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At your own risk

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At Your Own Risk

The importance of group dynamics and peer processes in adolescent peer groups for adolescents' involvement in risk behaviors

Kim Pattiselanno

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 behaviors

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CHAPTER

1

Introduction

Adolescence is a transitional phase between childhood and adulthood, a time when young individuals explore their own identities and attempt to find their place among others. Whereas children often look to parents and other significant adults for guidance, adolescents distance themselves from adults and look to each other when deciding in which direction to go and how to behave. During adolescence, peers become increasingly important to the social and emotional development of adolescents, and interpersonal relationships with age-mates have shown to be of fundamental importance to finding acceptance, support, and a place among peers (e.g., Baumeister & Leary, 1995; Buhrmester, 1990; Coleman, 1961; Juvonen, 2006; Newman, Lohman, & Newman, 2007; Rubin, Bukowski, & Parker, 2006).

Scholars have acknowledged that relationships between adolescents are not only bidirectional, for example between friends, but are also part of a broader social network (Gest, Graham-Bermann, & Hartup, 2001). Relationships between individuals are usually embedded within a network and adolescents are sensitive to the dynamics of that network. These peer groups form one of the most important settings where adolescents socialize and spend time with peers (Brown & Klute, 2003; Gifford-Smith & Brownell, 2003; Hallinan, 1980; Rasmussen & Salkind, 2008), and it is here where adolescents find social support, feel connected and accepted, and look most to each other to decide how they will or should behave (see also Brown, 1990; Hartup, 1993; Kwon & Lease, 2007).

Although peer groups have shown to be important for the social-emotional development of adolescents, they also form a context where adolescents can influence each other in less favorable ways, such as risk behaviors (e.g., Dishion, McCord, & Poulin, 1999; Gardner & Steinberg, 2005; Gardner & Steinberg, 2012). Peers in groups affect each other a great deal, and the beliefs, attitudes, and behavior of others affect how adolescents consider things and behave (Adler & Adler, 1998; Espelage, Green Jr., & Wasserman, 2007). Although this occurs for favorable aspects, such as prosocial behavior (Buhrmester, 1996; Rubin et al., 2006), adolescents tend to have their own views on what is favorable. What adults preferably see is not always normative for adolescents. Particularly behaviors that reflect a sense of (mature) status, but are not (yet) acceptable to be exhibited, are highly attractive for adolescents and they encourage each other to engage in these behaviors (Moffitt, 1993). Risk behaviors that peers display, such as aggression, delinquency, or substance use have shown to be one of the most important factors for adolescents' own risk behaviors (e.g., Dishion, Andrews, & Crosby, 1995; Henry, Tolan, & Gorman-Smith, 2001; Kerr, Van Zalk, & Stattin, 2012; Patterson, Dishion, & Yoerger, 2000; Svensson, Burk, Stattin, & Kerr, 2012; Weerman, 2011).

With research on peer relations steadily increasing, we continue to learn more about why adolescents have such a great impact on one another when it comes to each other's behaviors, in both positive and less positive ways. One methodological innovation that has enabled researchers to examine the impact of peers on each other's lives is SIENA (Ripley, Snijders, Boda, Vörös, & Preciado, 2014; Snijders, Van de Bunt, & Steglich, 2010). This method of longitudinal social network analysis uses a stochastic actor-based model to analyze relations between individuals (networks) along with the individual's characteristics, attitudes, or behaviors. The method can disentangle selection and influence, or socialization, processes. Peer selection refers to the tendency for individuals to associate with similar others (similarity attraction or homophily) (Byrne, 1971; Lazarsfeld & Merton, 1954), whereas influence refers to the tendency among adolescents to adjust their behavior according to the behavior of peers with whom they have a relationship (Cohen, 1977; Friedkin, 1998), resulting in their becoming more similar to each other over time.

Most researchers agree that selection and influence processes go hand in hand and can enlighten us to why adolescents tend to be similar to each other in their (risk) behaviors. Although methodological innovations have enabled us to disentangle selection from influence in risk behaviors, there is still much to study and we should delve deeper into the underlying processes of peer selection and influence in risk behaviors to understand what goes on in the adolescent realm. Researchers now have the opportunity to go beyond the examination of relations between adolescents and their behavior, and can examine more closely how and under which conditions youngsters become similar to those around them. This dissertation attempts to go into those questions and tries to increase our knowledge of how group dynamics and peer processes in adolescent peer groups relate to adolescents' involvement in risky behaviors.

Peer Processes in Adolescent Peer Groups

To understand how and under which conditions adolescents are (not) influenced by peers in their risk behaviors, it is necessary to realize that risk behaviors do not occur in a vacuum. More often than not they are a part of the group process; adolescents engage in these behaviors together. For example, Lahey, Moffitt, and Caspi (2003) suggest that the main reason why peers are so influential for whether or not other adolescents will display acts of delinquency is that adolescents commit most such acts in the company of peers. The group creates the context of influence,

and that context, in which risky behaviors take place, plays an important role in adolescent influencing (see also Warr, 2002). Hence, if the group context makes it likely that adolescents are influenced, that context might also have an effect on whether or not adolescents are influenced by the risk behavior of their peers. This is because peer groups tend to create their own moral climate (e.g., Sherif & Sherif, 1964; Warr, 2002). Individuals in the group determine what is acceptable and desirable behavior, and what is not, in their own social context. Most likely due to group processes, risk behavior might proliferate in one group and not the other.

Thus, to gain a better understanding of how and under which conditions adolescent risk behaviors proliferate in some peer groups, but not others, we need to examine when adolescents are more likely to adopt risk behaviors and how they accomplish this. This dissertation argues that it is vital to study both group dynamics in adolescent peer groups and the way in which peer influence is accomplished to be able to understand why peer influence in risk behavior occurs for some adolescents, but not for others. Thus I will examine how certain group dynamics may make it more or less likely that adolescents display risk behaviors and are sensitive to peer influence in those risk behaviors, and the ways in which peer influence may occur. One aspect of group dynamics is that adolescents are motivated to behave in a certain way, but only when that behavior fits their sought-after goals. Adolescents are likely to engage in behaviors that will help them to find acceptance and belongingness among peers, which, depending on group features, might make (the influence of) some behaviors more or less likely than other behaviors. Chapter two examines how *features of peer groups* are related to adolescent behaviors, and chapter three examines how these features relate to the susceptibility to peer influence in risk behaviors. The way peer influence in risk behavior is assumed to work, namely looking at others to decide how to behave oneself, is essential for understanding sensitivity to peer influence. However, there may be other ways as well in which adolescents are influenced by their peers. By examining how adolescents may be influenced by others, I aim to understand how risk behaviors are likely to be adopted. Chapters four and five study how peer influence in risk behaviors may work and attempt to delve deeper into the *mechanisms of peer influence*.

The following sections of the introduction first give the theoretical background that forms the basis of the research questions answered in the empirical chapters. The introduction next discusses the Dutch educational system

and the data gathered for the purpose of the studies in the empirical chapters, and it concludes with a short outline of the rest of the dissertation.

Features of Peer Groups

We know that adolescents look to one another to decide how to behave (e.g., Brown, 1990; Hartup, 1993; Kwon & Lease, 2007). However, how they actually do behave depends on what they want to achieve. According to goal-framing theory, individuals are motivated to behave in a way that helps them accomplish their goals, but refrain from activities that inhibit the achievement of goals (Lindenberg, 2001; 2006). When adolescents look to others how to behave, not everyone will behave in the same way, because adolescents act according to what is functional to achieving their goals. Although adolescents are generally influenced by their peers, individuals will likely differ in susceptibility to that influence, because what is important for one might not be important for someone else. Here the peer group is an important context that can help to explain these differences in susceptibility to peer influence.

