of the peer group. In these cases, the moderator effect was contrary to the hypothesis: the density of the peer group moderated the positive relation between the percentage of above cut-off scores in the peer group at T1 and the individual change in MASC score at T2, such that for denser peer groups, the percentage of more above cut-off scores was less strongly associated with increases in the individual's MASC score at T2.

Subjective Peer Group Density

Just as with objective peer group density, a linear regression framework was employed to examine whether subjective peer group density operated as a moderator of the relation between peer group psychopathology and later individual psychopathology. All variables were grand mean centered before being included as criterion or predictors in the model. First, a model predicting T2 individual psychopathology measure score from the T1 individual psychopathology measure score, peer group psychopathology measure, and subjective peer group density was calculated (Step 1). Next, the interaction between subjective peer group density and the peer group psychopathology measure was added to the Step 1 model (Step 2). In all models calculated, the T1 individual psychopathology score was a significant predictor of the T2 individual psychopathology score. However, this finding was not considered pertinent to the moderator hypotheses and is not reported below, although it is included in the tables. Additionally, only regression models that produced significant results for peer group psychopathology measures, peer group density, or the interaction term are presented in the regression tables. The bivariate

correlations between T1 subjective peer group density and the various individual psychopathology measures at T2 are shown in Table 4.1. No specific relation was expected between density and the psychopathology variables. Subjective peer group density was significantly negatively correlated with the CES-D, CBCL – Aggression subscale score, and the CBCL – Delinquency subscale score.

For the MASC, Table 4.5 shows the results when the reciprocated peer group mean scores and percentage of the reciprocated peer group that falls above the cut-off on the MASC are included in the model with subjective density. When each of these were included in Step 1 models, $R^2 = .58$, $F(3, 128) = 58.18$, $p < .001$ and $R^2 = .58$, $F(3, 128) = 58.34$, $p < .001$ respectively, the reciprocated network variable was a significant predictor, though subjective peer group density was not. For Step 2, when the interaction between the reciprocated peer group variables and density was added, the models did not improve, $R^2 = .58$, $F(4, 127) = 43.62$, $p < .001$, $\Delta R^2 = .002$, $F(1, 127) = .55$, $p > .05$, for the mean reciprocated peer group MASC score and $R^2 = .58$, $F(4, 127) = 44.38$, $p < .001$, $\Delta R^2 = .01$, $F(1, 127) = 1.64$, $p > .05$ for the percentage of the reciprocated peer group falling above the cut-off, though the reciprocated network variables remained significant predictors. For each of the inclusive and ego-nominated peer group predictor variables, all Step 1 and Step 2 models were all significant, but did not contain any significant predictors aside from initial individual MASC score, $R^2 \geq .52$, $F(3\text{-}4, 130\text{-}137) \geq 37.59$, $p < .001$.

Table 4.5

Hierarchical Linear Regression Investigating Subjective Peer Group Density as a Moderator of Peer Group Variables Predicting Individual Score on the MASC at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Reciprocated Peer Group Mean Scores:				
Step 1	.58			
MASC Score		.74	.06	< .001
Reciprocated Peer Group MASC – Average		.26	.13	< .05
Subjective Peer Group Density		.02	.04	.59
Step 2	.58 [a]			
MASC Score		.74	.06	< .001
Reciprocated Peer Group MASC – Average		.26	.13	< .05
Subjective Peer Group Density		.01	.04	.73
Peer Group MASC X Density		-.15	.20	.46
Using Reciprocated Peer Group Percentage Above Cut-Off:				
Step 1	.58			
MASC Score		.75	.06	< .001
Reciprocated Peer Group MASC – Percentage		.40	.19	.04
Subjective Peer Group Density		.01	.04	.76
Step 2	.58 [b]			
MASC Score		.76	.06	< .001
Reciprocated Peer Group MASC – Percentage		.43	.19	.03

Subjective Peer Group Density	.01	.04	.74
Peer Group MASC X Density	-.40	.31	.20

Note. Unstandardized regression weights are presented.

[a] ΔR^2 = .002, $F(1, 127) = .55$, $p > .05$. [b] ΔR^2 = .01, $F(1, 127) = 1.64$, $p > .05$

For the CES-D, Table 4.6 shows the results when reciprocated peer group mean scores are included in the model with subjective density. The Step 1 model was significant, $R^2 = .44$, $F(3, 128) = 33.43$, $p < .001$, but did not have any significant predictors aside from initial individual CES-D score. At Step 2, when the interaction between the reciprocated peer group mean scores on the CES-D and subjective density was added, the model did not improve, $R^2 = .45$, $F(4, 127) = 26.21$, $p < .001$, $\Delta R^2 = .01$, $F(1, 127) = 2.99$, $p > .05$, however, mean reciprocated peer group scores on the CES-D was a significant predictor. No other significant predictors aside from initial individual CES-D score were observed for the remaining Step 1 and Step 2 models, including the percentage of the reciprocated peer group that fell above the cut-off on the CES-D and all models using inclusive and ego-nominated peer group predictors. All of these models were significant at Step 1 and Step 2, $R^2 \geq .43$, $F(3\text{-}4, 127\text{-}137) \geq 25.55$, $p < .001$.

Table 4.6

Hierarchical Linear Regression Investigating Subjective Peer Group Density as a Moderator of Peer Group Variables Predicting Individual Mean Scores on the CES-D at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Reciprocated Peer Group Mean Scores:				
Step 1	.44			
CES-D Score		.43	.05	< .001
Reciprocated Peer Group CES-D – Average		.19	.11	.07
Subjective Peer Group Density		-.05	.04	.22
Step 2	.45 [a]			
CES-D Score		.43	.05	< .001
Reciprocated Peer Group CES-D – Average		.21	.10	.04
Subjective Peer Group Density		-.03	.04	.55
Peer Group CES-D X Density		.29	.17	.09

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .01$, $F(1, 127) = 2.99$, $p > .05$

Consistent with all previous analyses, no significant predictors, aside from initial individual CBCL – Aggression score, were observed for models predicting individual CBCL – Aggression subscale scores. All Step 1 and Step 2 models were significant, $R^2 \geq .50$, $F(3\text{-}4, 126\text{-}136) \geq 33.10$, $p < .001$.

Finally, for the CBCL – Delinquency subscale, Table 4.7 shows the results when inclusive peer group mean scores were included in the model with subjective density. The Step 1 model was significant, $R^2 = .44$, $F(3, 137) = 36.55$, $p < .001$, and inclusive peer group mean score on the CBCL – Delinquency subscale was a significant predictor. For Step 2, when the interaction between the inclusive peer group mean scores on the CBCL – Delinquency subscale and subjective density was added, the model did not improve, $R^2 = .44$, $F(4, 136) = 27.22$, $p < .001$, $\Delta R^2 < .001$, $F(1, 136) = .02$, $p > .05$, however, mean reciprocated peer group scores on the CBCL – Delinquency subscale remained a significant predictor. No other significant predictors, aside from initial individual CBCL – Delinquency score, were observed for the remaining Step 1 and Step 2 models, including the percentage of the inclusive peer group that fell above the cut-off on the CBCL – Delinquency subscale and all models using ego-nominated and reciprocated peer group predictors. All of these models were significant, $R^2 \geq .43$, $F(3\text{-}4, 127\text{-}131) \geq 24.34$, $p < .001$.

Table 4.7

Hierarchical Linear Regression Investigating Subjective Peer Group Density as a Moderator of Peer Group Variables Predicting Individual Score on the CBCL – Delinquency Subscale at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Inclusive Peer Group Mean Scores:				
Step 1	.44			
CBCL-Del Score		.62	.07	< .001
Inclusive Peer Group CBCL-Del – Average		.43	.20	.03
Subjective Peer Group Density		-.04	.03	.19
Step 2	.44 [a]			
CBCL-Del Score		.62	.07	< .001
Inclusive Peer Group CBCL-Del – Average		.44	.21	.04
Subjective Peer Group Density		-.03	.03	.21
Peer Group CBCL – Del X Density		.05	.35	.89

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 < .001$, $F(1, 136) = .02$, $p > .05$

Summary. Overall, subjective peer group density was never a significant predictor of the change in outcome measures over time. Additionally, the results for subjective peer group density did not support the hypothesis that density would moderate the relation between the peer group psychopathology measures and the change in the

individual's psychopathology measure over time. While previously established peer group predictors remained significant predictors of later individual psychopathology measures when subjective density was included in the model, subjective density and the interaction of peer group predictors and subjective density were not significant in any of the models examined. This was somewhat surprising given the strength of the bivariate relations between subjective density and these outcome measures.

Hypothesis Five: Grade Level as a Moderator

In order to examine the way in which the relation between peer group and individual psychopathology changed with age, grade level was examined as a moderator of these relations. Initially, analyses were proposed to examine age as a potential moderator of these relations as well. However, the correlation between age and grade was very strong, $r(182) = .93$, $p < .001$, and in only 25% of the cases did an individual's age differ, never by more than 1 year, from the modal age of their grade cohort. It was therefore felt that the minimal differences between age and grade would not create distinct enough results to warrant separate analyses. In addition, preliminary analyses were conducted investigating age as a moderator and found results comparable to those presented here for grade.

As with peer group density, a linear regression framework was employed to examine whether grade level operated as a moderator of the relation between peer group psychopathology and later individual psychopathology. All variables were grand mean centered before being included as criterion or predictors in the model. Grade level was not mean centered and instead was set such that freshmen were coded as 0, sophomores were coded as 1, etc. Grade level was first entered into a baseline model as a predictor of

a T2 individual psychopathology score along with the T1 individual psychopathology score and the T1 peer group mean score or percentage of the peer group that fell above cut-off on the psychopathology measure (Step 1). Next, the interaction between grade level and the peer group predictor variable was entered into the model (Step 2).

Curvilinear effects of grade were investigated after the investigation of simple linear effects. For all models, the quadratic effect of grade was examined by including this variable with the other predictors from the baseline/Step 1 model (Step 1a). Next, the interaction terms of the linear effect of grade level and the peer group psychopathology measure and of the quadratic effect of grade level with the peer group psychopathology measure were added to this model (Step 2a). Unless otherwise mentioned or described in the tables, quadratic effects of grade did not produce significant hypotheses-related results. In all models calculated, the T1 individual psychopathology score was a significant predictor of the T2 individual psychopathology score. However, this finding was not considered pertinent to the moderator hypotheses and is not reported below, although it is included in the tables. Additionally, only regression models that produced significant results for peer group psychopathology measures, linear or quadratic grade level, or the interaction term are presented in the regression tables.

The bivariate correlations between grade level and the various individual psychopathology measures at T2 are shown in Appendix M. No specific relation was expected between grade level and the psychopathology variables and grade level was not significantly correlated with any of the psychopathology measures.

Results for the MASC

For the MASC, when inclusive or ego-nominated peer group mean scores or the percentage of the inclusive or ego-nominated peer groups falling above cut-off were included in the Step 1 and Step 2 models with grade level, all models were significant, $R^2 \geq .52$, $F(3\text{-}6, 134\text{-}144) \geq 26.46$, $p < .001$, though no predictor variables were significant aside from the initial individual MASC score. When the reciprocated peer group mean scores were included in the Step 1 model with grade level, neither were significant predictors of T2 individual MASC scores, though the model was significant, $R^2 = .57$, $F(3, 134) = 60.27$, $p < .001$, as seen in Table 4.8. In Step 1a, when the quadratic effect of grade was included in the model, $R^2 = .58$, $F(4, 133) = 45.78$, $p < .001$, the reciprocated peer group mean scores was a significant predictor, as seen in Table 4.9. For Step 2a, when the interaction between the reciprocated peer group mean scores and linear and quadratic effects of grade were added to the model, the model did not improve, $R^2 = .58$, $F(6, 131) = 30.71$, $p < .001$, $\Delta R^2 = .01$, $F(2, 131) = .82$, $p > .05$, and no predictor variables were significant aside from the initial individual MASC score.

Table 4.8

Hierarchical Linear Regression Investigating Linear Effects of Grade as a Moderator of Peer Group Variables Predicting Individual Score on the MASC at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Reciprocated Peer Group Mean Scores:				
Step 1	.57			
MASC Score		.73	.06	< .001
Reciprocated Peer Group MASC – Average		.24	.13	.05
Grade		.00	.02	.82
Using Reciprocated Peer Group Percentage Above Cut-Off:				
Step 1	.58			
MASC Score		.75	.06	< .001
Reciprocated Peer Group MASC – Percentage		.39	.19	.04
Grade		.01	.02	.79

Note. Unstandardized regression weights are presented.

When the percentage of the reciprocated peer group falling above the cut-off on the MASC was included in the model examining the linear effects of grade level (Step 1), the model was significant, $R^2 = .58$, $F(3, 134) = 60.77$, $p < .001$, as well as the percentage of the reciprocated peer group predictor (Table 4.8). However this result became nonsignificant and the model was not improved, $R^2 = .58$, $F(4, 133) = 45.24$, $p < .001$, $\Delta R^2 < .001$, $F(1, 133) < .01$, $p > .05$, for Step 2, when the interaction term was added.

For Step 1a, when the quadratic effect of grade level was included (Table 4.9), the percentage of the reciprocated peer group falling above the cut-off was again a significant predictor, $R^2 = .58$, $F(4, 133) = 45.88$, $p < .001$. At Step 2a, this predictor again became nonsignificant and the model was not improved, $R^2 = .59$, $F(6, 131) = 31.98$, $p < .001$, $\Delta R^2 = .01$, $F(2, 131) = 2.34$, $p > .05$. In this model, the interaction terms for the linear and quadratic effects of grade level and the percentage of the reciprocated peer group above cut-off were significant. This result indicated that while for freshmen the effect of the percentage of the reciprocated peer group falling above the cut-off on later individual MASC scores was not significantly different from zero, this effect was stronger at later grades. The significant quadratic interaction term indicates that the increase in the peer group effect on individual MASC scores diminished for higher grades. Closer examination of the unstandardized regression weights indicates that from 11th to 12th grade, the effect of grade level on the influence of the peer group on the individual does reverse.