One of the most important goals in adolescence is trying to fit in. Being accepted by peers and finding a sense of belonging among peers is of utmost importance in adolescence (e.g., Baumeister & Leary, 1995; Berndt, 1979; Coleman, 1961; Rubin et al., 2006). Acceptance and belongingness are vital for individuals and social relations with peers play a particularly significant role for social acceptance, support, and a sense of belonging in adolescence. According to social production functions theory, the attainment of status, affection, and behavioral conformation satisfies basic needs, and achieves social acceptance, and ultimately social wellbeing (Lindenberg, 1996; 2001; Ormel, Lindenberg, Steverink, & Verbrugge, 1999; Ormel, 2002). Adolescents can fulfill their need for status, affection, and the need to conform by behaving in a way that is attractive to others, by showing “correct” behavior or doing the “right” thing in the eyes of relevant others. These needs might account for the differences in susceptibility to risk behaviors of peers.

Having high social status is one way of being attractive for others. In the realm of adolescence, attaining high social status or becoming popular has proven its importance (Buhrmester, 1990; Cillessen & Rose, 2005; Jarvinen & Nicholls, 1996; Ojanen, Grönroos, & Salmivalli, 2005). In general, adolescents want to increase their social status among peers (Lindenberg, 1996). Adolescents with high social status on average not only have a certain power and influence over others, but also receive affection, especially from those who wish to have a high status themselves (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010; Merten, 1997;

Parkhurst & Hopmeyer, 1998). However, high social status implies that some individuals have low(er) social status. I argue that especially the dynamics between adolescents and their social status in peer groups makes some adolescents more or less likely to display behaviors associated with social status (chapter 2) and more susceptible to peer influence in risk behaviors than others (chapter 3).

Group dynamics might give rise to various behaviors that help adolescents accomplish their goal of becoming attractive (i.e. getting high social status). We already know that some peer groups have higher social status as a whole than other peer groups, and those differences between groups are accompanied by characteristics and behaviors of members of those groups, most prominently aggressive and prosocial behaviors (e.g., Adler & Adler, 1998; Closson, 2009; Garandeau, Ahn, & Rodkin, 2011). Both aggression and prosocial behavior appear to be more associated with higher social status than lower social status (e.g., Cillessen & Rose, 2005; Dijkstra, Lindenberg, Verhulst, Ormel, & Veenstra, 2009; Ellis & Zarbatany, 2007; Peters, Cillessen, Riksen-Walraven, & Haselager, 2010). However, there are also social status differences between adolescents in peer groups (e.g., Adler & Adler, 1998; Closson, 2009). Some peer groups will have more diversity in social status than others, making them more hierarchical, whereas peer groups with small differences in social status can be considered more egalitarian. Then the question is, what does this mean for the behavior of adolescents in those peer groups.

In chapter two I examine how differences between the social statuses of members in peer groups relate to differences in behaviors associated with social status (i.e., aggression and prosocial behavior). I argue that aggression and prosocial behavior should be considered in the light of their function to maintain social status. In some peer groups there might be more competition for status, and thus it will be more difficult to maintain one's social status (Adler & Adler, 1998; Eder, 1985). Adolescents might then be more inclined to display aggressive behaviors that reflect and emphasize a powerful and dominant position among peers (see also Cillessen & Mayeux, 2004; Dijkstra et al., 2009), and prosocial behavior might be less likely, because in a competitive context it can be costly to act prosocially (Clark & Mils, 1993) and behaving prosocially can be seen as a weakness (Ryan, Pintrich, & Midgley, 2001; Shim, Kiefer, & Wang, 2013). Thus, chapter two examines how social statuses in peer groups are related to the behavioral dynamics in those groups. It is expected that particularly in egalitarian groups, aggression is more likely and prosocial behavior is less likely due to more competition for status in those groups.

After our first examination of differences in social status of adolescents on behavioral dynamics, in chapter three I examine how those differences affect the behavior of individual members. In this chapter I actually delve deeper into how group features can have an effect on peer influence in adolescents' risky behaviors. Here, I argue that adolescents are not only inclined to display behaviors that are functional for maintaining social status, but they can also become attractive as a high status individual by displaying attractive behaviors, such as risk behaviors (Dijkstra et al., 2009). Especially those low in social status may be more likely to be influenced in those behaviors, not only because higher status individuals are more powerful and thus influence what lower status peers do, but also because adolescents can increase their own social status by imitating peers that already have high social status (Cialdini & Richardson, 1980; Dijkstra et al., 2010). Adolescents with higher social status tend to become role models to their peers and passively evoke imitation of their behavior among those peers, next to actively influencing others. Thus, chapter three gives insight into how social statuses in peer groups affect the susceptibility to peer influence in risk behaviors of the individual members in those groups, by testing whether peer influence is especially strong in adolescents with relatively low social status compared to adolescents with relatively high social status in the peer group.

Furthermore, examining features of peer groups requires me to think carefully about how those features are expressed in groups or in a social network. In chapter two I introduce a new measure that captures the *structure* of a hierarchy in a peer group. The most commonly used measure of hierarchy, based on variation (i.e., standard deviation) in adolescents' social status in peer groups, shows only that large differences indicate a hierarchy and small differences indicate an egalitarian peer group. Our measure identifies hierarchies on a continuous scale, so that it detects hierarchies ranging from a pyramid shape (i.e., relatively more group members with low status than high status), to an equal distribution of higher and lower social status, to structures indicating an inverted pyramid (i.e., relatively more group members having high status than low status). Our new measure captures the social status structure between individuals in peer groups better.

In chapter three I also examine how relations between adolescents in peer groups can affect how those adolescents influence one another. As mentioned before, another way to achieve social acceptance among peers is through behavioral confirmation (e.g., Lindenberg, 1996; Ormel et al., 1999). Individuals value close relations with peers and are motivated to confirm their membership of

the group (see also Baumeister & Leary, 1995; Reis, Collins, & Berscheid, 2000). They can achieve this by doing things that are considered “correct” in the eyes of oneself and relevant others, in this case peer group members. By displaying “correct” behavior, adolescents make it more likely that their behavior is what peer group members see as desirable, and increases their chances of being accepted by those members and belonging to the group (Coleman, 1961; Horne, 2001).

However, what is considered desirable can depend on the group. In most cases, socially competent adolescents learn to adopt social control and are reluctant to indulge in deviant or risky behavior, because it is generally frowned upon (Gottfredson & Hirschi, 1990; Hirschi, 2002). Individuals will demonstrate self-control when it comes to exhibiting antisocial behavior to be accepted by peers. However, a peer group might also approve of risk behaviors and consider this ‘the norm’. If this is the case, then individuals will more likely imitate that behavior (Akers, 1977; 2009; Sutherland, Cressey, & Luckenbill, 1992). This differentiation between when risk behaviors are favored and when they are not may be even greater when we consider the relations adolescents have in the peer group. For some groups, interactions between adolescents might be more intense than in other groups, resulting in greater group cohesion. If the peer group is more cohesive, contact between adolescents occurs more frequently and this can strengthen the transmission of norms, rules, and behavioral conformity (Horne, 2001). Studying the interactions between group members makes it possible to compare and check what behavior is considered desirable in the peer group. Thus, chapter three also looks at relations between adolescents in peer groups by examining how differences in cohesiveness relate to differences in the peer influence in risk behaviors, whereby it is expected that peer influence will be stronger for adolescents in more cohesive peer groups than adolescents in more loose-knit peer groups.

Also in chapter three I consider how features of peer groups might be expressed. Here I examine cohesion from an adolescent’s perspective, to say something about the behavior of individual group members. For this we asked respondents to identify their best friends, and peers in the group they socialize or ‘hang out’ with most often. This allows me to construct networks that include members of an adolescent’s intimate peer group. With these networks, we can focus on how social status and cohesion would relate to being influenced in risky behaviors by peers as seen from the perspective of the individual adolescent. Thus,

examining features of peer groups made me have to think about and create new, innovative, approaches to answer our research questions properly.

Mechanisms of Peer Influence

While examining group dynamics and features that might enhance or inhibit peer influence, it is also important to examine how peer influence might work. Not only examining which conditions make peer influence more or less likely, but also taking a closer look at *how* adolescents may be influenced by peers in their risky behavior can help us understand why peer influence in risk behavior may occur for some adolescents, but not for others.

In terms of peer group dynamics, it becomes clear that adolescents are likely to behave in ways considered 'correct' or desirable to improve their chance of being accepted by peers and finding a place where they belong. Behaving correctly or desirably is, furthermore, important to the underlying mechanisms of peer influence. In most studies examining peer influence in risk behaviors, *mimicking observed behavior* of others is assumed to be the crucial underlying process (e.g., Burk, Kerr, & Stattin, 2008; De Cuyper, Weerman, & Ruiters, 2009; Haynie, Doogan, & Soller, 2014; Knecht, Snijders, Baerveldt, Steglich, & Raub, 2010; Weerman, 2011). Yet, underlying processes of peer influence have received relatively less attention in the framework that examines peer influence (SIENA). This dissertation, therefore, also attempts to examine possible mechanisms of peer influence in adolescent risk behaviors. Chapter four does this by examining whether adolescents *imitate* each other's behavior with regard to specific risky behavior or whether they mimic deviant behavior more generally. This chapter looks into the mechanism of peer influence, and peer selection, using a novel way of analyzing risk behavior.

Most studies on peer influence in risk behaviors treat behavior as a latent construct, consisting of several items, especially in the case of delinquency (e.g., Burk et al., 2008; Knecht et al., 2010; Svensson et al., 2012; Tilton-Weaver, Burk, Kerr, & Stattin, 2013; Weerman, 2011). However, when considering influence and selection processes, the underlying assumption is that these processes pertain to the behavior in general rather than to specific acts. This is surprising, as selection processes, for example, are often understood by using similarity attraction theory (Byrne, 1971), which would imply that due to engaging in the same behavior even stronger homophily would be likely. Similarly, most studies examining peer influence use differential association theory and social learning theory in explaining the driving mechanism of this influence (Burgess & Akers, 1966; Sutherland, Cressey, & Luckenbill, 1995), which assumes that adolescents learn from and

imitate peers by mimicking what they see. For this reason, chapter four aims to test influence and selection processes by examining these processes for specific same behaviors, in this case delinquent acts, rather than for delinquency in general, in a novel way, using delinquency items as a two-mode network in SIENA analyses. This means that we compare analyses of peer influence and selection in delinquency both as a scale and as a two-mode network. For the analyses of delinquency as a two-mode network, influence and selection would only be seen as such when it concerns the exact same delinquent acts. If adolescents associated with peers engaged in, for example, weapon carrying, and those adolescents began carrying weapons, it would be considered influence, whereas if they started to steal, this would not be considered as influence. By comparative analyses, I can examine whether adolescents select or are influenced by peers based on their overall delinquency or on whether they engage in the same delinquent acts.

The novelty of chapter four is not only found in its examination of the underlying mechanism of peer processes, but also in the methodological innovation needed to adequately examine the mechanism. Chapter four considers behavior as both a latent construct and a two-mode network. In the latter approach, behavioral acts or items are dummy-coded and treated as a network, meaning that respondents could either engage in a specific behavior (represented by a relation between respondent and the behavioral act) or not (represented by the absence of a relation between the respondent and the behavioral act). This means that when peers with whom one associates nominate a specific item and adolescents also nominate the same item over time, this is considered to be peer influence in a two-mode network. Peer selection is when adolescents nominate the same item and associate with each other at a later time point. By considering behavior as a network, we are actually able to explicitly test peer influence and selection in specific behavioral acts.

Chapter five concludes by examining another possible way by which adolescents might be influenced by their peers. This chapter argues that adolescents not only engage in risk behaviors, because of what they see peers do, but also because of the idea they have about how adolescents are expected to behave in a certain context. Although adolescents learn which behaviors are appropriate in a certain context through observation, imitation, and modeling (Bandura & McClelland, 1977), they are also inclined to create a perception of what others do by interacting and communicating with peers (Cialdini, Kallgren, & Reno, 1991). This way, adolescents familiarize themselves with the kind of behavior

considered desirable without having seen the behavior at all. It has also been shown that the relationship between the perception of peers' behavior and adolescents' own behavior is sometimes even stronger than the relationship between peer-reported behavior and adolescents' own behavior (Boman, Stogner, Miller, Griffin, & Krohn, 2011; Kandel, 1996; Prinstein & Wang, 2005; Weerman & Smeenk, 2005). Therefore, chapter five tests whether the perceptions adolescents have of the risk behaviors of their peers also influences their own engagement in risky behaviors, besides the direct influence of peers. To avoid tapping into the issue of influence in specific acts versus general risky behavior, I focus on substance use (smoking tobacco and drinking alcohol) in this chapter.

Chapter five also required a novel (methodological) approach that focuses on perceived behavior as relations between adolescents. In this chapter, perceived substance use consists of a network in which adolescents could nominate which of their close peers engaged in substance use. I examined how adolescents perceive each individual in the peer group to engage in substance use, and studied the combined effect of those perceptions on an adolescents' own substance use. No effects currently programmed in the SIENA framework test the effect of a dyadic covariate on a behavioral outcome variable. We found an innovative solution to this problem. We entered the network of perceptions of substance use in the analyses as a dependent network. Subsequently, we fixed several parameters so that this network is not modeled over time. Entering the variable as a dependent network and fixing changing parameters, enabled us to model the effect of a dyadic covariate on a behavioral outcome. Our novel methods in both chapters four and five helped us thoroughly examine the research questions and hypotheses at hand, and the formation of my conclusions in those chapters.

Taken together, chapters two to five aim to increase our understanding of relevant factors that might enhance or inhibit the occurrence of and susceptibility to peer influence in risk behaviors, and enlighten us on how adolescent peer influence presumably works, by examining this empirically. For this, data was collected especially for the studies in the empirical chapters. In the next sections I briefly discuss why Dutch secondary schools are so beneficial for the studies in this dissertation. Furthermore, I go into the details of the SNARE data collection, and also mention TRAILS, from which I used data for the study in chapter two.

The Dutch Educational System

After elementary school, all children in the Netherlands attend secondary education, which is comparable to high school in the United States. By then, children are on average 12 years old, entering early adolescence. The Dutch educational system does not have middle schools or junior high schools, and the first grade of secondary education is seen as a transitional year that bridges elementary school to secondary school, also referred to as *brugklas* (bridge class). Especially here, old relationships dissolve and new relationships are formed. This is also one of the most important reasons why we collected data at this time.

There are highly beneficial, practical reasons for including Dutch secondary school students in our study. First, in the Dutch educational system, many students entering secondary school lose a number of former primary school relationships and create relationships with new peers in secondary school. Starting data collection in the first and second years of secondary school offers us the opportunity to study new networks as they form and follow them across time. It makes it possible to track with whom adolescents tend to associate and how they adapt their behavior to the behavior of other students.