Table 4.9

Hierarchical Linear Regression Investigating Quadratic Effects of Grade as a Moderator of Peer Group Variables Predicting Individual Score on the MASC at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Reciprocated Peer Group Mean Scores:				
Step 1a	.58			
MASC Score		.73	.06	< .001
Reciprocated Peer Group MASC – Average		.27	.13	.04
Linear Fixed Effect of Grade		.08	.07	.21
Quadratic Fixed Effect of Grade		-.03	.02	.21
Using Reciprocated Peer Group Percentage Above Cut-Off:				
Step 1a	.58			
MASC Score		.75	.06	< .001
Reciprocated Peer Group MASC – Percentage		.40	.19	.03
Linear Fixed Effect of Grade		.07	.07	.28
Quadratic Fixed Effect of Grade		-.02	.02	.30
Step 2a	.59 [a]			
MASC Score		.76	.06	< .001
Reciprocated Peer Group MASC – Percentage		.02	.40	.96
Linear Fixed Effect of Grade		.07	.07	.31
Quadratic Fixed Effect of Grade		-.02	.02	.32
Peer Group MASC X Linear - Grade		1.21	.58	.04

Peer Group MASC X Quadratic - Grade	-.40	.18	.03

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .01$, $F(2, 131) = 2.34$, $p > .05$

Results for the CES-D

For the CES-D, when the inclusive peer group mean scores or the percentage of the inclusive, ego-nominated, or reciprocated peer groups falling above cut-off were included in the Step 1 and Step 2 models with grade level, all models were significant, $R^2 \geq .42$, $F(3\text{-}6, 131\text{-}144) \geq 16.58$, $p < .001$, though no predictor variables were significant aside from the initial individual CES-D score. When the ego-nominated peer group mean scores were included in the Step 1 model, the model was significant, $R^2 = .43$, $F(3, 137) = 34.79$, $p < .001$, as seen in Table 4.10, as was the ego-nominated peer group mean score on the CES-D. This predictor did not remain significant at Step 2 when the interaction term with grade level was added into the model, and the model was not improved, $R^2 = .44$, $F(4, 136) = 26.36$, $p < .001$, $\Delta R^2 = .004$, $F(1, 136) = 1.05$, $p > .05$. Testing for the quadratic effect of grade level, seen in Table 4.10, resulted in a similar effect, as ego-nominated peer group mean scores were significant in the Step 1a model, $R^2 = .43$, $F(4, 136) = 25.91$, $p < .001$, but became nonsignificant in Step 2a, when the interaction terms were added in, and the model was not significantly improved, $R^2 = .45$, $F(6, 134) = 18.06$, $p < .001$, $\Delta R^2 = .01$, $F(2, 134) = 1.77$, $p > .05$.

Table 4.10

Hierarchical Linear Regression Investigating Linear and Quadratic Effects of Grade as a Moderator of Peer Group Variables Predicting Individual Score on the CES-D at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Ego-Nominated Peer Group Mean Scores:				
Step 1	.43			
CES-D Score		.45	.05	< .001
Ego-Nominated Peer Group CES-D – Average		.27	.13	.04
Grade		-.02	.02	.28
Using Ego-Nominated Peer Group Mean Scores:				
Step 1a	.43			
CES-D Score		.45	.05	< .001
Ego-Nominated Peer Group CES-D – Average		.27	.13	.04
Linear Fixed Effect of Grade		-.01	.07	.88
Quadratic Fixed Effect of Grade		-.00	.02	.86
Using Reciprocated Peer Group Mean Scores:				
Step 1	.43			
CES-D Score		.43	.05	< .001
Reciprocated Peer Group CES-D – Average		.25	.10	.02
Grade		-.02	.02	.24
Using Reciprocated Peer Group Mean Scores:				
Step 1a	.43			
CES-D Score		.43	.05	< .001

Reciprocated Peer Group CES-D – Average	.25	.10	.02
Linear Fixed Effect of Grade	-.04	.07	.55
Quadratic Fixed Effect of Grade	.01	.02	.79
Step 2a	.47 [a]		
CES-D Score	.40	.05	< .001
Reciprocated Peer Group CES-D – Average	-.26	.23	.26
Linear Fixed Effect of Grade	.01	.07	.94
Quadratic Fixed Effect of Grade	-.01	.02	.80
Peer Group CES-D X Linear - Grade	.89	.32	.01
Peer Group CES-D X Quadratic - Grade	-.26	.10	.01

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .03$, $F(2, 131) = 3.86$, $p > .05$

When the reciprocated peer group mean scores on the CES-D were included in the Step 1 model, the model was significant, $R^2 = .43$, $F(3, 134) = 34.29$, $p < .001$ (Table 4.10), and the reciprocated peer group mean score was a significant predictor. When the interaction term was added into the model (Step 2), the model did not improve, $R^2 = .44$, $F(4, 133) = 26.23$, $p < .001$, $\Delta R^2 = .01$, $F(1, 133) = 1.61$, $p > .05$, and there were no significant predictors aside from the initial individual CES-D score. When the quadratic effect of grade was investigated, the Step 1a model was again significant, $R^2 = .43$, $F(4, 133) = 25.56$, $p < .001$ (Table 4.10), and the reciprocated peer group mean score was again a significant predictor. However, when the interaction between the reciprocated peer group mean score and the linear and quadratic effects of grade were added to the

model (Step 2a), the model did not improve, $R^2 = .47$, $F(6, 131) = 19.06$, $p < .001$, $\Delta R^2 = .03$, $F(2, 131) = 3.86$, $p > .05$, but the linear and quadratic interaction terms were significant predictors. This interaction is depicted graphically in Figure 4.2 for adolescents with average CES-D scores at T1. As can be seen, these results indicated that for the freshmen, the reciprocated peer group mean scores were not significantly related to later individual CES-D scores (as indicated by the nonsignificant main effect for reciprocated peer group mean scores). However, as grade level increased, the reciprocated group mean scores became more positively related to the later individual scores (linear grade X peer group interaction). This increase in influence diminished and reversed at higher grades (quadratic grade X peer group interaction).

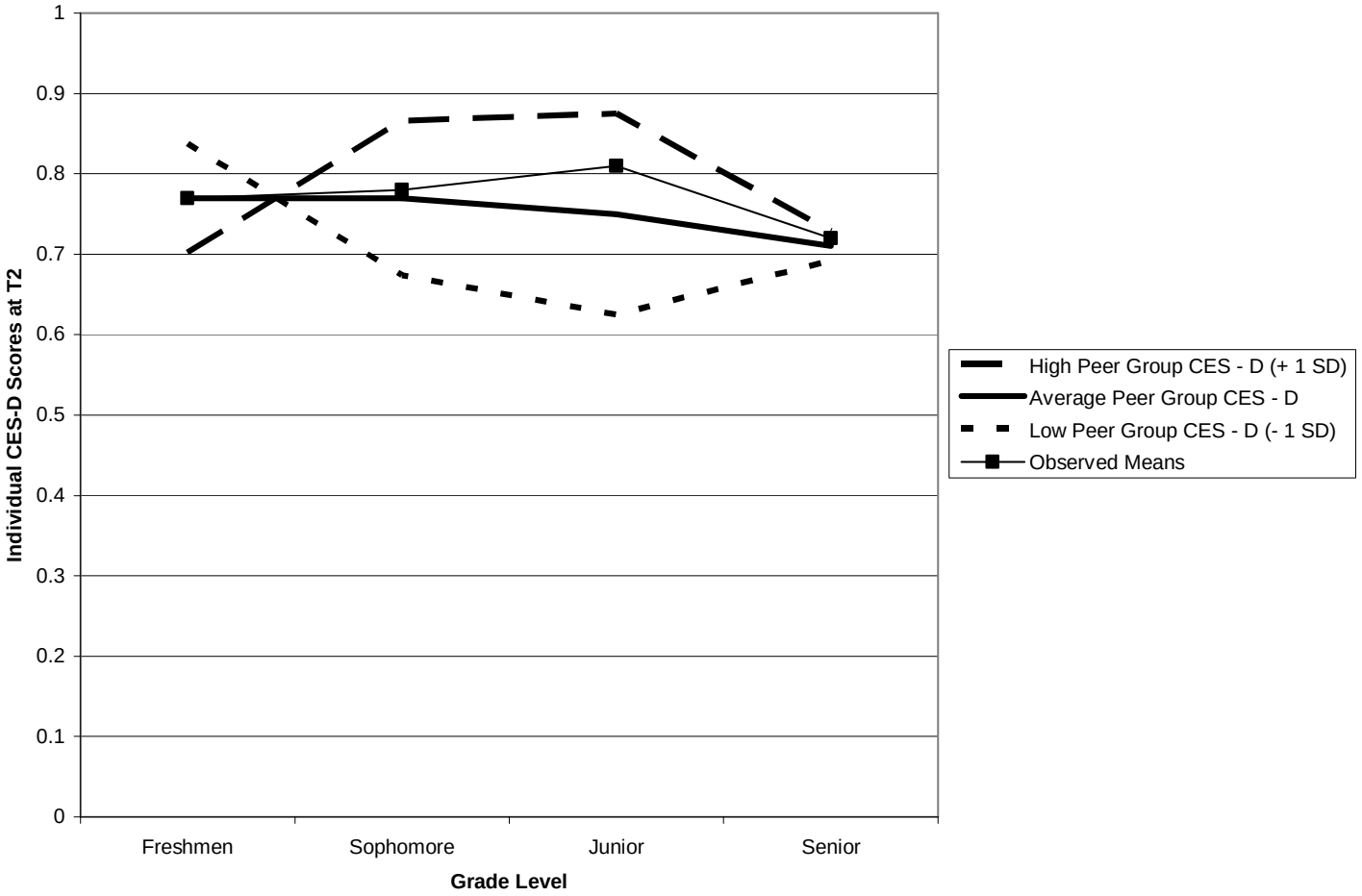

Figure 4.2. Graphical Depiction of Moderating Role of Grade Level on the Relation Between the Reciprocated Peer Group's Mean CES - D Scores and the T2 Individual CES - D Score.

Results for the CBCL Aggression and Delinquency subscales. Consistent with previous analyses, no significant results relevant to the hypotheses were observed for the majority of the models predicting individual CBCL – Aggression subscale scores. All Step 1 and Step 2 models were significant, $R^2 \geq .50$, $F(3\text{-}6, 128\text{-}141) \geq 22.24$, $p < .001$. When the reciprocated peer group mean score on the CBCL – Aggression subscale was included in the Step 1 model, shown in Table 4.11, the model was significant, $R^2 = .53$, $F(3, 131) = 48.99$, $p < .001$, and the reciprocated peer group mean score was a significant, though negative, predictor. This result indicates that the greater the reciprocated peer group mean score on the CBCL – Aggression subscale, the lower the individual's later score on the CBCL – Aggression subscale was. This relation was no longer significant in Step 2, when the interaction term was added to the model, $R^2 = .54$, $F(4, 130) = 37.89$, $p < .001$, $\Delta R^2 = .01$, $F(1, 130) = 2.71$, $p > .05$, or when quadratic effects of grade were evaluated, $R^2 = .53$, $F(4, 130) = 36.54$, $p < .001$ for the Step 1a model and $R^2 = .54$, $F(6, 128) = 25.15$, $p < .001$ for the Step 2a model.

Table 4.11

Hierarchical Linear Regression Investigating Linear Effects of Grade as a Moderator of Peer Group Variables Predicting Individual Score on the CBCL – Aggression Subscale at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Reciprocated Peer Group Mean Scores:				
Step 1	.53			
CBCL-Agg Score		.80	.07	< .001
Reciprocated Peer Group CBCL-Agg – Average		-.17	.13	.19
Grade		.00	.02	.81
Step 2	.54 [a]			
CBCL-Agg Score		.80	.07	< .001
Reciprocated Peer Group CBCL-Agg – Average		-.47	.22	.04
Grade		.01	.02	.45
Peer Group CBCL-Agg X Grade		.18	.11	.10

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .01$, $F(1, 130) = 2.71$, $p > .05$

Finally, for the CBCL – Delinquency subscale, when inclusive peer network mean score was included in the Step 1 model (Table 4.12), the model was significant, $R^2 = .42$, $F(3, 143) = 34.68$, $p < .001$, and the inclusive peer network mean score was a

significant predictor. When the interaction of the inclusive peer network mean score and grade level was included in the Step 2 model, the model was not significantly improved, R^2 = .43, F(4, 142) = 26.61, p < .001, ΔR^2 = .01, F(1, 142) = 1.82, p > .05, and no variables were significant predictors aside from the initial individual CBCL – Delinquency score. As Table 4.12 shows, when the quadratic effect of grade was included in the Step 1a model, the model was significant, R^2 = .43, F(4, 142) =27.30, p < .001, and the inclusive peer network mean score was a significant predictor. When the linear and quadratic interaction terms were added into the model (Step 2a), R^2 = .45, F(6, 140) = 18.96, p < .001, ΔR^2 = .01, F(2, 140) = 1.73, p > .05, only the quadratic fixed effect of grade was a significant predictor, indicating that individuals from higher grades had higher CBCL – Delinquency subscale scores and that this relation accelerated in strength at higher grade levels. Table 4.12 shows that there were no significant predictors (aside from the initial individual CBCL – Delinquency score) when the Step 1 model was estimated including the percentage of the inclusive peer group falling above the cut-off, R^2 = .41, F(3, 143) = 32.72, p < .001, or when the interaction term was added into this model (Step 2), R^2 = .41, F(4, 142) = 24.37, p < .001, ΔR^2 < .001, F(1, 142) = .02, p > .05. However, the percentage of the inclusive peer group that fell above the cut-off on the CBCL – Delinquency subscale was a significant predictor when the quadratic effect of grade was included in the Step 1a model, R^2 = .42, F(4, 142) = 25.19, p < .001. This effect was no longer significant when the interaction terms were added to the model (Step 2a), R^2 = .42, F(6, 140) = 16.61, p < .001, ΔR^2 < .001, F(2, 140) = .08, p > .05.