Second, in Dutch schools, students spend a lot of time at school and classrooms play an important role in peer relations. In contrast to secondary education in the United States, Dutch classes do not change throughout the year. Students share classes with the same fellows for all their classes and do not change at random between different subjects. This results in hardly any change of classroom composition in the first (three) years of secondary school. For SIENA analyses this is highly beneficial. Although our main questions, from which I create networks of interest, are measured across classes and grades, analyses of items measured only within the class are also possible. Even then it is still possible to study influence and selection processes without losing much information on students across time points. All in all, our sample of first and second graders in Dutch secondary schools allows for different benefits, which may be harder to find in other school systems around the world.

The SNARE Study

The SNARE study was designed specifically for the studies in this dissertation, with the exception of one in chapter two. SNARE stands for Social Network Analysis of Risk behavior in Early adolescence and includes data on risk behaviors, individual characteristics, and a range of social networks (see for example Dijkstra et al., 2015;

Franken et al., 2015). SNARE was originally planned as a study design with seven waves of data in two school years (funded by the NWO Youth & Family Program, project number 431-09-027, and VENI grant, project number 451-10-012), but has been expanded to incorporate a total of 12 regular waves, and two waves of pre-assessments, over the course of four years. Recent funding has opened up the possibility for collecting post-hoc genetic data allowing for a whole new range of future empirical studies (see also NWO-middelgroot MaGW, project number 480-13-005). This rich dataset on the social development of early adolescents will continue to be of great importance to future research.

With a specific focus on adolescents' involvement in risk behavior, SNARE has proven particularly important for this dissertation. We began preparing data collection in 2010 and 2011, and approached schools and the first students in 2011. Our desire was to include students from an entire school, rather than from random classes across the country, to be able to map out more or less complete networks of adolescents. We found two secondary schools willing to participate in the SNARE study: one in the middle and one in the north of the Netherlands. Subsequently, all first- and second-year secondary school students from these schools were approached for the first enrollment in SNARE (2011-2012). The next year (2012-2013) all new first year students were again approached for participation in the study, resulting in two participating cohorts. In total, almost 1,800 students participated in SNARE, filled in a pre-assessment in September of the first year of participation, and completed regular annual measurements in October, December, and April. This data collection concluded only recently, in April 2015, after a very successful collaboration with the participating schools, and their students.

In SNARE, we used the same questionnaires throughout the study, thus we could compare responses from each time point. Another great benefit of our data is that we included nominations across classes and grades for the most important network items, such as friendship or group membership, which allowed us to map out the social networks of adolescents even better.

Besides SNARE, the basis of the studies dealt with in chapters three to five, chapter two uses data from another large longitudinal data collection called the Dutch Tracking Adolescents' Individual Lives Survey (TRAILS; De Winter et al., 2005; Oldehinkel et al., 2015). Conducted in the north of the Netherlands, TRAILS is a prospective cohort study following respondents from preadolescence into early adulthood and was designed to chart and explain the development of mental health and social development. Data collection began in 2001/2002 on the birth cohorts

1990/1991 when respondents were approximately 11 years old. The data used in chapter two is a peer-nominations subsample collected together with the second wave of the study when respondents and classmates were on average 14 years old.

This Dissertation

This dissertation attempts to go beyond the examination of relations between adolescents and their behavior, and wishes to examine more closely how and under which conditions adolescents become similar to each other in their behaviors by delving into group dynamics and peer processes in adolescent peer groups and their relation to adolescents' engagement in risk behaviors. In doing so, I hope to advance knowledge of adolescent influence processes, not only with regard to risk behaviors, but also more generally. The outline of the empirical chapters (see Table 1.1) gives an overview of the topics this dissertation addresses. The dissertation concludes with a general discussion and conclusions drawn from the results of the empirical chapters. I discuss the benefits and considerations of using SIENA, implications for the future, and future endeavors that could result from this dissertation.

Table 1.1. Overview of Empirical Chapters (2-5)

Chapter	Main Research Questions	Hypotheses	Data	Sample
2	How does the relationship between individual social status and aggression and prosocial behavior depend on the internal status hierarchy in peer groups?	There is a stronger relationship between individual social status ...: ... and aggression in more egalitarian peer groups and when the peer group status structure reflects an inverted-pyramid structure (H1). ... and prosocial behavior in more hierarchical peer groups and when the peer group status structure reflects a pyramid structure (H2).	TRAILS	N = 2,674 M _{age} = 14 years
3	How do features of (individuals in) peer groups relate to peer influence in delinquency?	Susceptibility to peer influence in delinquency is especially strong for adolescents with relatively low social status compared to adolescents with relatively high social status in the peer group (H1). Adolescents are more susceptible to peer influence in delinquency in more cohesive peer groups than in more loose-knit peer groups (H2).	SNARE	N = 1,309 M _{age} = 13 years
4	Do selection and influence processes in delinquency pertain to delinquency in general or specific delinquent acts?	Adolescents select peers who engage in the same delinquent acts (H1). Adolescents are influenced by peers, with whom they associate, in the same delinquent acts (H2).	SNARE	N = 1,309 M _{age} = 13 years
5	Are adolescents directly influenced by observing substance use by their peers or indirectly by their perception of their peers' substance use?	Adolescents are likely to be influenced by their peers' substance use, but this influence is mediated by the perception adolescents have about the tobacco and alcohol use of their peers.	SNARE	N = 1,309 M _{age} = 13 years

CHAPTER 2

Structure Matters: Peer Group Hierarchy and Adolescents' Aggression and Prosocial Behavior*

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Abstract

Peer groups form an important context for the social development of adolescents. Although group members are often similar in social status, status differences do arise in groups. How differences in social status between group members are related to the behavior of individual members is relatively unknown. This study examines how the relationship of individual social status (i.e., perceived popularity) with aggression and prosocial behavior depends on the level of internal group hierarchy. The sample consists of 2,674 adolescents (49.8% boys), with a mean age of 14.02 years. We focus on physical and relational aggression, and practical and emotional support, because these behaviors have shown to be of great importance for social relationships and social standing among adolescents. The internal status hierarchy of groups is based on the variation in individual social status between group members (i.e., group hierarchization) and the structure of status scores in a group (pyramid shape, inverted pyramid, or equal distribution of social status scores) (i.e., group status structure). The results show that differences in aggressive and prosocial behaviors are moderated particularly by group status structure: aggression is more strongly related to individual social status in (girl) groups where the group status structure reflects an inverted pyramid with relatively more high status than low status adolescents, and prosocial behavior shows a significant relationship with individual social status, again predominantly in inverted-pyramid groups (boys and girls). The effects differed by type of gender groups: associations are found in same-gender but not mixed-gender groups. The findings stress the importance of considering internal group characteristics when studying adolescent social status in relation to aggression and prosociality.

During adolescence, peers become increasingly important for the social and emotional development of adolescents (Rubin et al., 2006). Reflecting this, adolescents spend much time with peers, particularly smaller groups of friends (Brown, 2004; Gifford-Smith & Brownell, 2003; Hallinan, 1980; Rasmussen & Salkind, 2008), who become highly salient in early adolescence (Brown, 2004; Steinberg & Monahan, 2007). Adolescent peer groups have been identified as a developmentally important unit of analysis (Adler & Adler, 1998; Espelage et al., 2007) as they form a setting in which adolescents socialize, gain a sense of belonging and receive support (e.g., Ellis & Zabatany, 2007; Kwon & Lease, 2007; Prinstein & La Greca, 2002).