Table 4.12

Hierarchical Linear Regression Investigating Linear and Quadratic Effects of Grade as a Moderator of Peer Group Variables Predicting Individual Score on the CBCL – Delinquency Subscale at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Inclusive Peer Group Mean Scores:				
Step 1	.42			
CBCL-Del Score		.63	.07	< .001
Inclusive Peer Group CBCL-Del – Average		.52	.20	.01
Grade		-.00	.01	.88
Using Inclusive Peer Group Mean Scores:				
Step 1a	.43			
CBCL-Del Score		.65	.07	< .001
Inclusive Peer Group CBCL-Del – Average		.74	.23	< .01
Linear Fixed Effect of Grade		-.10	.05	.07
Quadratic Fixed Effect of Grade		.03	.02	.07
Step 2a	.45 [a]			
CBCL-Del Score		.65	.07	< .001
Inclusive Peer Group CBCL-Del – Average		.33	.48	.50
Linear Fixed Effect of Grade		-.11	.06	.06
Quadratic Fixed Effect of Grade		.04	.02	.03
Peer Group CBCL-Del X Linear - Grade		.10	.76	.89
Peer Group CBCL-Del X Quadratic - Grade		.12	.26	.65

Using Inclusive Peer Group Percentage Above Cut-Off:				
Step 1a	.42			
CBCL-Del Score		.65	.07	< .001
Inclusive Peer Group CBCL-Del – Percentage		.36	.16	.03
Linear Fixed Effect of Grade		-.07	.05	.17
Quadratic Fixed Effect of Grade		.03	.02	.16
Using Ego-Nominated Peer Group Mean Scores:				
Step 1a	.40			
CBCL-Del Score		.64	.07	< .001
Ego-Nominated Peer Group CBCL-Del – Average		.38	.18	.04
Linear Fixed Effect of Grade		-.05	.05	.38
Quadratic Fixed Effect of Grade		.01	.02	.44
Using Reciprocated Peer Group Mean Scores:				
Step 1	.43			
CBCL-Del Score		.66	.07	< .001
Reciprocated Peer Group CBCL-Del – Average		.16	.14	.25
Grade		-.00	.01	.92
Step 2	.46 [b]			
CBCL-Del Score		.65	.07	< .001
Reciprocated Peer Group CBCL-Del –		-.38	.23	.10

Average				
Grade		.02	.02	.16
Peer Group CBCL – Del X Grade		.45	.15	< .01
Using Reciprocated Peer Group Percentage Above Cut-Off:				
Step 1	.42			
CBCL-Del Score		.66	.07	< .001
Reciprocated Peer Group CBCL-Del – Percentage		.06	.09	.52
Grade		-.00	.01	.89
Step 2	.44 [c]			
CBCL-Del Score		.64	.07	< .001
Reciprocated Peer Group CBCL-Del – Percentage		-.28	.18	.13
Grade		.02	.02	.30
Peer Group CBCL – Del X Grade		.24	.11	.04

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .01$, $F(2, 140) = 1.73$, $p > .05$. [b] $\Delta R^2 = .03$, $F(1, 132) = 8.50$, $p < .01$. [c] $\Delta R^2 = .02$, $F(1, 132) = 4.46$, $p < .05$

Table 4.12 shows that, while there were no significant predictors aside from the initial individual CBCL – Delinquency score for the Step 1 or Step 2 grade models, $R^2 = .40$, $F(3, 136) = 30.34$, $p < .001$ and $R^2 = .41$, $F(4, 135) = 23.78$, $p < .001$, $\Delta R^2 = .01$, $F(1,$

135) = 2.84, $p > .05$, the ego-nominated peer group mean score on the CBCL – Delinquency subscale was a significant predictor when the quadratic grade level term was included in the Step 1a model, $R^2 = .40$, $F(4, 135) = 22.83$, $p < .001$. This effect was no longer significant when the linear and quadratic interaction terms were added to the model (Step 2a), $R^2 = .42$, $F(6, 133) = 16.32$, $p < .001$, $\Delta R^2 = .02$, $F(2, 133) = 2.36$, $p > .05$. There were no significant predictors, aside from the initial individual CBCL – Delinquency score, when the percentage of the ego-nominated peer group falling above the cut-off on the CBCL – Delinquency subscale was included, though all models were significant, $R^2 \geq .40$, $F(3\text{-}6, 133\text{-}136) \geq 15.33$, $p < .001$.

Table 4.12 shows that when both the reciprocated peer group mean score and the percentage of the reciprocated peer group falling above cut-off on the CBCL – Delinquency subscale score were included in the respective Step 1 models, $R^2 = .43$, $F(3, 133) = 33.27$, $p < .001$ and $R^2 = .42$, $F(3, 133) = 32.73$, $p < .001$ respectively, there were no significant predictors aside from the initial individual CBCL – Delinquency score. However, for both the reciprocated peer group mean score and the percentage of the reciprocated peer group falling above cut-off, when the interaction terms were added into the models (Step 2), both models improved, $R^2 = .46$, $F(4, 132) = 28.48$, $p < .001$, $\Delta R^2 = .03$, $F(1, 132) = 8.50$, $p < .01$, $R^2 = .44$, $F(4, 132) = 26.30$, $p < .001$, $\Delta R^2 = .02$, $F(1, 132) = 4.46$, $p < .05$ respectively, and the peer group X grade level interactions were significant. These results indicated that while the relation between the peer group variable, either mean score or percentage above cut-off, and later individual CBCL – Delinquency subscale score was not significantly different from zero for 9th graders, this relation grew more positive, and became significant, at higher grade levels. For both the

reciprocated peer group mean score and the percentage of the reciprocated peer group falling above cut-off on the CBCL – Delinquency subscale score, there were no significant predictors (aside from the initial individual CBCL – Delinquency score) in the Step 1a and 2a models including the quadratic effect of grade, $R^2 \geq .42$, $F(4\text{-}6, 130\text{-}132) \geq 17.50$, $p < .001$.

Summary

Overall, these results produced mixed support for the hypothesis that grade level would moderate the relation between psychopathology in the peer group and change in individual psychopathology over time. The most support for this hypothesis was obtained for MASC scores when the percentage of the reciprocated peer group falling above cut-off was considered, for CES-D scores when the reciprocated peer group's mean score was considered, and for the CBCL – Delinquency subscale when the reciprocated peer group's psychopathology measures, regardless of how they were operationalized, were considered. For the internalizing psychopathology measures, quadratic effects of grade level were significant contributors to the models in which they were included; however, they did not produce a significant change in the R^2 values and therefore did not explain the data significantly better than other, less complicated, models.

Hypothesis Six: Gender as a Moderator

In order to examine the way in which the relation between peer group and individual psychopathology may be different for boys and girls, gender was examined as a moderator of these relations. First, bivariate relations were explored. Means and standard deviations for boys and girls for each of the T1 peer group variables and the T2

psychopathology variables are presented in Table 4.13. As would be expected, girls reported significantly higher scores on the MASC and CES-D than did boys. Contrary to what would be expected, no gender difference was evident on the CBCL – Aggression or Delinquency subscales. Though not shown, these relations were similar for individual psychopathology scores at T1 as well. Across methods of constructing the peer group variables, a pattern emerged of girls',peer groups reporting consistently higher mean scores and percentages of above cut-off scores for the internalizing measures than did boys. For the reciprocated peer group, girls' peer groups reported significantly higher mean scores and rate of above cut-off scores on the CBCL – Aggression subscale score than did boys' peer groups. For the inclusive peer group, girls' peer groups reported significantly lower mean scores on the CBCL – Delinquency subscale score than did boys' peer groups, though boys and girls' peer groups did not significantly differ on rates of above cut-off scores on the CBCL – Delinquency subscale score.

Table 4.13

Means and Standard Deviations of Peer Group Characteristics at T1 and Individual Psychopathology Measures at T2 by Gender

Variable	Females (n = 87)	Males (n = 84)	*F*
T1 Peer Group Psychopathology Measures			
Inclusive			
MASC Total	1.06 (.08)	.92 (.10)	F(1, 169) = 94.41 ***
CES-D Total	.77 (.13)	.62 (.16)	F(1, 169) = 46.59 ***
CBCL – Agg Total	.48 (.09)	.48 (.08)	F(1, 169) < .01
CBCL – Del Total	.32 (.08)	.36 (.08)	F(1, 169) = 8.14 **
MASC – Percentage above Cut-off	.14 (.08)	.09 (.06)	F(1, 169) = 16.36 ***
CES-D Total – Percentage above Cut-off	.41 (.16)	.31 (.16)	F(1, 169) = 16.89 ***
CBCL – Agg – Percentage above Cut-off	.18 (.12)	.18 (.10)	F(1, 169) = .02
CBCL – Del – Percentage above Cut-off	.14 (.13)	.15 (.12)	F(1, 169) = .27
Ego-Nominated			
MASC Total	1.06 (.09)	.89 (.12)	F(1, 151) = 90.26 ***
CES-D Total	.76 (.16)	.56 (.17)	F(1, 151) = 56.76 ***
CBCL – Agg Total	.48 (.13)	.46 (.10)	F(1, 151) = 1.12

CBCL – Del Total	.33 (.10)	.35 (.10)	F(1, 151) = 2.82
MASC – Percentage above Cut-off	.14 (.08)	.09 (.07)	F(1, 151) = 20.91 ***
CES-D Total – Percentage above Cut-off	.41 (.17)	.25 (.15)	F(1, 151) = 36.45 ***
CBCL – Agg – Percentage above Cut-off	.17 (.14)	.15 (.14)	F(1, 151) = .81
CBCL – Del – Percentage above Cut-off	.16 (.16)	.15 (.16)	F(1, 151) = .08
Reciprocated			
MASC Total	1.10 (.13)	.90 (.18)	F(1, 148) = 62.69 ***
CES-D Total	.81 (.25)	.57 (.21)	F(1, 147) = 42.36 ***
CBCL – Agg Total	.51 (.15)	.45 (.14)	F(1, 148) = 5.25 *
CBCL – Del Total	.33 (.13)	.34 (.11)	F(1, 148) = .52
MASC – Percentage above Cut-off	.16 (.12)	.07 (.10)	F(1, 148) = 27.56 ***
CES-D Total – Percentage above Cut-off	.44 (.24)	.22 (.18)	F(1, 148) = 39.91 ***
CBCL – Agg – Percentage above Cut-off	.21 (.20)	.14 (.16)	F(1, 148) = 6.48 *
CBCL – Del – Percentage above Cut-off	.14 (.20)	.12 (.18)	F(1, 148) = .36

T2 Individual Psychopathology Measures

MASC Total	1.07 (.36)	.79 (.35)	F(1, 154) = 23.73 ***
CES-D Total†	.89 (.32)	.65 (.35)	F(1, 153) = 19.89 ***
CBCL – Agg Total	.51 (.30)	.48 (.28)	F(1, 152) = .22
CBCL – Del Total	.31 (.21)	.39 (.26)	F(1, 154) = 3.59

Note. † Square-root transformation.

* p < .05, ** p < .01, *** p < .001

As with previously examined moderators, a linear regression framework was employed to examine whether gender operated as a moderator of the relation between peer group psychopathology and later individual psychopathology. All variables were grand mean centered before being included as criterion or predictors in the model. Gender was not mean centered and instead was set such that girls were coded as 0 and boys were coded as 1. Gender was first entered into the baseline model as a predictor of a T2 individual psychopathology measure score along with the T1 individual psychopathology measure score and the T1 peer group mean score or percentage of the peer group that fell above cut-off on the psychopathology measure (Step 1). Next, the interaction between gender and the peer group predictor variable was entered into the model (Step 2). In all models calculated, the T1 individual psychopathology score was a significant predictor of the T2 individual psychopathology score. However, this finding was not considered pertinent to the moderator hypotheses and is not reported below, although it is included in the tables. Additionally, only regression models that produced significant results for peer group psychopathology measures, gender, or the interaction term are presented in the regression tables.

For the MASC, CES-D, and CBCL – Aggression subscale, across all methods of peer group variable construction, all Step 1 and Step 2 models were significant when gender was included and when the gender by peer group interaction variable was added into the model, $R^2 \geq .52$, $F(3\text{-}4, 131\text{-}142) \geq 38.90$, $p < .001$ for the MASC, $R^2 \geq .43$, $F(3\text{-}4, 131\text{-}142) \geq 24.42$, $p < .001$ for the CES-D, $R^2 \geq .51$, $F(3\text{-}4, 128\text{-}139) \geq 34.50$, $p < .001$ for the CBCL – Aggression subscale. However, no predictors were significant in any of these models, aside from initial individual psychopathology scores.

For the CBCL – Delinquency subscale, when the inclusive peer group mean score was included in the Step 1 model, as seen in Table 4.14, the model was significant, $R^2 = .44$, $F(3, 141) = 36.82$, $p < .001$, and the inclusive peer group mean score was a significant predictor. In Step 2, when the gender by inclusive peer group mean score interaction term was added to the model, the model was not improved, $R^2 = .45$, $F(4, 140) = 28.76$, $p < .001$, $\Delta R^2 = .01$, $F(1, 140) = 3.01$, $p > .05$, and the inclusive peer group mean score was no longer a significant predictor. When the ego-nominated peer group mean score, as well as the percentages of the inclusive and ego-nominated peer groups that fell above cut-off on the CBCL – Delinquency subscale were included in the Step 1 and Step 2 models, all models were significant, $R^2 \geq .42$, $F(3\text{-}4, 133\text{-}141) \geq 24.28$, $p < .001$, however no variables were significant predictors (aside from initial individual CBCL – Delinquency score). Finally, when the reciprocated peer group mean score and percentage of the reciprocated peer group falling above the cut-off were included in the Step 1 models, $R^2 = .46$, $F(3, 131) = 36.66$, $p < .001$ and $R^2 = .45$, $F(3, 131) = 36.25$, $p < .001$ respectively, there were no significant predictors (aside from initial individual CBCL – Delinquency score). See Table 4.14. When the interaction term was added into

the models (Step 2), the models were not significantly improved, $R^2 = .46$, $F(4, 130) = 28.21$, $p < .001$, $\Delta R^2 = .01$, $F(1, 130) = 2.02$, $p > .05$, $R^2 = .45$, $F(4, 130) = 27.09$, $p < .001$, $\Delta R^2 = .001$, $F(1, 130) = .26$, $p > .05$ respectively, but gender was a significant predictor of later individual CBCL – Delinquency subscale scores. This result indicated that boys had a greater increase in CBCL – Delinquency scores from T1 to T2 than did girls.

Table 4.14

Hierarchical Linear Regression Investigating Gender as a Moderator of Peer Group Variables Predicting Individual Score on the CBCL – Delinquency Subscale at T2

T1 Variables	R^2	*B*	*SE B*	*p*
Using Inclusive Peer Group Mean Scores:				
Step 1	.44			
CBCL-Del Score		.65	.07	< .001
Inclusive Peer Group CBCL-Del – Average		.44	.20	.03
Gender		.04	.03	.17
Using Reciprocated Peer Group Mean Scores:				
Step 1	.46			
CBCL-Del Score		.68	.07	< .001
Reciprocated Peer Group CBCL-Del – Average		.13	.14	.36
Gender		.05	.03	.07
Step 2	.46 [a]			
CBCL-Del Score		.70	.07	< .001
Reciprocated Peer Group CBCL-Del – Average		-.11	.21	.61
Gender		.06	.03	< .05
Peer Group CBCL – Del X Gender		.40	.28	.16
Using Reciprocated Peer Group Percentage Above Cut-Off:				

Step 1	.45			
CBCL-Del Score		.68	.07	< .001
Reciprocated Peer Group CBCL-Del – Average		.04	.09	.69
Gender		.06	.03	.05
Step 2	.45 [b]			
CBCL-Del Score		.68	.07	< .001
Reciprocated Peer Group CBCL-Del – Average		-.02	.15	.87
Gender		.06	.03	< .05
Peer Group CBCL – Del X Gender		.10	.19	.61

Note. Unstandardized regression weights are presented.

[a] $\Delta R^2 = .01$, $F(1, 130) = 2.02$, $p > .05$. [b] $\Delta R^2 = .001$, $F(1, 130) = .26$, $p > .05$.

Overall, these results did not support gender as a moderator of the relation between peer group psychopathology variables and change in individual psychopathology variables. Gender was not a significant moderator of this relation across each psychopathology variable and for each method of constructing the peer group variables . Gender was associated only once with the change in individual psychopathology over time when it was included in the model containing reciprocated peer group levels of CBCL – Delinquency scores. This finding is in contrast to the bivariate analyses that showed a significant relation between gender and the MASC and CES-D.

Chapter Summary

The current chapter set out to examine three hypotheses that proposed moderators to the relation between peer group psychopathology and later individual psychopathology. The proposed moderators were peer group density (Hypothesis 4), grade level (Hypothesis 5), and gender (Hypothesis 6). For the analyses testing hypothesis four, peer group density was considered from both an objective (derived from the peer network linkages) and subjective (derived from a self-report measure of adolescent's perceptions) perspective. Results supported objective density as a moderator of the relation between the percentage of the peer group that fell above cut-off on the MASC and later individual scores on the MASC. However this moderation was in the opposite direction as predicted such that individual adolescents with denser peer groups were less influenced by their peer group (see Figure 4.1). Aside from the MASC, objective peer group density was not supported as a moderator for any other psychopathology measure. Subjective peer group density was not supported as a moderator for any psychopathology measure, including the MASC.

For the analyses testing hypothesis five, grade level was examined first as a linear moderator and second as a linear and quadratic moderator. The linear moderating role of grade level was supported for the relation between reciprocated peer group and individual adolescent CBCL – Delinquency scores, such that at higher grade levels, the peer group was more influential, contrary to the hypothesis. The quadratic moderating role of grade level was supported for the relations between the percentage of the reciprocated peer group that fell above the cut-off on the MASC and individual adolescent MASC scores and between the reciprocated peer group's average scores on the CES-D and individual

adolescent CES-D scores. For both of these psychopathology measures, linear and quadratic grade level moderated the relation as hypothesized such that peer influence increased from freshmen to sophomore years, stabilized between sophomore and junior years, and decreased from junior to senior years (see Figure 4.2).

Finally, for analyses testing hypothesis six, gender was not supported as a moderator for any psychopathology measure examined, despite bivariate relations showing significant differences between boys and girls in their own MASC and CES-D scores as well as these scores in their peer group.

CHAPTER 5: Discussion

The present study sought to investigate the role of the friendship network in the development and spread of psychopathology in youth. This was accomplished by examining several hypotheses divided into two categories. The first group of hypotheses investigated the connection between the adolescent's level of psychopathology and that of the friendship network cross-sectionally (Hypothesis 1), longitudinally (Hypothesis 2), and in comparison to the influence of the youth's closest friend (Hypothesis 3). In general it was hypothesized that the friendship network's level of psychopathology would be positively related to individual psychopathology, such that higher levels of psychopathology in the friendship network would be associated with higher levels of individual psychopathology or an increase in psychopathology over time. The second group of hypotheses investigated moderators of the relations established in the first group. These moderators were peer group density (Hypothesis 4), grade level (Hypothesis 5), and gender (Hypothesis 6). Peer group density was hypothesized to moderate the relation between friendship network and individual psychopathology such that the friendship network's level of psychopathology would be more influential for those whose friendship network was denser. Grade level was hypothesized to moderate the relation between friendship network and individual psychopathology such that the friendship network's level of psychopathology would be most influential in the 9th and 10th grade years and would diminish in influence after this. Finally, gender was hypothesized to moderate the relation between friendship network and individual psychopathology such that the friendship network's level of psychopathology would be more influential for girls than for boys.

For each form of psychopathology, comparisons were run using data from each of several friendship network representations, which were created using three different methods. The ego-nominated method created the friendship network representations using only the individual's peer nominations. By contrast the inclusive method created the friendship network representations using *both* the peers nominated by the individual *and* any peers that nominated the individual on their own questionnaire. Finally, the reciprocated method created the friendship network by only including peers that were *both* nominated by the individual and who nominated the individual in return. See Figure 3.1 for a graphical depiction. Once the friendship network was created, the independent variable was the level of psychopathology reported by the members of each individual's friendship network. Somewhat unexpectedly, results indicated that the manner in which the friendship network construct was created was very influential to the findings obtained. This is discussed in more detail in the section on methodological implications below.

The first hypothesis stated that rates of specific forms of psychopathology (anxiety, depression, aggression, and delinquency) would be correlated across friendship groups such that individuals in groups containing more peers with greater symptoms of a specific form of psychopathology (e.g., anxiety) would be more likely to report symptoms of the same psychopathology. This dependent and independent variables for this hypothesis were operationalized as both quantitative (the mean of the psychopathology measure of interest) and categorical (whether or not individuals fell above the cut-off on the psychopathology measure of interest) terms. This hypothesis was tested cross-sectionally at each of the two time points of the study, allowing for the

investigation of consistency of individual findings across time. Very few results were consistent and significant across the two time points. Bivariate correlation between the individual's score on the anxiety measure (the MASC) and the mean anxiety score within his or her friendship network were significant and positive for the ego-nominated and reciprocated friendship networks. Individual scores on the depression measure (the CES-D) and the mean depression score within the friendship network were also significantly positively correlated at both time points for the reciprocated friendship network. Finally at both time points, individuals' scores on the delinquency measure (the CBCL – Delinquency subscale) were significantly positively correlated with the percentage of the reciprocated friendship network that fell above cut-off, and individuals who scored above the cut-off for delinquency had a greater percentage of their reciprocated friendship network that fell above the cut-off than did individuals who did not fall above the cut-off. Individual scores on the aggression measure (the CBCL – Aggression subscale) were not consistently related to friendship network report of aggression.

These results showed conditional support for the hypothesis. For anxiety, depression, and delinquency, results showed that individual and friendship network psychopathology measures were positively related as hypothesized. However, these findings were not consistently found across methods of creating the friendship network, as the reciprocated peer group appeared to show more consistent findings across time points than the ego-nominated or inclusive peer groups. Also, the findings were not consistent across the methods of operationalizing the independent and dependent variables. The internalizing variables (anxiety and depression) showed significant correlations between individual and friendship network mean scores, while the delinquency variable showed a significant

relation with the percentage of the friendship network that fell above the cut-off. Overall, these results supported for the hypothesis in certain situations and suggested the need for further exploration of these relations.

The finding that friendship network delinquency, depression, and anxiety were correlated with individual delinquency and anxiety replicates previous research showing such a connection in other samples (e.g., Hogue & Steinburg, 1995, Ellis & Zarbatany, 2007, Mariano & Harton, 2005). The absence of a cross-sectional relation between friendship network and individual aggression represents a failure to replicate past findings for aggression in teenagers (e.g., Xie et al., 1999). Possible explanations for this failure to replicate are described below.

The second hypothesis stated that adolescents belonging to a friendship network with higher levels of symptoms of specific psychopathology would report more symptoms of the same psychopathology later, after controlling for the individual's initial levels of psychopathology. The T1 individual report of psychopathology was included in these regression models in order to test a possible causal effect and influence of the friendship network's level of psychopathology. If individual adolescents select friendship networks similar to themselves in level of psychopathology, this would create a correlation between initial friendship network level of psychopathology and later individual level of psychopathology. By controlling for the initial individual level of psychopathology, however, any significant relation between the friendship network and later individual reports of psychopathology is unique of the individual adolescent's initial level of psychopathology and therefore the effects of selection. Again, results were analyzed for each of the four psychopathology measures, by each of the three peer group

representations, and by operationalizing the dependent and independent variables in the two ways described above.

These results again showed conditional support. Anxiety, depression, and delinquency again showed the expected positive relations between initial friendship network levels of psychopathology and later individual levels of psychopathology after controlling for initial levels of psychopathology. However these relations differed by the method of constructing the friendship network variables and how independent and dependent variables were operationalized. Similar to the cross-sectional results, later individual anxiety and depression were significantly predicted by the reciprocated peer group variables and were not significantly predicted by ego-nominated or inclusive peer group variables. Contrary to the cross-sectional results, however, later individual delinquency was significantly predicted by the inclusive peer group variables rather than the reciprocated or ego-nominated peer group variables. When the peer group variable was operationalized as a percentage of the friendship network that fell above the cut-off, friendship network anxiety predicted later individual anxiety after controlling for initial mean scores on the anxiety measure. When the peer group variable was operationalized as the mean friendship network score on the anxiety measure, this variable did not predict later individual anxiety. For depression, these findings were reversed, such that the percentage of the friendship network that fell above the cut-off did not predict later individual levels of depression, but the friendship network mean level of depression did. The method of operationalizing the independent or dependent variable did not alter the results for delinquency. Overall, these results showed partial support for this hypothesis, consistent with the cross-sectional results, namely that for anxiety, depression, and

delinquency, psychopathology within the friendship network significantly positively predicted later individual psychopathology under certain conditions. Again, both the method of creating the peer group and the method of operationalizing the independent and dependent variables were influential in determining the results.

Because fewer studies have examined the effect of the friendship network longitudinally, the current findings both replicate and expand previous research. For instance, the current results replicate previous longitudinal research showing an influence of the friendship network on later individual symptoms of psychopathology, controlling for initial symptoms, in the case of delinquency (e.g,, Ellis & Zarbatany, 2007; Dishion et al., 1999) and depression (e.g., Hogue & Steinberg, 1995). In the case of anxiety, the current study's findings add to the existing evidence of cross-sectional relations between peer and individual levels of anxiety (Mariano & Harton, 2005) and expend it to show a significant longitudinal relation between the friendship network and the individual's level of anxiety. Finally, the current study again failed to replicate the previously established relation between initial friendship network and later individual report of aggression (e.g., Espelage et al., 2003). The results obtained here were more similar to those found by Ellis and Zarbatany (2007) that showed no relation between initial friendship network report of aggression and later individual report of aggression once initial individual aggression was taken into account.

The third hypothesis stated that both the target adolescent's closest friend's report of psychopathology and level of psychopathology in the target adolescent's friendship network when considered together would contribute significantly to prediction of the target adolescent's later level of psychopathology. In order to begin to test this

hypothesis, the bivariate relation between the closest friend's level of reported psychopathology at T1 and the individual's report at T2 was examined. For all psychopathology measures, the closest friend's report of psychopathology, operationalized as either the total score or the binary cut-off status, was not significantly related to later individual psychopathology. Despite the fact that bivariate analyses did not indicate further investigation, closest friend psychopathology measures were added to regression models predicting T2 individual psychopathology measures from T1 friendship network and individual psychopathology measures. Closest friend report of psychopathology was not significant in any model. This relatively surprising result led to the decision to not include the closest friend's report of psychopathology in further analyses.

One possible explanation for this unexpected result is that missing closest friend data may have confounded the results. Several individuals were not included in the closest friend analyses because the data for their closest friend was missing. Comparisons between individuals whose closest friend's data were present and those whose closest friend's data were not (n = 34) revealed that individuals with missing closest friend data had significantly lower grades, higher ego-nominated peer group aggression at T1, higher reciprocated peer group depression at T1, lower ego-nominated peer group aggression at T2, , and lower T1 inclusive peer network density. Because these differences showed no pattern of consistent difference on the psychopathology measure variables, they were unlikely to account for the finding that the closest friend variables were not significantly related to any form of later psychopathology. Overall, the results supported the hypothesis that peer network psychopathology would

significantly predict later individual psychopathology after the closest friend's report of psychopathology was included. The surprising finding was that the closest friend's initial report of psychopathology was not related to the individual's later report of psychopathology, which was not what had been expected or demonstrated in previous research (e.g., Prinstein, 2007, Prinstein & Wang, 2005, Rubin et al., 2006, Stevens & Prinstein, 2005).

The second group of hypotheses examined moderators to the established relations between initial friendship network report of psychopathology and later individual psychopathology when controlled for initial individual psychopathology. A baseline model was tested for each of these hypotheses that included the dependent variable (individual's T2 score on the psychopathology measure) and the predictor variables (T1 individual score on the psychopathology measure and T1 friendship network psychopathology measure). The peer group variables included each of the three methods of creating the peer group, ego-nominated, inclusive, and reciprocated, and also the two methods of operationalizing the friendship network score, mean scores and percentage of the friendship network falling above cut-off. Each of the six resulting peer group variables formed the six initial baseline models for each of the four psychopathology measures and moderators were added to these. The level of psychopathology reported by the adolescent's closest and the cut-off status method of operationalizing the dependent variable were not included in baseline models. This was due to the results from the first group of hypotheses, described above, which indicated that these two constructs did not add meaningfully to the results.

The fourth hypothesis stated that the density of the individual's friendship network would moderate the previously established relations such that for individuals belonging to denser friendship network, the relation between friendship network and individual psychopathology would be stronger than for individuals belonging to a less dense peer network. Peer group density was considered as either "objective" peer group density, density calculated from the peer network links themselves, or "subjective" peer group density, density calculated by the score of the Friendship Questionnaire. Results supported peer group density as a moderator only for anxiety and, contrary to the hypothesized direction, the significant negative interaction term indicated that individuals from less dense friendship networks had a more positive relation between the percentage of the friendship network that scored above cut-off for anxiety and later individual report of anxiety. The moderating effect of peer group density on anxiety was present for the reciprocated and ego-nominated peer groups but was not present in the inclusive peer group. The finding that the percentage of the reciprocated peer group that fell above cut-off was related to an increase in anxiety is consistent with the results for anxiety reported for Hypothesis Two above. However, the appearance of a significant effect within the ego-nominated peer group may indicate that the moderating effect of peer group density was suppressing the main effect of the ego-nominated peer group in previous analyses. Subjective density did not significantly moderate the relation between friendship network psychopathology and later individual psychopathology. Aside from the mixed support this hypothesis received for anxiety, peer group density, objective or subjective, was not supported as a moderator for the other psychopathology measures evaluated. These results failed to replicate the evidence from prior research (Haynie, 2001) supporting peer

network density as a moderator of the relation between friendship network and individual delinquency.