An important way to distinguish different types of adolescent peer groups is to look at the average social status of the group in the broader peer context (Adler & Adler, 1998; Corsaro & Eder, 1990). Attaining high social status or becoming popular as an individual is important in adolescence (Buhrmester, 1990; Cillessen & Rose, 2005; Jarvinen & Nicholls, 1996; Ojanen et al., 2005). Those with high social status can demonstrate power and influence over others and receive affection from others who also wish to have high status themselves (Dijkstra et al., 2010; Merten, 1997; Parkhurst & Hopmeyer, 1998). Reflecting this, some groups have a higher position in the status hierarchy than other groups. Social status differences between groups are accompanied by distinct characteristics and behavior by the members of those groups, most prominently aggressive and prosocial behaviors (e.g., Adler & Adler, 1998; Closson, 2009; Garandeanu et al., 2011). Both behaviors are more pronounced in higher status peer groups, reflecting the associations between social status among peers and aggression and prosocial behavior on the individual level (e.g., Cillessen & Rose, 2005; Dijkstra et al., 2009; Ellis & Zabatany, 2007; Peters et al., 2010).

However, in assessing mean status differences *between* peer groups ignores possible differences in social status between members *in* the same group. Although members within peer groups tend to be quite similar in individual social status (Cairns & Cairns, 1995; Dijkstra, Cillessen, & Borch, 2012; Kupersmidt, DeRosier, & Patterson, 1995), status differences can and do emerge also between individuals *in* peer groups (e.g., Adler & Adler, 1998; Closson, 2009). Basically, some groups may be more hierarchical with large differences in social status between group members, whereas other groups may be more egalitarian with small differences in social status between group members. Although the importance of such differences in groups has been acknowledged (Brown, 1990), it remains unknown whether

these differences might be related to the behavior of individual members, as the internal hierarchy might steer distinct group dynamics.

The aim of this study is therefore to examine structural differences between peer groups in relation to status and behavior. More specifically, we examine to what extent the relationship between individual social status (i.e., perceived popularity) and status-related behaviors, namely aggression (physical and relational aggression) and prosocial behavior (emotional and instrumental support) (Cillessen & Rose, 2005; Mayeux & Cillessen, 2008) depend on the internal status hierarchy within peer groups. Status hierarchy within groups is defined in two ways: the level of *peer group hierarchization* and *peer group status structure*. *Peer group hierarchization* is based on the variation (i.e., standard deviation) in individual social status in groups, with large differences indicating hierarchical groups and small differences indicating egalitarian groups. A similar approach has been used in previous research on hierarchies in classrooms (e.g., Garandeau, Lee, & Salmivalli, 2013; Zwaan, Dijkstra, & Veenstra, 2013). An important limitation of this measure is that it is less informative about the structure of the hierarchy. A peer group could contain a 'typical' top-down hierarchical structure with a few high status individuals and many with very low status (pyramid shape; as an illustration see Appendix 2.1a and 2.1b), but also an inverted pyramid (Appendix 2.1c). Furthermore, peer groups could contain an equal distribution of low and high status individuals, and still display high group status standard deviation (Appendix 2.1d). Hence, these different configurations are not captured by the standard deviation for individual status in groups. Therefore, we also consider *peer group status structure* as a measure of hierarchy by subtracting the group status median score from the mean, introducing a new measure of group hierarchy which captures the above-mentioned configurations. Specifically, positive values of this measure imply group hierarchies with a pyramid shape, whereas negative values indicate an inverted pyramid with relatively more group members having a high status than a low status.

The Role of Status Differences in Peer Groups

The question is how might status hierarchy in peer groups might affect the relation between social status and behaviors. Starting with aggressive behaviors, it has been argued that large status differences between individuals are related to a power imbalance, which in turn promotes aggression (Adler & Adler, 1998; Wilkinson & Pickett, 2009). The explanation is that individuals at the bottom of the status hierarchy are 'easy' victims for higher status peers, who can exert their power upon

those lower in status. A recent study by Garandeau, Lee, and Salmivalli (2013) for example showed that higher levels of classroom status hierarchy were associated with higher levels of bullying, a specific form of aggression among adolescents. Similarly, Wolke, Woods, and Samara (2009) showed that victims of relational aggression were more likely to be in classrooms with a stronger hierarchy than in more egalitarian classrooms. Closson (2009) showed that aggression to peer group members was associated with a higher status in the peer group, and those who were more dominant used more overt and relational forms of aggression. Furthermore, in another study, Garandeau and colleagues (2011) showed that the positive relation between an individual's status and aggression was stronger in more hierarchical classrooms compared to more egalitarian classrooms. Together, these studies draw attention to possible negative consequences of a hierarchical ordering in peer groups as it seems to go together with aggressive behaviors.

Whereas previous studies assume that high status adolescents more easily display aggression to low status children to emphasize their dominance, we believe that aggression should be considered in the light of its function to maintain social status. Although some adolescents value status more than others (LaFontana & Cillessen, 2010; Ryan & Shim, 2006), in general, adolescents want to increase their status position among peers (Lindenberg, 1996). Status is a positional good, implying that not everyone can have high status. At the same time, people generally strive for status, and as a consequence, individuals compete with each other for status. Such competition should be pronounced specifically in groups and contexts with small differences in status. Here, adolescents could be more aware of others who could challenge their position and compete with them for status (see also Adler & Adler, 1998; Eder, 1985). To maintain their social ranking, adolescents might be more inclined to display aggressive behaviors that reflect and emphasize a powerful and dominant position among peers (see also Cillessen & Mayeux, 2004; Dijkstra et al., 2009). In reverse, in groups and contexts with large status differences, there is less competition, and thus less need for aggression to maintain status. Hierarchies can stabilize relations and decrease hostility in groups (Pellegrini & Long, 2002; Savin-Williams, 1979), because individuals learn their position in the group and no longer compete for status (Hawley, 1999). Zwaan and colleagues (2013) for example showed that status was more strongly related to aggression when status differences in classrooms were smaller. Building on this latter approach, we expect a stronger relationship between individual status and aggression when status differences between peer group members are smaller (i.e.,

in more *egalitarian* peer groups; Hypothesis 1a) and when the peer group status structure reflects an inverted pyramid with relatively more high status adolescents within the peer group than low status peers (Hypothesis 1b).

Furthermore, studies have shown that high status adolescents are not only characterized by negative behavior, such as aggression, but also by prosocial behavior (De Bruyn & Cillessen, 2006; Dijkstra et al., 2009; Hymel, Vaillancourt, McDougall, & Renshaw, 2002). Prosocial behavior facilitates friendly relations with peers (e.g., Asher & McDonald, 2009; Buhrmester, 1996; Closson, 2009; Coie, Dodge, & Kupersmidt, 1990; Rubin et al., 2006), and might help high status adolescents to mitigate the negative effects of their aggressive behavior (De Bruyn & Cillessen, 2006; Dijkstra et al., 2009). However, prosocial behavior towards others by providing support and aid also implies a certain risk because it is uncertain if and when prosocial acts will be reciprocated over time. In most cases individuals display prosocial behavior if they expect a similar act in return (Clark & Mils, 1993). Therefore, prosociality is more likely to emerge among individuals who can rely on each other. However, in a competitive context, reciprocity is less certain and it can be costly to act prosocially (Clark & Mils, 1993). Also, seeking help can be costly, because it exposes individuals' weaknesses (Ryan et al., 2001; Shim et al., 2013), which can hinder both the attainment of and maintenance of status in a competitive context. Hence, it could be argued that prosociality will particularly flourish in situations where individuals do not compete with each other. This implies that the relationship between individual status and prosocial behavior is stronger in peer groups with large status differences as there is less competition. Hence, we expect a stronger relationship between individual status and prosocial behavior when status differences between group members are larger (i.e., in more *hierarchical* peer groups) (Hypothesis 2a) and when the peer group status structure reflects a pyramid with relatively fewer high status adolescents within the peer group than low status peers (Hypothesis 2b).