The fifth hypothesis stated that the grade level or age of the individual would moderate the previously established relations such that the strength of these relations would be the strongest in middle adolescence (9th and 10th grade) and would diminish in later adolescence (11th and 12th grade). Age was not examined as a moderator due to its strong correlation with the grade level of the individual. The moderating effects of grade were examined using both a linear and quadratic approach to grade. From the linear perspective, the hypothesis would predict a negative interaction between grade level and friendship network psychopathology, such that as grade level increased, the influence of the friendship network on an adolescent's report of psychopathology would decrease. From a quadratic perspective, the hypothesis would predict a negative quadratic interaction effect of grade such that the strength of the relation between friendship network and later individual psychopathology decreases over time and to a greater extent at each successive grade level.

The results supported a linear (but not quadratic) interaction effect of grade for delinquency; however the effect was in the opposite direction of the hypothesis. The influence of initial reciprocated peer group delinquency scores on later individual delinquency scores was higher for individuals at higher grade levels. This was true to such an extent that the effect of the friendship network was non-significant for 9th graders and was significant and positive for 12th graders. This finding is inconsistent with previous findings that delinquent peers become less influential in later adolescence (Collins & Steinberg, 2006; Dishion et al., 1999; Dunphy, 1963; Shrum & Cheek, 1987).

It is interesting that this effect appeared in the reciprocated peer group because the basic relation between the reciprocated peer group initial delinquency scores and later individual delinquency was not significant in previous analyses.

Results did not support a linear interaction effect of grade level for any other psychopathology measure. However, when quadratic effects of grade level were considered, both anxiety and depression showed results consistent with the hypothesis. For anxiety, the hypothesized significant negative quadratic interaction effect was found when these terms were included in the model with the percentage of the reciprocated peer group that fell above cut-off. For depression, the hypothesized significant negative quadratic interaction effect was found when the terms were included in the model with the mean depression score in the reciprocated peer group. However, for both anxiety and depression, the quadratic models did not account for significantly more variance than did the linear model. A preference for parsimony then would suggest that the simpler linear models be preferred over the more complicated quadratic models. While little research has directly empirically tested a quadratic model for peer influence over time, the proposed trajectories of peer influence proposed by Dunphy (1963), Collins and Steinberg (2006) and others predict a quadratic effect of grade/age similar to the one found here for anxiety and depression.

Overall, these results only partially support the hypothesized moderating role of grade level on previously established relations between friendship network and individual psychopathology. A linear moderating effect of grade level was found for delinquency; however it was in the opposite direction of the expected moderation. Quadratic moderating effects of grade level were found as predicted for both anxiety and

depression; however these models did not significantly outperform the more parsimonious models that did not include such moderation.

The sixth and final hypothesis stated that the gender of the individual would moderate the previously established relations such that the strength of these relations would be the stronger for girls than for boys. Gender was not supported as a moderator for any of the psychopathology measures evaluated across all three methods of creating the peer group and both methods of operationalizing the independent variables. In fact, despite strong bivariate relations between the individual's gender and his or her report of anxiety or depression at T2, gender was not a significant predictor of later individual psychopathology when it was included in the model with initial individual and friendship network psychopathology in all but one case. For delinquency, which had not shown a significant gender difference at the bivariate level, a significant main effect of gender indicated that boys reported higher delinquency scores after controlling for their initial delinquency score and the reciprocated peer group's delinquency scores. These results did not support the hypothesized role of gender as a moderator, in contrast to some previous research and theorizing that has predicted that girls would be more influenced by their peers than boys (e.g., Crockett et al., 1984; Hanish, Martin, Fabes, Leonard, & Herzog, 2005; Johnson, 2004; Rose & Rudolph, 2006; Stevens & Prinstein, 2005). However, these findings did coincide with other empirical findings showing no difference between the genders in terms of the strength of the influence of peers (Ellis & Zarbatany, 2007; Espelage et al., 2003; Xie et al., 1999).

Conceptual Implications

The primary purpose of the present study was to determine if the level of psychopathology within an adolescent's friendship network influenced that adolescent's own level of psychopathology. This relation has often been theorized but rarely has it been rigorously tested using a longitudinal sample with adolescents. For the measures of anxiety, depression, and delinquency, the current study demonstrated cross sectional relations between the friendship network and the individual and also a longitudinal connection between the initial friendship network report and later individual report when the individual's initial report was considered. As such, the present study demonstrated that the initial friendship network report of psychopathology was related to the change in individual psychopathology over time. While there are other alternative explanations for this finding, one compelling reason for the observed results is that the friendship network influenced the individuals to become more or less depressed, anxious, or delinquent over time. This replicated previous research showing this relation in the case of delinquency (e.g., Dishion, et al., 1999), depression (e.g., Hogue & Steinberg, 1995) and anxiety (e.g., Mariano & Harton, 2005). The current study did not test the selection, or homophily, hypothesis that individuals would seek out friendship networks similar to themselves. The role of selection was controlled for by the inclusion of the initial individual report in the model so that the friendship network report from T1 could predict the individual's change from T1 to T2 and not simply how similar the T1 friendship network's report was to the T2 individual's report.

At the same time, these results do not discount selection as playing a role in the development of psychopathology in adolescents. In fact, the combination of selection of similar peers and the positive influence between friendship network psychopathology and

individual psychopathology might create a positive feedback loop, resulting in more extreme levels of psychopathology in individuals and friendship networks that are more homogeneous in their composition over several repetitions of this process. However the finding of diminishing strength of the influence of the peer group over grade level, discussed in more detail below, might prevent this cycle from becoming too extreme. Overall, the results of the present study support the theory that the peer group influences change in individual psychopathology over time, at least for the constructs of anxiety, depression, and delinquency. It should also be noted that while the dependant measures were forms of psychopathology, the results do not suggest that the peer group's influence is always in a negative direction. In fact, the positive association between the friendship network and the individual suggests that the friendship network may act as a protective influence as well as a negative one. For example, the results suggest that, just as having a higher percentage of the friendship network that falls above the cut-off for anxiety problem is associated with an increase in the target adolescent's reported anxiety, having a below average percentage of the friendship network falling above the cut-off, as in the case for the 40% of the sample whose friendship networks did not include any peers falling above the cut-off, is associated with a decrease in the target adolescent's reported anxiety over time.

Another important finding of the current study was in regards to the role of the closest friend. Surprisingly, the closest friend's initial report of psychopathology was not significantly related to later individual psychopathology before the role of the friendship network was considered and the relation remained nonsignificant when friendship network predictors were included. This finding failed to replicate several previous

studies on the importance of the closest friend for individual psychopathology (see Rubin et al., 2006), though it is consistent with some research that has suggested that it is the individual's perceptions rather than the closest friend's actual behavior that is influential (Prinstein & Wang, 2005; Jaccard, Blanton, & Dodge, 2005). There are several possible explanations for the failure to find this relation. First, many individuals did not select a closest friend, selected more than one, or selected a closest friend that did not provide data. These individuals tended to have poorer grades and higher rates of some forms of psychopathology in their friendship network and it is possible that the data from the missing closest friends might have changed the overall outcome. This seems unlikely given that the sample size was still sufficient to allow for any medium or large effects to be significant and the friendship network effects remained largely significant when the closest friend data were included.

Another explanation is that much of the previous research into the role of the closest friend has used a younger sample than the current high school sample (Hartup, 1996). It may be the case that the influence of the closest friend diminishes over time in a way similar to the influence of the peer group except that closest friend influence peaks prior to the high school age. Thus the effect of the closest friend seen in research with younger, middle-school populations may no longer be relevant by the time the individual reaches high school. It may also be the case that the individuals in the present study had known their closest friend's for long enough to no longer be as influenced by them in the short term of the study. It may be interesting for future research to consider including the length of friendship as a moderator of any friendship network or closest friend influence. A final explanation for the failure to find the influence of the closest friend is, of course,

that the closest friend is not influential to the development of psychopathology in adolescence, though this is extremely unlikely given the ample research evidence supporting the similarity between youth and their closest friends during adolescence.

Conceptual Implications of Findings Related to Specific Psychopathology

The results of the present study were not consistent across the different forms of psychopathology evaluated. In the domain of internalizing psychopathology, anxiety and depression were investigated. Generally, the findings of the present study were consistent across these two constructs. For both anxiety and depression, the reciprocated peer group report of anxiety or depression was consistently associated with later individual anxiety or depression after controlling for initial individual levels. However, for anxiety, this relation was consistently found only when the friendship network anxiety level was considered as a percentage of the friendship network falling above the cut-off on the anxiety measure. For depression, this relation was only consistently found when the friendship network depression level was considered as an average score on the depression measure from the members of the friendship network. In either case, the other method of considering the friendship network level of psychopathology was occasionally significant, but not consistently so.

This difference may indicate some meaningful relation in the ways for which these forms of psychopathology are connected in the friendship network. For depression, the relation appears simpler, in that higher mean levels of depression in the friendship network led to higher individual depression scores. The proposed concept of co-rumination (Rose, 2002) might account for this finding such that as more time is spent in sharing depression-related thinking amongst members of the friendship network,

individuals begin to experience and report more symptoms of depression, regardless of whether this level of depressive symptoms passed a clinical cut-off. For anxiety however, only when peers exhibited a clinically significant level of anxiety did they show an effect on an individual's mean anxiety score, the friendship network's mean level of anxiety did not show this effect. It was not until members of the friendship network began to exhibit signs of anxiety causing difficulty in their life that individual members of the group began to experience an increase in their own anxiety. This suggests a threshold effect for anxiety but not for depression. Given the variety of forms that anxiety might take (e.g., social phobia might present in a peer group as very different from generalized anxiety disorder), it is perhaps not surprising that anxiety is required to be clinically significant before it begins to have an effect on others. Further, it makes sense that an individual with significant anxiety problems is likely to behave in a way that is noticed by their peers. Perhaps it is the case that co-rumination is less likely to occur with anxiety or is less potent at spreading anxiety until the anxiety reaches the point of disorder because of the variety of forms that anxiety may take compared to depression.

For delinquency, the results did not show the same discrepancy between when friendship network delinquency was considered as a mean value or as a percentage of the friendship network falling above the cut-off. This was likely due to the fact that the cut-off in the case of delinquency was determined by the mean and standard deviation of the present sample rather than a pre-determined clinical cut-off (as was the case for anxiety and depression). As a result, approximately 16% of the sample at each time point fell above the cut-off regardless of the actual absolute level of delinquency present in the

sample. This resulted in the delinquency cut-off being a direct categorical proxy for the mean score in a way that was not the case for anxiety and depression.

In the domain of externalizing psychopathology, both aggression and delinquency were evaluated. The results differed dramatically between these two constructs, with delinquency showing the hypothesized relation between inclusive peer group and the individual and aggression not showing even the expected cross-sectional bivariate correlations between individuals and their friendship networks. Unlike the differences between anxiety and depression, it seems less likely that the differences in results between the aggression and delinquency measures are conceptually meaningful. Some previous research has found that the CBCL aggression subscale does not correlate with actual aggression (Henry & The Metropolitan Area Child Study Research Group, 2006). In the current study the aggression measure did not show results consistent with the hypotheses or with demographic variables that would have been expected to covary with aggression. For instance, gender was not significantly related to aggression scores. This result is counter to previous research establishing a gender difference in aggression (e.g., Espelage et al., 2003, Hudziak, et al., 2003, though see Espelage, Mebane, & Swearer, 2004 for a potential explanation of these differences). Additionally, while the CBCL – Aggression subscale does not only assess physical aggression, it contains several items that do not seem to be directly linked to any form of aggression (e.g., "I talk too much," "I brag"). Before considering the failure of the friendship network's level of aggression to be related to the individual's level of aggression as a conceptually meaningful finding, future research should attempt to replicate these findings with another measure of

aggression or with selected items from the aggression subscale that may more accurately assess aggression.

Conceptual Implications of Moderator Findings

Peer group density was proposed as a moderator of the established friendship network influence effects, but it was only significant for anxiety and not for depression, delinquency, or aggression. The proposed way in which density would moderate the influence of the friendship network was that denser, or more tightly knit, friendship networks would be more influential than less dense, diffuse friendship networks. In fact, the opposite moderating effect was found for anxiety such that a more diffuse friendship network was more influential on an individual than was a denser friendship network. Perhaps it is the case that when a friendship network is less dense, individual peers within that group are more salient and therefore their characteristics may be more noticeable or influential on the individual with whom they are friends. Again, as described above, results showed that only when peers fell above the clinical cut-off on the anxiety measure did they become influential to the individual's level of anxiety. Perhaps also, more tightly knit friendship networks provide a buffer from the influence of individual peers within the friendship network with anxiety problems in a way that less dense friendship networks cannot and therefore diminish the influence that those peers might have. Overall, however, these results do not support the moderating role of density on the influence of the friendship network for depression or delinquency and for anxiety do not support the moderation in the hypothesized direction.

Therefore the current results do not replicate previous research that has previously shown a moderating role for peer network density (Haynie, 2001) as well as a direct

effect of peer network density on an individual's level of reported psychopathology (Ennett et al., 2006, Windle & Windle, 1997). Several of the previous studies in this area has examined different forms of psychopathology (e.g., Ennett et al. examined substance use while Windle & Windle examined the rate of suicide attempts) which may indicate that peer network density is a moderator only for specific forms of psychopathology, rather than psychopathology in general. No studies have previously examined the moderating role of peer network density for the spread of anxiety and future research should attempt to replicate the moderation found here.

As was discussed above, grade was a significant moderator of the influence of the friendship network on the individual's level of psychopathology, at least for anxiety and depression. The results suggested that the reciprocated peer group's influence in the current sample peaked between the 9th and 10th grades and diminished over the 11th and 12th grades. These results support previous theory and research on the development of peer group influence over middle and late adolescence (Brown, 1990; Collins & Steinberg, 2006; Rubin, et al., 2006).

For delinquency, the moderating effect of grade level was present; however there were several unusual features of this finding. First, results suggested that the influence of the friendship network increased in higher grades. Thus for delinquency, the friendship network was most influential for 12th graders and was least influential for 9th graders, the opposite of what was shown for the internalizing measures. It is important to note that a main effect of grade level was not seen, so that there was no difference between the grades in terms of mean level of delinquency, simply a change in the influence of the friendship network over time. Second, the moderating effect of grade level was found

only when the reciprocated peer group was included, whereas in previous analyses, the inclusive peer group had been shown to be influential and the reciprocated peer group was not. Thus, when grade level was included as a moderator, the reciprocated peer group suddenly appeared as influential when it had not been in previous analyses. These unanticipated features raise some question about this finding's validity. This finding's validity is further questioned given previous research that has shown the opposite relation between grade level and the influence of the friendship network (see Dishion et al., 1999). Future research should certainly investigate the possibility that, for delinquency, the reciprocated peer group's influence may be masked by grade level and/or that the reciprocated peer group is not influential in earlier grades but becomes so in the 11th and 12th grades. It should be noted that the influence of the inclusive peer group remained constant and significant across grade levels with no evidence of grade level moderation.

Another conceptually interesting note was that the previously established trajectories of psychopathology over grade levels were not shown in the present sample. Previous research has shown that aggression and delinquency increases steadily over adolescence and diminishes in early adulthood (Moffitt, 1993; Haynie, 2001). However, this was not seen in the present sample which showed constant levels of aggression and delinquency across all four grade levels. Similarly, previous research has suggested that depression increases during adolescence (Steinberg & Morris, 2001) and the present study's results did not show increases in depression (or anxiety) over the grade levels to support this trajectory. This may indicate that the current sample was more stable in terms of psychopathology than has been seen in previous research. If true, this may have resulted in smaller overall effects for factors that might influence the transmission of

psychopathology and therefore made it more difficult to detect influences that may have been observed more easily in other samples.

Finally, when gender was investigated as a moderator of the influence of the friendship network on the individual, not only was it not supported as a moderator, all other previously significant relations were no longer significant. This result was unusual and unexpected as the inclusion of gender in the model, as a main effect or when included as an interaction term, appeared to wash out other significant effects. Gender itself was never a significant predictor of individual psychopathology either, with the exception of significantly predicting increases in delinquency over time when the reciprocated peer group was included in the model. These results are made more unusual by the fact that gender showed the expected bivariate correlations to anxiety and depression with girls reporting higher rates of anxiety and depression than boys. It is possible that the gender effects were not seen because the model was essentially predicting change in the psychopathology measures rather than the absolute level of individual psychopathology. Previous research has shown a significant difference between boys and girls in the rates of psychopathology investigated here (Espelage et al., 2003; Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2008; Hudziak et al., 2003; Kessler et al., 1993). However, previous research has not focused as much on the impact of gender on the change in psychopathology over time and it is possible that gender may be more related to an individual's initial levels rather than to any change that takes place in the space of five months. Overall, this finding did not support the previously reported differences between boys and girls in peer influence (e.g., Crockett et al., 1984; Hanish et al., 2005; Johnson, 2004; Rose & Rudolph, 2006; Stevens & Prinstein, 2005), and instead

supported research that has not shown a difference between boys and girls in peer influence (e.g., Ellis & Zarbatany, 2007; Espelage et al., 2003; Xie et al., 1999). Future research will be necessary to investigate potential explanations for this split in the literature.

Methodological Implications of Peer Group Findings

One of the most significant findings of this study with regard to the methodology of studying the friendship network was that the method by which the peer group variables are constructed had dramatic effects on the results obtained. For most of the psychopathology measures examined, the pattern emerged that a significant effect of the friendship network was obtained for one method of constructing the peer group variables and was not for the remaining two. If the same method of constructing the peer group variables had been significant in each analysis, it could have been concluded that this method was somehow superior to the others in detecting the desired effects. However, the method of constructing the peer group variables that produced significant effects was different across different forms of psychopathology. For anxiety and depression, effects of the friendship network were consistently seen in the reciprocated peer group. For delinquency, effects of the friendship network were most often seen in the inclusive peer group. This was consistent with the one other study that could be found to use the inclusive method which showed a relation between delinquency in the inclusive peer group and concurrent individual delinquency (Haynie, 2001). Overall, these results would suggest that perhaps the reciprocated peer group was more suited to showing relationships between the individual and his or her friendship network for internalizing

symptoms and the inclusive peer group was more suited to showing relationships for externalizing symptoms or delinquency.

This proposal, that certain methods of constructing peer group representations are differentially suited to studying different constructs, deserves further exploration. For a given individual, the reciprocated peer group is composed of those peers who were both nominated by the individual and nominated the individual in return. The reciprocated approach was taken to specifically prevent over-inclusion of peer group members that did not belong to the "true" friendship network but it also has the likely effect of limiting the group to those individuals that are close friends and excluding less close friendships. These friends likely spend the most time thinking about each other and spend the most valued time together (if not the most actual time), when compared to peers that did not receive reciprocated nominations. When considered from this perspective, this is perhaps the peer group that would be expected to be most influential in the transmission of syndromes such as anxiety or depression. Anxiety and depression are very personal feelings and characterized by thoughts of self-doubt and self-dislike that are unlikely to be shared amongst any but the closest friends. Thus the finding that the reciprocated peer group is most relevant to the transmission of anxiety and depression makes sense. For instance, in the case of co-rumination (Rose, 2002) as a proposed mechanism above for the contagion effect with regard to depressive thinking, the peers most likely to co-ruminate with each other are those that spend the most time together (i.e., the reciprocated peer group).

On the other hand, for a given individual, the inclusive peer group is composed of peers nominated by the individual and any peers that nominated that individual. This

approach was employed to prevent under-inclusion of peers that perhaps did spend time with the individual but that the individual may have overlooked or deliberately not included in his or her nominations. These friendship networks are composed of adolescents that spend at least some time together and, while they may not friends by choice or mutual agreement, they are linked by activity level. The inclusive peer group is likely to include people that do not mutually consider each other friends but that do spend time together. With more loosely affiliated individuals, it is reasonable to believe that the effects of closer friendships, detectable in the reciprocated peer group, would be weakened and not detectable in the inclusive peer group. However, the relation between the friendship network and individual's level of delinquency appeared to be stronger when these more loosely affiliated friends were considered. This finding relates to the mechanisms of deviancy training (Dishion et al., 1999), proposed to explain the contagion effect for deviant behavior, which stated that peers encourage an individual adolescent's delinquent behavior over time by providing immediate reinforcement as well as an identity tied to delinquent behavior for him or her. In the case of deviancy training, it may not be necessary for the target adolescent's peers to be in reciprocated friendships with him or her to reinforce the delinquent behavior. Instead his or her peers need only be linked by spending some amount of time together, as is the case for the inclusive peer group here. Thus, the subtle differences between these two alternative methods of creating the friendship network construct appear to produce different results in ways that may be attributable to several proposed mechanisms of the peer contagion effect.

It is interesting to note that the ego-nominated peer group was not strongly associated with any particular form of psychopathology and most often did not show

significant relations with the individual. The ego-nominated peer group might be termed the subjective friendship network as it is made up of the peers that an individual subjectively listed as composing his or her friendship network. The current study did not support this method of constructing the peer group representation as a useful construct for understanding the role of the friendship network in the spread of psychopathology compared to the inclusive or reciprocated peer groups. The ego-nominated peer group's failure to be consistently significantly associated with individual psychopathology may be due to weakening of the effects described in the other two peer groups. Effects seen for very close friends in the reciprocated peer group would have been diluted by the inclusion of less close friends in the ego-nominated peer group, whereas effects seen for the larger, broader friendship network in the inclusive peer group would have been left out of the smaller, ego-nominated peer group.

Overall, the results of this study emphasize the powerful effect that subtle changes in the way the peer group variables are constructed and conceptualized can have on the appearance of friendship network influence over time. Some of the findings reported here replicate the previous research showing that the relation between friend depression and later individual depression is stronger when reciprocated friendships are used as opposed to ego-nominated friendships (Stevens & Prinstein, 2005). However, no other research has directly compared these different methods of constructing the peer group construct with regards to the spread of adolescent psychopathology. Previous research in the area of peer networks has focused almost exclusively on either the ego-nominated or the reciprocated method of peer group variable construction (e.g., Urberg et al., 1997) which the present study shows may miss important results. Since the peer nomination

task can produce at least three different peer groups from the same collected data, it will be relatively simple methodologically for future studies using this technique to consider more than one method of peer group variable construction. Other methods of studying the friendship network, such as the Social Cognitive Map (Cairns et al., 1985) procedure, may also be able to consider peer groups as differing along a continuum of closeness to inclusiveness and therefore examine similar representations of friendship networks to those explored here. While these procedures are methodologically relatively simple, they are conceptually complex and deserve further replication, definition, and examination in the future. In addition, the present study used the report of the peers themselves whereas much of the previous research has asked the target adolescent to report on themselves and his or her peer's behavior. Given the evidence of consensus bias in adolescents' reports of their peers' behavior (Prinstein & Wang, 2005; Jaccard et al., 2005), the results obtained directly from the peers may be a more valid representation of the actual peer environment.

Methodological Implications of Moderator Findings

Peer group density was proposed as a potential moderator of the influence of the friendship network on individual psychopathology and received support for this role in the case of anxiety. However, the current study included measures of both objective and subjective peer group density. Objective density was derived from the actual links between peers within the friendship network whereas subjective density was taken from each individual's score on a self-report questionnaire. These items on this questionnaire were specifically chosen to represent the characteristics that an individual might be able to describe about their friendship network without requiring the input of the other group

members as the objective peer group density does. The bivariate correlations between objective and subjective peer group density were positive and significant. However, only objective peer group density was a significant moderator of the relation between friendship network and individual anxiety. Subjective density was not a significant moderator for any relations. This may be due to measurement issues with the subjective density questionnaire or it may be that, similar to the findings above regarding the ego-nominated peer group, simply relying on an adolescent's self-report of their friendship network characteristics may not reveal the most influential components of the peer group (Prinstein & Wang, 2005). While this hypothesis certainly deserves more direct empirical testing, it suggests that future research on the role of the friendship network should always consider that the individual's subjective report may be less valid or useful than the individual's subjective report tempered by his or her peers' reports

Another important methodological consideration raised by the current results is the role of curvilinear effects of age. In the present study, quadratic moderating effects of grade level were revealed for anxiety and depression. Models for peer influence, such as those described by Collins and Steinberg (2006) prescribe just such a curvelinear relation. Peer influence is expected to increase to a peak in mid-adolescence and decrease following that time period. Often, previous research has approximated these relations with simple linear trends (e.g., Elliss & Zarbatany, 2007), with influence increasing in early adolescence and decreasing in later adolescence. Or researchers consider grade level as a categorical variable and examine mean differences between individuals in the different grades (e.g., Johnson, 2004). A truer test of the proposed change in peer

influence over time is to conceptualize grade level or age as having a negative quadratic moderating effect and to test this effect; however this approach is rarely taken.

The results of the present study support the investigation of curvilinear relations in future research. While quadratic moderating effects of grade did not significantly improve model fit, they did improve model interpretability and were consistent with the hypotheses. Without considering curvilinear effects, grade level was not a significant moderator of the influence of the friendship network on the individual. If the present investigation had only examined linear moderation effects, no evidence would have existed to suggest that maturation or developmental changes occur in the influence of the friendship network. This result is counter to decades of previous research and theorizing (e.g., Brown, 1990; Collins & Steinberg, 2006; Rubin, et al., 2006) and seems especially premature when the more accurate test of the hypothesized pattern in change of peer group influence over grade found significant results as predicted. Thus researchers investigating the role of grade or age as a moderator are encouraged to consider the curvilinear effects of these moderators provided that such a curvilinear relation is hypothesized as in the current research.

Implications for Clinical Work

The results of the present study have several implications for clinicians who work with adolescents. First, the results of the present study suggest the importance of the peer group in the development of psychopathology, specifically depression, anxiety, and delinquency. As such clinicians should strive to understand the friendship network with which their clients associate. While a thorough social network analysis similar to the current study's is obviously unrealistic for clinical practice, useful information may be

gleaned by asking the client and perhaps the client's parents or teachers about the peers with whom they spend the most time. Asking only the adolescent about his or her friendship network will likely yield information similar to the ego-nominated peer group of the present study. As this peer group variable was the least influential of the three versions investigated, it will be important to obtain collateral information from teachers and parents in order to support and supplement the adolescent's report and simulate the inclusive or reciprocated peer groups of the present study which were more valuable in predicting changes in psychopathology. During the initial intake clinicians who regularly work with adolescents might consider routinely asking adolescents and their families about the presence or absence of anxiety, depression, or antisocial behavior in the client's friendship network just as the presence of family member psychopathology is assessed.

The current study showed that being engaged in a friendship network with lower rates of psychopathology resulted in a decrease or slower increase in the individual adolescent's report of these forms of psychopathology. It may be beneficial therapeutically for clinicians to encourage their clients and their families that struggle with psychopathology to seek out less anxious, depressed, or delinquent peers. Within the realm of externalizing disorders this has often been recommended, however the results of the present study show that the same strategy may be effective for internalizing disorders such as depression and anxiety as well.

When working with adolescents that report problems with anxiety, the current study showed evidence to suggest that a denser peer group might act in a buffering fashion for the worsening of anxiety. These results showed that a client with a diffuse friendship network including other individuals that experience problems with anxiety was

most at risk for developing additional anxiety. However subjective reports of density did not moderate the influence of the friendship network. Therefore clinicians should attempt to use collateral information when evaluating the adolescent's peer network density. If possible, the results of the current study support the building of more tightly knit friendship groups for individuals that experience problems with anxiety as a way of diminishing negative effects of an anxious individual(s) within the peer group.

Implications for Policy or Prevention

For the school administrator or other professional interested in preventing the spread of the forms of psychopathology investigated here through a large network of adolescents such as the one examined in the present study, these results suggest several guidelines that may produce better results. First, it is important to gather additional data to add to, subtract from, or support the individual adolescents' reports about who composes their peer groups. In the case of anxiety and depression it was the peers that reciprocated the adolescent's nomination and were likely the closest to that adolescent who were important. For delinquency, it was the friendship network including peers that the individual did not list that was important. When trying to prevent the spread of psychopathology through the peer network, administrators will likely have the most success when collateral input is gathered regarding the make-up of the friendship network. In a school context this collateral input can easily be gathered from teachers that work with the adolescents on a regular basis.