The Present Study

This study examines how the relationship between adolescents' individual social status, and aggression and prosocial behavior varies by the internal peer group hierarchy. Specifically, we examine the impact of social status differences *within* adolescent peer groups, with peer group hierarchization and peer group status structure, on the relationship between individual social status and aggression (physical aggression and relational aggression) and prosocial behavior (emotional and instrumental support). Furthermore, we take gender into account, because

boys are often more physically aggressive than girls, whereas girls are more relationally aggressive (Dijkstra et al., 2009; LaFontana & Cillessen, 2002; Rose, Swenson, & Waller, 2004; Vaillancourt & Hymel, 2006), and often display more prosocial behavior than boys (e.g., Maccoby & Jacklin, 1974; Rose & Rudolph, 2006). Moreover, we take into account the gender composition of the peer group by testing our hypotheses for same-gender (either boys or girls) and mixed-gender peer groups separately as boys and girls differ in their relationships. Boys' relationships are often characterized by shared mutual interests and girls' relationships by intimacy and support, whereas relationships between boys and girls combine characteristics of both (e.g., McDougall & Hymel, 2007). Furthermore, early adolescents prefer friendships with same-gender peers, but at the same time cross-gender friendships steadily increase (Maccoby, 1990; Rose & Rudolph, 2006).

Method

Participants and Procedure

In the present study, we used a subsample of data from a large cohort study, TRAILS (TRacking Adolescents' Individual Lives Survey, De Winter et al., 2005). TRAILS is a prospective cohort study of Dutch preadolescents who are measured biennially until they are at least 25 years old, and designed to chart and explain the development of mental health and social development from preadolescence into adulthood. Of all the children approached for enrollment in the TRAILS study (selected by the participating municipalities and schools; $N = 3145$ children from 122 schools; schools response 90.4%), a total of 2,230 children participated in the first assessment wave (T1). Of the 2,230 baseline participants, 96.4% ($N = 2149$, 51.0% girls) participated in the second assessment wave (T2).

In addition to the regular questionnaires, which were filled out by TRAILS participants only, the T2 assessment wave also included peer nominations collected from both TRAILS participants and their classmates. Peer nominations were assessed by nominations of all classmates in classes with at least three regular TRAILS participants. Schools provided the names of classmates of TRAILS participants. All eligible students then received an information letter for themselves and their parents, inviting the students to participate. If students or their parents wished to refrain from participation, they were asked to send a reply card within ten days. In total, 98 students, including three regular TRAILS participants, declined to participate. Approximately two weeks after the information letter was sent, a TRAILS staff member visited the selected school classes to assess the peer

nominations in class. The assessment of peer nominations took about 15 minutes during regular lessons. Peer nominations were assessed in a total of 172 classes in 34 schools in the first grade (72 school classes) and second grade (100 school classes) of secondary education, and were cued to peers in the same class. Of all 3,672 children that were approached to participate in this study, 90.2% filled out the questionnaire and nominated their classmates. This yielded a total number of 3,312 students (1,675 boys, 1,637 girls), including 1,007 regular TRAILS participants (M age = 14.02, SD = 0.73). Each classroom contained on average 18.39 participating pupils (SD = 5.99; range from 7 to 30).

Measures

Peer groups were identified based on the network of friendship nominations in each class. Adolescents could nominate an unlimited number of friends in the class. A relation was considered if at least one person indicated that they were friends. Hence, nominations did not need to be mutual. Following the two-step method of *peer group overlap analysis* (Borgatti, Everett, & Johnson, 2013; Everett & Borgatti, 1998), we first identified groups of three or more in which everyone was connected to everybody else (graph-theoretical peer groups). This set of partly overlapping groups was used to construct a matrix of proximity scores, indicating for each pair of individuals the number of groups they jointly are part of. Second, based on a hierarchical clustering of this proximity matrix (Johnson, 1967), non-overlapping groups were identified, which we used to operationalize the peer groups in this chapter. Average peer group size and the proportion of individuals allocated to a peer group increased with decreasing proximity level at which this clustering process was evaluated. We chose as cutoff a proximity level where, out of the total sample (N = 3,312), more than 80 percent of all individuals were assigned to a peer group with a minimum of three members. This ultimately led to 534 identified groups containing 2,674 adolescents (M / F = 1,331 / 1,343) and a distribution of group sizes (M = 5.72, SD = 2.24) dovetailing with earlier research on adolescent peer groups (Rasmussen & Salkind, 2008). We are aware of the multitude of alternative algorithms to extract peer groups from network data (Fortunato, 2010; Porter, Onnela, & Mucha, 2009), but are confident that these would not have resulted in very different groups.

Because this study focused on peer group characteristics, our target sample only includes participants residing in peer groups (N = 2,674). Participants who did not belong to a group were on average lower in status, more physically aggressive, displayed less relational aggression, and gave less emotional and instrumental

support according to their classmates (see Appendix 2.2).

Individual social status. To determine *individual status* of peers, individual proportion scores were calculated in peer groups (not class) for the number of nominations received to the question ‘Who do others want to be associated with?’. Next, proportion scores were calculated by dividing the total number of nominations received by the number of nominating peer group members. Because we are interested in internal group dynamics, we focused on nominating group members, not all classmates. This yielded a measure of adolescents’ individual status, ranging from 0 (low status) to .80 (high status). We explicitly disentangled personal preferences for being associated with a person from reputation-based preferences by asking respondents to nominate people with whom others want to be associated with, instead of who they themselves want to be associated with. We believe this yielded a reputation-based measure for social status. This question has been used in previous research, showing similar associations with other peer status measures (e.g., acceptance, rejection) and behaviors compared to studies using most and least popular peer nominations (e.g., Dijkstra, Lindenberg, & Veenstra, 2008; Dijkstra et al., 2009; Dijkstra et al., 2010).

Peer group status. To determine *peer group status* (i.e., the overall status of a peer group in the larger peer context), we calculated a mean score of individual status proportion scores for each group. This yielded a continuous measure for peer group status, ranging from 0 (low status peer group) to .56 (high status peer group).

Peer group size. Peer group size was determined by the number of members in an adolescent’s peer group (including the adolescent him- or herself). This resulted in an average peer group size of 5.72 (range from 3 to 18).

Peer group hierarchization. To assess whether a peer group was more hierarchical (i.e., had large differences in individual status scores) or more egalitarian (i.e., had small differences in individual status scores), we first calculated a continuous measure of *peer group hierarchization* based on the standard deviation of individual status proportion scores in the peer group. By examining the distance between individuals in a group, we could approximate how group members relate to one another. This serves as an indicator for the presence (or absence) of a hierarchy (see also Garandeau et al., 2013; Zwaan et al., 2013). A large standard deviation in proportion scores indicates a more hierarchical peer group, reflected by larger differences in individual status, whereas more egalitarian peer groups have a smaller standard deviation. This yielded a hierarchization score for groups, running from 0 to .39 ($M = .10$, $SD = .08$).