The results of the present study also suggest the potential targets for intervention that may maximally prevent the spread of psychopathology. First, it is important to note that the current study did not support intervening at the closest friend level, as the

psychopathology of the closest friend was not related to the change in individuals' level of psychopathology. Therefore, the results do suggest a need for intervening at the friendship network level despite the more complicated challenges such an intervention faces (see Cho, et al., 2005, Gifford-Smith, Dodge, Dishion, & McCord, 2005). Not surprisingly, friendship networks composed of individuals reporting high levels of depression, anxiety, or delinquency were likely to have the most influence in continuing the spread of these forms of psychopathology and would be ideal targets for intervention. Interventions targeted at friendship networks with members who are not currently depressed, anxious, or delinquent may not have much value as the current findings show these peer groups already serve a preventative role by decreasing the level of psychopathology in their individual members. The results of the current study also suggest that interventions that target the peer group may be most effective in the early high school years when the peer group was the most influential. Finally, for preventing the spread of anxiety, the current study showed that diffuse friendship networks composed of anxious individuals were the most influential on an individual's levels of anxiety. Close-knit friendship networks, even though they contain individuals with anxiety problems, were less likely to increase the anxiety of their group members and may be lower priority targets than more diffuse networks. Also, unlike depression, anxiety did not spread through friendship networks unless individuals within the network reached a clinical level of difficulty with anxiety. This suggests that intervention to respond to "normal" levels of anxiety in the friendship group may not be particularly beneficial.

Limitations

Evidence for the validity of the present sample included the replication of many previously established relations (e.g., correlations between gender and reports of anxiety and depression), the measures used showed adequate reliability and validity in the sample for the most part, and the design allowed for the novel testing of several important relations; however the present study is not without limitations that should be considered with the results. First, the CBCL – Aggression subscale, used in the present study as a measure of aggression, showed signs of poor validity and may not have adequately assessed the construct of adolescent aggression. While this measure showed adequate reliability, both through a high internal consistency value and high test-retest correlations over the five month time between data collections, it behaved differently than expected throughout the analyses, even when attempting to replicate strongly established findings, for example that boys would exhibit higher aggression scores than girls. Some research has questioned the validity of the CBCL – Aggression subscale for measuring the actual occurrence of aggression as rated by an observer (Henry & The Metropolitan Area Child Study Research Group, 2006). The current results support the possibility that the CBCL – Aggression subscale may not accurately assess aggression in the same way as other measures. Therefore the absence of findings in the current study related to aggression should be replicated with other measures of aggression before being interpreted too strongly.

Another potential limitation is the fact that the current sample may not be representative of more urban environments as it was drawn from a small rural high school. The sample used was also largely Caucasian and the results obtained may not be typical of youth from other ethnic backgrounds. While these limitations are valid, the

rural environment was chosen for a specific reason. Namely that in a more rural setting in which there is only one high school, the individuals that compose the peer network are more likely to all attend that school and more complete data from the peer network can be obtained. Other research on friendship networks that has taken place in larger towns or cities has been hampered by the fact that adolescents are likely to have significant friendship networks that are not assessed as they fall outside of the school being investigated (e.g., Urberg et al., 1997). The decision was made for the present study, as an initial investigation into the role of the friendship network, to attempt to capture as much of the relevant peer network as possible. Future research will need to determine how these findings may differ in a more urban setting.

From a design perspective, one potential limitation is that the current study examined only half a year longitudinally and examined several years cross-sectionally. A more robust and powerful test of the effects of the friendship network over grade levels would be to follow the same adolescents over the entire course of high school. Indeed, since the current study examined only high school aged adolescents, the proposed increase in the importance of the peer group during early adolescence could not be tested. Therefore the ideal study to more powerfully test the influence of the peer group would be to follow 6th through 12th graders longitudinally over several years. The present study cannot rule-out minor cohort effects across the different grades that may have accounted for the moderating effects of grade level seen here, whereas a longer term longitudinal study would be able to rule this out.

Another potential limitation of the study was the power to detect smaller effects. The present study had an *N* sufficient to detect effects between $r = .25$ and $r = .3$, or

approximately medium effect sizes according to Cohen's classification (1988), with appropriate risk of type II error (power = .8). This means that for most of the longitudinal regression models conducted, in order to add significantly to the model, a predictor of later individual psychopathology had to contribute at least an additional 5% of the variance explained. Since the individual's initial report of psychopathology accounted for between 40 and 50% of the variance in each model, this required that each new predictor must uniquely add at least 5% of the variance accounted for in later individual psychopathology. After initial friendship network psychopathology was included, it would become increasingly difficult for new predictors to account for the additional 5% of unique variance. Thus smaller effects, especially of predictors added into the model later, such as those that were tested in the moderation analyses, would be less likely to be detected in the current sample. However, in order to detect significantly smaller effects ("small" effect sizes according to Cohen's classification), the sample size would have needed to have been dramatically increased (*N* between 700 and 1000).

A potential limitation of the statistical approach taken was the lack of correction for alpha inflation. Between the six main hypotheses over 180 distinct analyses were conducted many with multiple sub-analyses containing significance tests for each individual predictor as well as model fit (and change in model fit). This large number of analyses could have led to several spurious results. An alpha correction strategy was not employed because, as pointed out before, at a level of $\alpha = .05$, the current sample's power required a medium to large effect size in order to be detected as significant. To further decrease the required alpha level would have resulted in very stringent significance testing and only the strongest effects would have achieved significance. As a result it

was felt that, due to the exploratory nature of this investigation of the friendship network's influence on individuals' report of psychopathology, when results were significant at the $\alpha = .05$ and fit with theoretical and hypothesized mechanisms, they could be interpreted as being significant. Future replication of these findings using fewer analyses or analyses with greater power is required to rule-out the possibility of spurious findings and replicate the findings of the current study.

Finally, in regards to the scope of the present study, there was no examination of the stability of the friendship networks from T1 to T2. In other words, this study did not examine if the networks that individual's belonged to at T1 were the same at T2. This point does not affect the interpretation of the results of the present study, however it may affect the proposed clinical and policy implications. If the friendship network is not relatively stable, then interventions within one friendship network may not be effective in the long term as adolescents quickly change to a new friendship network with new influences. Some previous research has suggested that this is not usually the case and that the friendship networks, while not entirely stable, do not rapidly shift their entire membership (Cohen, 1977). The present study did not confirm or deny this result and this possibility should be considered a future investigation that could be conducted with these data.

Future Research

While the present study has made some contribution to what is known about the influence of the peer group on the development of psychopathology in adolescents, it has also suggested several avenues for future research that can further expand and elaborate this role. First and foremost, each of the findings of this study warrants replication in

alternative samples. The present sample of a small, rural and ethnically homogeneous high school, as discussed above, may have presented unique characteristics that made this study possible, however replication of the present findings in larger high schools, in urban and suburban areas, and with ethnically diverse samples will add to the generalizability of the present findings to adolescents and peer groups in general. Future research might also consider investigating if the role of the peer group differs when the friendship network is largely community based, as opposed to being school based. The friendship network may have a very different role as well in non-western societies that focus more on the importance of the family or that do not treat adolescence as a transition period into independence from family-only social groupings.

In addition, a popular topic at this time is the rise and importance of digital or online friendship networks, made possible through such online networking sites as Facebook and MySpace. It seems unlikely that friendships in these networks function in the same way as those friendships investigated here (Subrahmanyama, Reich, Waechter, & Espinoza, 2008), however the digital medium offers interesting methodological potential for exploration of these networks and the ways in which they may be similar or different from "in person" friendship networks. Future research should investigate these possibilities.

Prior research has already established the role of the family in contributing to the development and prevention of adolescent psychopathology (Andrew, 1981; Bögels, Brechman-Toussaint, 2006; Lieb, Isensee, Höfler, Pfister, & Wittchen, 2002). Related to expanding the investigation of the peer network to other settings and cultures, future research should examine the comparative power of the family and the friendship network

in shaping the development of psychopathology during adolescence. Previous research has shown that the peer group grows in importance during early adolescence (Brown, 2004; Hartup & Abecassis, 2002) and future research is needed to determine to what extent the influence of the family is usurped by this increase. In addition, the present study showed that the influence of the friendship network diminishes in later adolescence, however additional studies are needed to determine what factors might replace the friendship network's influence in determining the course of psychopathology from later adolescence into adulthood.

Finally, the current study showed that the methodology with which the friendship network representation is constructed and analyzed has the potential to dramatically affect the results obtained. Standardized practices utilized by all or most researchers within the domain of peer network research are nonexistent. Future research into the effect of different methodological practices on the results obtained is needed. For instance, the present study used a simple, bottom-up approach of constructing the friendship network representation based on the nominations of the individual and of their peers; however, other approaches exist. The program NEGOPY (Richards, 1995) considers the nominations and entire peer network in order to classify individuals according to their position within the overall network, thus creating cliques, dyads, liaisons, and isolates (Richards, 1995). This method of categorizing individuals by their network position may produce very different results than the approach taken in the present research. Only through side-by-side comparisons in future research can this question be answered. The present study hinted at the many subtle ways in which the friendship network can be considered (e.g., reciprocated vs. ego-nominated/inclusive;

mean friendship network levels of psychopathology vs. the percentage of the network that falls above a cut-off) and much work is needed to develop an understanding of these different ways to conceptualize the friendship network and its potential for influence. Hopefully with further investigation a more standardized set of procedures can be developed that allows for simpler comparison across studies. This would add greatly to the understanding of the role of the friendship network across a wide variety of populations and stages of development.

The present study set out to determine the role of the friendship network in the presence of and change in psychopathology in adolescents during the high school years. The results firmly showed that for depression, anxiety, and delinquency, the level of these types of psychopathology in the friendship network predicted changes in the individual's level of psychopathology. Some claim at a causal relation can be made as the friendship network's report of psychopathology was influential on the individual's report several months later and after controlling for the individual's initial report. Additionally, the friendship network influence was shown to be above and beyond the influence of the individual adolescents' self-identified closest friend, who did not appear to significantly influence the individual's report over time. The manner in which the peer group variables were constructed appeared to make a dramatic difference in the results obtained, with the peer group composed of reciprocated nominations being influential for internalizing psychopathology (anxiety and depression) and the peer group composed of peers that nominated the individual or who were nominated by the individual being the most influential for delinquency. Moderators of these relations were examined revealing that the density of the friendship network, or the degree to which friends of the individual

were friends with each other, moderated only the relation between the friendship network's report of anxiety and later individual report of anxiety. This moderation relation was in the opposite direction expected and showed that for individuals with denser friendship networks the number of peers falling above the clinical cut-off for anxiety had less of an effect on the individual's report of anxiety. Density was not supported as a moderator for any of the other forms of psychopathology. Grade level was supported as a moderator of the influence of the friendship network for both anxiety and depression, such that the friendship network was most influential in the 9th and 10th grades years and decreased in the 11th and 12th grades. Gender was investigated as a moderator but was not supported. All in all, these results highlight the importance of the adolescent peer group in the development of psychopathology and begin to capture the complexity of the role that the friendship network plays in the life of an adolescent. Future research needs to embrace the complexity and richness offered by the peer group as an important developmental factor in adolescence.

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Appendix A

Demographic Questionnaire

SCHOOL / UNL Questionnaire Study
September 15, 2008

ID # __________

On the next few pages, you will find several questionnaires asking you about a variety of things. Please read the instructions on each page and answer questions as truthfully as you can. Your help is greatly appreciated. Please ask a teacher or one of the UNL students if you have any questions. Thanks!!

Your Birth date (Month/Day/Year) : _______/_________/__________

Your Gender (Circle one) : **M** **F**

Your Preferred Race or Ethnicity (Circle one) : White / Caucasian
Black / African American
Latino/a or Hispanic
Asian / Asian American
Native American / American Indian
Bi-racial / Multi-racial
Other :

____

What is your Year in High School (based on credits) : **Freshman** **Sophomore** **Junior** **Senior**

How many years have you been in High School : ___________

What kind of grades do you usually receive in school (circle one or two): **A's**
B's
C's
D's
F's

- -

Please **Print** your name here (first name, middle initial, and last name). Once your name and code number have been matched up, this part of your questionnaire will be removed and destroyed so no one will know what you answered.

____

Appendix B

Center for Epidemiological Studies – Depression Scale (CES-D)

On the following 20 items, please select the choice that best describes how you have felt over the past week (7 days).

	Rarely or none of the time (Less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5-7 days)
1) I was bothered by things that usually don't bother me.	**1**	**2**	**3**	**4**
2) I did not feel like eating; my appetite was poor.	**1**	**2**	**3**	**4**
3) I felt that I could not shake off the blues even with the help from my family and friends.	**1**	**2**	**3**	**4**
4) I felt that I was not as good as other people.	**1**	**2**	**3**	**4**
5) I had trouble keeping my mind on what I was doing.	**1**	**2**	**3**	**4**
6) I felt depressed.	**1**	**2**	**3**	**4**
7) I felt that everything I did was an effort.	**1**	**2**	**3**	**4**
8) I felt hopeless about the future.	**1**	**2**	**3**	**4**
9) I thought my life has been a failure.	**1**	**2**	**3**	**4**
10) I felt fearful.	**1**	**2**	**3**	**4**
11) My sleep was restless.	**1**	**2**	**3**	**4**
12) I was unhappy.	**1**	**2**	**3**	**4**

	Rarely or none of the time (Less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5-7 days)
13) I talked less than usual.	**1**	**2**	**3**	**4**
14) I felt lonely.	**1**	**2**	**3**	**4**
15) People were unfriendly.	**1**	**2**	**3**	**4**
16) I did not enjoy life.	**1**	**2**	**3**	**4**
17) I had crying spells.	**1**	**2**	**3**	**4**
18) I felt sad.	**1**	**2**	**3**	**4**
19) I felt that people disliked me.	**1**	**2**	**3**	**4**
20) I could not get "going."	**1**	**2**	**3**	**4**

Appendix C

Multidimensional Anxiety Scale for Children (MASC)

Appendix D

Child Behavior Checklist – Youth Self Report (CBCL)

Appendix E

Peer Nomination Form

Who are the kids at school that you hang out with the most?
Please name only those students at this school and do not include your brother (s) or sister (s).
Please list as many or as few kids as you would like.
Please circle the (one) person you consider your closest friend.
Please write as legibly as you can.
If you do not know the correct spelling of someone's name, please try your best.

Your Name: _____

First name	**Last name**	**First name**	**Last name**

Don't forget to **circle** the once person you think is your closest friend!

Appendix F

Friendship Questionnaire

Next, we will be asking you questions about your friends and the things you like to do for fun. Occasionally there may be a question that is difficult to answer. If that happens, please give your best guess or pick the answer that you think is the closest.

1) How many friends do you have (please answer with a specific number and if you are not sure, try your best guess)? _____

2) How many of these friends would you call really good friends? _____

For these questions please circle the statement that best describes you.

3) Are most of your friends also good friends with each other?
   - **1)** All of my friends are good friends with each other.
   - **2)** Some of my friends are good friends with each other, and all of my friends like each other.
   - **3)** A few of my friends are good friends with each other, and most of my friends like each other.
   - **4)** None of my friends are really good friends with each other, but most of my friends like each other.
   - **5)** None of my friends are really good friends with each other, but a few of my friends like each other.

4) Are most of your friends the same sex as you?
   - **1)** All of my friends are the same sex as me (for example, if you are a girl, all of your friends are girls).
   - **2)** Most of my friends are the same sex as me.
   - **3)** My friends seem to be an even split of boys and girls.
   - **4)** Most of my friends are the opposite sex as me (for example, if you are a girl, most of your friends are boys).
   - **5)** All of my friends are the opposite sex as me

5) If you want to go out with some of your friends, do you typically:
   - **1)** Invite them all yourself.
   - **2)** Split the job of inviting people with another friend.

6) If you wanted to invite 2 or 3 friends to go out to a movie, would you have to be careful what mix of friends you invited so that everyone would get along?
Please Circle: Y or N

For the next section, please answer whether each statement is very true for you, somewhat true for you, not really true for you or does not describe you at all.

	This does not describe me at all	This is not really true of me	This is somewhat true for me	This is completely true for me
7) I like the same kinds of music as my friends	**1**	**2**	**3**	**4**
8) I do not usually hang out with the same people.	**1**	**2**	**3**	**4**
9) I usually like all the movies that my friends do.	**1**	**2**	**3**	**4**
10) My friends have some hobbies or play some games I really don't like.	**1**	**2**	**3**	**4**
11) I have friends that do not like each other very much.	**1**	**2**	**3**	**4**
12) I like to meet new people.	**1**	**2**	**3**	**4**
13) When I meet someone new, I usually introduce them to my other friends right away.	**1**	**2**	**3**	**4**
14) There are some jokes and stories that I enjoy telling but that do not make sense to people I'm not good friends with.	**1**	**2**	**3**	**4**
15) I would feel comfortable hanging out alone with any friend that I usually hang out with.	**1**	**2**	**3**	**4**
16) I think any two of my friends would be comfortable going to a movie together.	**1**	**2**	**3**	**4**
17) When my group of friends and I	**1**	**2**	**3**	**4**

	This does not describe me at all	This is not really true of me	This is somewhat true for me	This is completely true for me
accomplish something together, one or two people in our group will take credit for it.				
18) I have friends who do not know each other at all.	**1**	**2**	**3**	**4**
19) I feel like I know almost all of my friends' friends.	**1**	**2**	**3**	**4**
20) I am very influenced by my friends.	**1**	**2**	**3**	**4**
21) If I were upset, at least a few of my friends would be there for me.	**1**	**2**	**3**	**4**
22) My friends form a tight knit group.	**1**	**2**	**3**	**4**
23) My friends and I share many "inside jokes" that only we understand.	**1**	**2**	**3**	**4**
24) I feel it is easy to not do things my friends are doing if I am not interested in doing them.	**1**	**2**	**3**	**4**

25) **For this question, pick the statement that best describes you (either A or B) and circle that letter. Then answer only the questions underneath that letter.**

A) I usually hang out with a group of pretty much the same people.

How many people are in this group? _____

B) I hang out with more than one group of friends.

How many different groups do you hang out with? _____

Can you give a name to each of the different groups? **Y/N**

(For example, you may call the friends you hang out with in school your “school friends” and the people near where you live may be the “neighborhood kids”)

If possible, please list the names of the different groups you hang out with on the lines below.

Appendix G

Parent Notification Letter

Dear Parents of YYY Students,

I am writing to you today to inform you of a recent partnership between YYY High School and the University of Nebraska-Lincoln. We have recently met a graduate student from the Department of Psychology, Glen Veed, and have agreed to collaborate with him on a special project. Glen's project is supervised by a faculty member at the University of Nebraska Psychology Department, Dr. Lisa Crockett. In this letter we would like to let you know exactly what this collaboration will entail and what role you and your children will play in it.

The researchers at UNL have asked for your adolescent's help in completing a research project on which they are working. We have reviewed the project and have found it quite acceptable and would like to take this opportunity to tell you a little bit more about the project and what your adolescents will be asked to do. Your adolescent's participation is, of course, completely voluntary and you or your son or daughter may contact us at any time if you do not wish for your adolescent to participate.

The researchers are studying adolescent's friendships and how youths and their peers interact and how these friendships affect the developing teen. Specifically, they will be looking at how adolescents' friendship groups might play a role in the spread of common adolescent problems such as depression or delinquent behavior. The research conducted at YYY school will greatly improve future researchers' understanding of how friendship groups affect youth and how to help them with these struggles.

The first part of the research project will take place on MONTH, DAY-DAY2, 2008, two school days, and will take place during student's 20 minute MAP period each day. On each day, researchers from UNL will arrive at our school and will go into your adolescent's regular MAP classroom. Once there, the researchers will provide the students in the class with a verbal description of the project and pass out assent forms and questionnaire packets. Students who are interested in participating in the research study will be asked to sign this form acknowledging their agreement to participate. If your adolescent does not wish to participate, he/she does not have to and will instead be allowed to sit at his/her desk and work on other schoolwork.

On the first day, your son or daughter will be asked their age, gender, and questions about a variety of things in their life, including his/her day-to-day behaviors, thoughts, and feelings as well as some things he/she enjoys doing with his/her friends. For example, teens will be asked about their feelings (e.g., sadness or anxiety) or about misconduct (e.g., running away or stealing). On the second day, your adolescent will be asked to list the names of fellow students in the school with whom he/she is friends. After completing the questionnaires each day, your adolescent will be finished with the project and allowed to work quietly until all students have completed the questionnaires.

The second part of the research will be exactly the same as the first, except it will take place over two days in the Spring semester. Collecting this data at two different times of the school year will provide the researchers with extremely important information about how their findings change over time.

One very important component of this project is your son or daughter's privacy. All responses will be kept strictly confidential by the researchers. While the general results of the study may be presented at conferences and/or published in scientific journals, no individual youth's responses will be disclosed to anyone at any time

We at YYY are very excited to be participating in this project with the University and look forward to its completion. If you have any questions about the process, materials or individuals involved, please do not hesitate to contact us (at ###-###-####) and either we or the researchers will be happy to answer your questions. In the unlikely event of problems arising from participation in the study, counseling is available from your child's school counselor, ZZZ (telephone ###-###-####). If you DO NOT wish for your adolescent to participate in the project (they will not be penalized in any way for not participating) simply sign this form and send it back to the school or call the school at ###-###-#### and let them know you are not interested in having your adolescent participate. All youth in 9th through 12th grade whose parents do not return a form or call will be asked to participate. Each adolescent will be allowed to decline from completing the questionnaires if they wish on the day of the project, again, with no penalty. Youth that do not participate in the project will be given time to work quietly while other students complete the questionnaires. If you have any questions, please feel free to call us at ###-###-####.

Once again, let us know if you have any questions at all and we look forward to your adolescent's participation.

Sincerely,

AAAA
Principal

_____

Please sign here and return this form to your adolescent's teacher or the school's main office if you **DO NOT** wish for your son or daughter to participate in this study.

_____

Name(s) of your child(ren) you are signing for (please print)

Appendix H

Youth Assent Form

Youth Assent Form

Peer Networks and Psychopathology in Youth

IRB #

I would like to ask you to participate in a research project, titled "Peer Networks and Psychopathology in Youth," taking place today at your school. I am a graduate student in the Department of Psychology at the University of Nebraska – Lincoln and am studying how teens' friendships impact how they behave and feel. We are here at your school today to ask you to participate.

Today, all 9th through 12th grade students are being asked to complete some questionnaires. Today, you will complete several questionnaires during this class and completion of the questionnaires should not take more than 20 minutes. On these questionnaires, you will be asked your age, your gender, and about a variety of things in your life, including your day-to-day behaviors, thoughts, and feelings as well as some things you enjoy doing with your friends. For example, you will be asked about your feelings (e.g., sadness or anxiety) or about misconduct (e.g., running away or stealing). On another day, you will be asked to list fellow students in your school with whom you are friends. This information is completely confidential, which means that once the questionnaires have been collected all names will be removed and replaced with numbers so that no one will know what you answered or wrote down.

The general results of the study will help us understand how friendships affect your daily life as well as help schools better understand the needs of students. There are no known risks associated with being in this study; in fact, many students find it to be interesting and even fun. In the unlikely event of problems from being in the study, counseling is available from your school's counselor, ZZZ (telephone ###-###-####). Your teacher can help you to set up an appointment with a counselor if you think you would like that. You will not get anything from being in the study, other then perhaps learning more about yourself and the things you do with your friends. If you do not wish to answer specific questions you may skip them and, if you would like, you may stop answering questions on the questionnaires at any time. There will be no penalty if you do not wish to be in the study.

All information will be held confidential. Only the researchers will see the questionnaire and once the questionnaire has been collected, your name will be removed and replaced with a number so that you can no longer be connected to any specific answers. If you have any questions, please feel free to ask the research assistant or call me at (402) 472-2351 or send an e-mail to veed@bigred.unl.edu.

If you agree to participate in this study, please check the "Yes" line below, print you name and sign this form, and return it to the research assistant in the classroom. You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the investigators, the University of Nebraska-Lincoln, or your school. Your decision will not result in any loss of benefits you are otherwise entitled.

If you have any questions about your rights as a research participant that have not been answered by the investigator or to report any concerns about the study, you may contact the University of Nebraska-Lincoln Institutional Review Board, telephone (402) 472-6965.

_____ Yes, I would like to participate in the study.

_____ _____ _____

Signature of Participant Print Name Date

_____ _____

Signature of Investigator Date

INVESTIGATOR
Glen J. Veed, M.A. Office: (402) 472-2351

Appendix I

Table of All Correlations between Individual and Peer Group Psychopathology Measures at T1 and T2 Organized by Method of Constructing the Peer Group Variables

All Correlations between Individual and Peer Group Psychopathology Measures at T1 and T2 Organized by Method of Constructing the Peer Group Variables

	MASC Total			CES-D Total			CBCL – Agg			CBCL - Del		
	1	2	3	1	2	3	1	2	3	1	2	3
Peer Group Variables												
						T1 (Fall)						
MASC Total	.09	.19*	.21**	.08	.16*	.19*	.02	.01	-.00	-.05	-.09	-.11
CES-D Total	.08	.14	.14	.15*	.20*	.26**	.13	.07	.09	.15*	.08	.15
CBCL – Agg	-.01	-.02	.04	.10	.09	.10	.20**	.11	.12	.21**	.12	.10
CBCL - Del	-.11	-.15	-.11	.08	.06	.12	.18*	.04	.04	.27**	.14	.16*
						T2 (Spring)						
MASC Total	.21**	.22*	.24**	.12	.09	.21*	-.02	-.11	-.06	-.08	-.18*	-.02
CES-D Total	.19*	.24**	.21*	.09	.13	.21*	.08	-.01	.01	.05	-.02	.03
CBCL – Agg	-.04	.04	.00	-.01	.14	.06	.06	.06	.01	.08	.09	.13
CBCL - Del	-.12	-.09	-.02	-.01	-.02	.04	.10	.08	.04	.06	.05	.11

Note. [1] Inclusive, [2] Ego-Nominated, [3] Reciprocated.

* $p < .05$, ** $p < .01$

Appendix J

Table of All Correlations between Peer Group Psychopathology Measures at T1 and Individual Psychopathology Measures at T2 Organized by Method of Constructing the Peer Group Variables

All Correlations between Peer Group Psychopathology Measures at T1 and Individual Psychopathology Measures at T2 Organized by Method of Constructing the Peer Group Variables

	MASC Total			CES-D Total			CBCL – Agg			CBCL - Del		
	1	2	3	1	2	3	1	2	3	1	2	3
Peer Group Variables												
MASC Total	.15	.23**	.31**	.08	.16	.19*	-.02	-.00	-.07	-.03	-.07	-.19*
CES-D Total	.16*	.23**	.30**	.22**	.27**	.33**	.08	.03	.07	.09	.04	.04
CBCL – Agg	.08	.10	.10	.14	.10	.02	.14	.12	.05	.22**	.15	-.00
CBCL - Del	-.01	-.09	-.10	.12	.07	.03	.12	.09	.13	.24**	.21*	.13

Note. [1] Inclusive, [2] Ego-Nominated, [3] Reciprocated.

* $p < .05$, ** $p < .01$

Appendix K

Table of All Correlations between Rate of Peers Falling Above Cut-off at T1 and Individual Psychopathology Measures at T2 Organized by Method of Constructing the Peer Group Variables

All Correlations between Rate of Peers Falling Above Cut-off at T1 and Individual Psychopathology Measures at T2 Organized by Method of Constructing the Peer Group Variables

	MASC Total			CES-D Total			CBCL – Agg			CBCL - Del		
Percentage above cut-off on:	1	2	3	1	2	3	1	2	3	1	2	3
MASC	-.01	.13	.22**	.15	.21*	.28**	.15	.06	.05	.09	.02	-.04
CES-D	.10	.15	.21*	.19*	.25**	.28**	.13	.05	.07	.12	.07	.05
CBCL – Agg	.04	.15	.14	.04	.06	.01	.05	.14	.04	.15	.19*	-.00
CBCL - Del	.04	-.04	-.03	.15	.14	.12	.12	.09	-.01	24**	24**	.15

Note. [1] Inclusive, [2] Ego-Nominated, [3] Reciprocated.

* $p < .05$, ** $p < .01$

Appendix L

Table of Correlations between the Mean Psychopathology Measure Score Reported

By the Closest Friend at T1 and the Target Adolescent at T2

Correlations between the Mean Psychopathology Measure Score Reported By the Closest Friend at T1 and the Target Adolescent at T2

Closest Friend Variables	MASC Total	CES-D Total	CBCL – Agg	CBCL - Del
MASC Total	.17	.00	-.16	-.15
CES-D Total	.14	.16	-.06	.02
CBCL – Agg	-.01	.06	.16	.13
CBCL - Del	-.12	.06	.17	.15

Appendix M

Table of Correlations between Grade Level and

Various Individual Psychopathology Measures at T2

Correlations between Grade Level at T1 and Individual Psychopathology Measures at T2

	MASC Total	CES-D Total	CBCL – Agg	CBCL - Del
Grade Level	-.01	-.01	.12	-.04