Peer group status structure. We measured *peer group status structure* by subtracting for each peer group the median score from the mean of individual status proportion scores (peer group status). This resulted in a measure of hierarchy structure ranging from $-.24$ to $.28$ ($M = .02$, $SD = .06$), where positive scores indicate that more individuals reside at the bottom of a peer group (pyramid) and negative scores indicate that more individuals reside at the top of a peer group (inverted pyramid). Scores approaching zero indicate an equal distribution or a balance of low and high status peers in the group.

Aggression. We used physical aggression and relational aggression, derived from peer nominations, as measures for *aggression*. Students could nominate their classmates on the items ‘Who quarrels and/or initiate fights often?’ to assess physical aggression, and ‘Who spreads gossip/rumors about others?’ to assess relational aggression. Proportion scores were calculated by dividing the total number of nominations received by the number of nominating peer group members (again, not classmates), yielding scores from 0 to $.86$ for physical aggression, and 0 to $.83$ for relational aggression. Physical aggression and relational aggression correlated $.16$, and individual status correlated positively with both forms of aggression ($r = .16$; $r = .20$ respectively).

Prosocial behavior. We measured *prosocial behavior* using peer nominations for the questions ‘Which classmates give you emotional support when you are despondent (e.g., problems at home)?’ (emotional support) and ‘Which classmates give you practical support (e.g., with homework)?’ (instrumental support). Proportion scores were calculated for emotional support (ranging from 0 to $.89$), and instrumental support (ranging from 0 to $.88$), by dividing the total number of nominations received by the number of nominating peer group members. Emotional and instrumental support correlated $.60$, and individual status correlated positively with both forms of prosociality ($r = .12$ and $r = .07$ respectively).

Analyses

Although the data are classroom-based, we did not consider the class level in the description of the main variables as there was no variability at the class level. We used multilevel analysis with MLwiN 2.23 (Rasbash, Charlton, Browne, Healy, & Cameron, 2009) to test our hypotheses. This way, we could account for non-independence of observations caused by the nested structure of the data (see also Goldstein, 2003; Snijders & Bosker, 1999). We conducted separate analyses with a two-level structure for boys’ peer groups, girls’ peer groups, and mixed-gender peer groups, with individuals (level one) nested in peer groups (level two). On the

individual level, we included the effect of gender as a control variable for mixed-gender peer groups (girls = 0 and boys = 1). On the group level we controlled for peer group status and peer group size. All predictor variables (except gender) were centered around the grand mean. Multilevel analyses were conducted in three steps. First, we assessed the effect of gender (for mixed-gender peer groups). In the following step (models 1) individual status, peer group status, size, and hierarchization / status structure were added to the model. Finally (models 2), we examined the interaction between individual status and peer group hierarchization / status structure in the analyses to test our hypotheses.

Results

Descriptive Statistics

Although most adolescent peer groups were of the same gender ($N = 421$), there was also a fair percentage (21%) of mixed-gender groups ($N = 113$) (Table 2.1). When comparing boys' peer groups, girls' peer groups, and mixed-gender peer groups, it seemed that individual status was higher (according to group members) in mixed-gender peer groups, which also had higher overall status and were larger than same-gender peer groups. Boys' groups seemed to be slightly larger than girls' groups. Furthermore, mixed-gender groups appeared more hierarchical than same-gender groups, but similar in status structure, and boys' groups had a somewhat more hierarchical structure than girls' groups. With regard to the outcome variables, it appeared that boys seemed more physically aggressive, whereas girls scored higher on relational aggression, particularly in mixed-gender groups. Furthermore, both emotional and instrumental support seemed higher for girls than for boys, and among girls higher in same-gender peer groups than in mixed-gender peer groups. It has to be noted that we did not test whether these descriptive differences above are significant or not.

Correlations were calculated for boys and girls separately in same- and mixed-gender peer groups (see Appendix 2.3 and 2.4). Positive correlations were found between individual social status and aggression / prosocial behavior in all peer group types (ranging from $r = .07, p < .05$ to $r = .36, p < .01$), except for instrumental support in girls' groups and girls in mixed-gender groups. Physical and relational aggression were positively related (ranging from $r = .14$ to $.31, p < .01$), and emotional and instrumental support correlated positively in all group types (ranging from $r = .14$ to $.31, p < .01$, and $r = .47$ to $.54, p < .01$ respectively). In boys' groups physical aggression and prosocial behavior showed a negative correlation (r

Table 2.1. Descriptive Statistics of the Sample Split by Peer Group Gender Composition

	Boys' peer groups (<i>N</i> = 1012; <i>N</i> _{peer groups} = 207)	Girls' peer groups (<i>N</i> = 976; <i>N</i> _{peer groups} = 214)	Mixed-gender peer groups		Difference <i>F</i>
	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Boys in mixed (<i>N</i> = 331; <i>N</i> _{peer groups} = 113) Mean (<i>SD</i>)	Girls in mixed (<i>N</i> = 355; <i>N</i> _{peer groups} = 113) Mean (<i>SD</i>)	
Individual status	.09 (.15)	.10 (.17)	.14 (.16)	.14 (.17)	11.45
Peer group status	.09 (.10)	.10 (.12)		.14 (.11)	23.96
Peer group size	5.46 (1.79)	5.07 (1.52)		7.04 (2.90)	127.14
Peer group hierarchization	.09 (.08)	.09 (.09)		.12 (.07)	19.83
Peer group status structure	.025 (.050)	.016 (.058)		.017 (.060)	4.70
Physical aggression	.09 (.17)	.03 (.09)	.11 (.18)	.03 (.09)	58.09
Relational aggression	.06 (.13)	.10 (.16)	.09 (.15)	.18 (.20)	46.42
Emotional support	.28 (.22)	.50 (.23)	.24 (.19)	.40 (.23)	203.43
Instrumental support	.37 (.23)	.54 (.21)	.35 (.22)	.40 (.21)	119.98

= $-.08, p < .01$, and $-.11, p < .01$), and for girls in mixed-gender groups physical aggression and instrumental support showed a negative significant correlation ($r = -.26, p < .01$). Furthermore, positive correlations were found in same-gender, but not mixed-gender groups for peer group status and size ($r = .12, p < .01$), peer group size and hierarchization ($r = .25, p < .01$, and $r = .11, p < .01$), and peer group hierarchization and status structure ($r = .50, p < .01$, and $r = .30, p < .01$). Status was also positively related to hierarchization in all peer group types (ranging from $r = .71$ to $.78, p < .01$), positively related to status structure in boys' peer groups ($r = .11, p < .01$), and negatively related to status structure in mixed-gender peer groups ($r = -.24$ and $-.28, p < .01$). Peer group size was positively related to status structure in boys' and mixed-gender peer groups ($r = .14$ and $.15, p < .01$ respectively).

Hypothesis Testing

Aggression

First we tested our hypothesis regarding aggression. For the interpretation of the results it should be kept in mind that the dependent variable has a range of 1, which results in relatively small regression coefficients. The level one and level two variances for physical aggression were, for boys', girls', and mixed-gender peer groups, .021 and .008, .006 and .001, and .013 and .009. The intra class correlations (ICCs) were .28, .14, and .41 respectively. The variances for relational aggression were .010 and .006, .014 and .011, and .014 and .010, and the ICC's .38, .44, and .42 respectively. We will now first discuss the models with peer group hierarchization and then the models with peer group status structure. As Table 2.2a shows, there was a positive relationship between gender and physical aggression and a negative relationship between gender and relational aggression in mixed-gender peer groups (Models 1), indicating that boys were more physically aggressive but less relationally aggressive than girls. Peer group status was positively related to physical aggression in boys', girls', and mixed-gender peer groups, and positively related to relational aggression in mixed-gender groups. Peer group size had a slight negative relation with relational aggression in boys' and mixed-gender peer groups, and a slight positive relation with relational aggression in girls' peer groups. Looking at the main effect of individual status, it appeared that status had a significantly positive relation with all types of aggression across all peer group types, indicating that adolescents of higher status were more physically and relationally aggressive. Peer group hierarchization had a positive main effect on relational aggression in boys' peer groups. To test our hypotheses, we examined the interaction effect between individual status and hierarchization (Models 2). Only for

physical aggression in girls' peer groups a significant moderating effect was found of peer group hierarchization ($R_1^2 = .14$, $R_2^2 = .09$)¹.

Models with peer group status structure were similar to those with peer group hierarchization (see Models 1), except that peer group status was also positively related to relational aggression in girls' peer groups, and peer group size only had a small positive relation with relational aggression in girls' groups (Table 2.2b). Furthermore, we found a negative main effect of status structure in mixed-gender peer groups for both physical and relational aggression, suggesting that aggression was higher in groups where the status structure reflected an inverted pyramid (i.e., with relatively more high status than low status adolescents). Regarding our hypotheses, a negative moderating effect of peer group status structure was found on the relation between individual status and aggression (both physical and relational aggression; $R_1^2 = .14$, $R_2^2 = .14$, and $R_1^2 = .08$, $R_2^2 = .09$ respectively) in girls' peer groups (Model 2)¹, indicating that individual status was particularly related to aggression in girls' peer groups with an inverted pyramid structure (i.e., more high status than low status adolescents) (see Figure 2.1).

Prosocial behavior

With regard to prosocial behavior, the level one and level two variances for emotional support were, for boys', girls', and mixed-gender peer groups, .026 and .024, .040 and .013, and .031 and .019. The intra class correlations (ICCs) were .48, .25, and .38 respectively. The variances for instrumental support were .030 and .023, .029 and .017, and .026 and .022, and the ICC's .43, .37, and .46 respectively. We found that boys in mixed-gender groups gave less emotional and instrumental support than girls in mixed-gender groups (Models 1; Table 2.3a). The relation between peer group status and emotional support was positive for girls' groups. No relations were found between peer group status and instrumental support in any type of peer group. Furthermore, there was a small negative effect of peer group size for emotional support in boys' groups. Also for prosocial behavior, individual status showed a positive main effect for all group types, meaning that adolescents of higher status gave more emotional and instrumental support than adolescents of lower status. Peer group hierarchization related negatively to emotional support in girls' groups. Apparently, hierarchization did not moderate the effect of individual status on emotional and instrumental support in any type of peer group (Models 2).

¹ For a better explanation of the variance in individual status (IS), the model should have included a random slope for IS (the interaction between IS and CSS then becomes marginally significant).

Table 2.2a. Multilevel Models of Individual Status and Peer Group Hierarchization for Physical and Relational Aggression

	Boys' peer groups				Girls' peer groups				Mixed-gender peer groups ^a			
	Physical Aggression		Relational Aggression		Physical Aggression		Relational Aggression		Physical Aggression		Relational Aggression	
	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)
<i>Level 1</i>												
Individual status (IS)	.12* (.05)	.09 (.08)	.09** (.04)	.10 (.06)	.09*** (.02)	-.02 (.04)	.10* (.04)	.06 (.07)	.19*** (.04)	.24*** (.05)	.19*** (.04)	.20*** (.06)
<i>Level 2</i>												
Peer group status	.26** (.08)	.26** (.08)	-.09 (.06)	-.09 (.06)	.14*** (.04)	.14*** (.04)	.06 (.07)	.06 (.07)	.17* (.09)	.18* (.09)	.33** (.11)	.33** (.11)
Peer group size	-.002 (.010)	-.002 (.010)	-.01** (.004)	-.01** (.004)	.003 (.004)	.003 (.004)	.01** (.004)	.01** (.004)	.002 (.003)	.002 (.003)	-.01** (.003)	-.01** (.003)
Peer group hierarchization (CH)	-.05 (.11)	-.05 (.11)	.41*** (.08)	.41*** (.08)	-.02 (.05)	-.02 (.05)	.07 (.09)	.07 (.09)	-.11 (.13)	-.11 (.13)	.26 (.17)	.26 (.17)
<i>Cross-level interaction</i>												
IS × CH		.33 (.70)		.02 (.53)		.90** (.29)		.36 (.50)		-.65 (.44)		.11 (.46)
<i>Df</i>	4	1	4	1	4	1	4	1	4	1	4	1
χ^2 deviance difference ^b	21.54***	.22	86.51***	.01	40.71***	9.58**	27.34***	.51	28.31***	2.17	54.38***	.05

Note. ⁺ $p < .1$. ; * $p < .05$; ** $p < .01$; *** $p < .001$; .

^a For mixed-gender peer groups we also included gender as a control variable (Girl = 0 / Boy = 1). The effect of gender was .08***(.01) for the models with physical aggression and -.08*** (.01) for the models with relational aggression.

^b The decrease in χ^2 deviance for models 1 of boys' and girls' peer groups is compared with the deviance of the empty model, and of mixed-gender peer groups compared with the deviance of the model including only gender. Model 2 is compared with model 1.

Table 2.2b. Multilevel Models of Individual Status and Peer Group Status Structure for Physical and Relational Aggression

	Boys' peer groups				Girls' peer groups				Mixed-gender peer groups ^a				
	Physical Aggression		Relational Aggression		Physical Aggression		Relational Aggression		Physical Aggression		Relational Aggression		
	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	
<i>Level 1</i>													
Individual status (IS)	.14** (.04)	.13** (.05)	.09** (.03)	.08** (.03)	.09*** (.02)	.10*** (.02)	.10* (.04)	.12** (.04)	.19*** (.04)	.19*** (.04)	.20*** (.04)	.20*** (.06)	
<i>Level 2</i>													
Peer group status	.22** (.07)	.22** (.07)	.11 (.06)	.11 (.06)	.13*** (.03)	.13*** (.03)	.10** (.05)	.10** (.05)	.16** (.06)	.16** (.06)	.53*** (.08)	.53*** (.08)	
Peer group size	-.002 (.005)	-.002 (.005)	-.002 (.005)	-.002 (.005)	.001 (.0012)	.001 (.0012)	.01*** (.0012)	.01*** (.0012)	.003 (.0033)	.003 (.0033)	-.01 (.003)	-.01 (.003)	
Peer group status structure (CSS)	-.22 (.15)	-.22 (.15)	.23 ⁺ (.13)	.23 ⁺ (.13)	.03 (.05)	.03 (.05)	.03 (.10)	.04 (.10)	.26* (.11)	.26* (.11)	.43** (.15)	.43** (.15)	
<i>Cross-level interaction</i>													
IS × CSS		.50 (.65)		.31 (.45)			-.53* (.24)				-.01 (.37)		-.41 (.38)
<i>Df</i>	4	1	4	1	4	1	4	1	4	1	3	1	
χ^2 deviance difference ^b	62.51***	.60	192.47***	.48	30.80***	4.70*	26.96***	4.31*	33.27***	.00	70.46***	1.13	

Note. ⁺ $p < .1$. ; * $p < .05$; ** $p < .01$; *** $p < .001$.

^a For mixed-gender peer groups we also included gender as a control variable (Girl = 0 / Boy = 1). The effect of gender was .08*** (.01) for the models with physical aggression and -.08*** (.01) for the models with relational aggression.

^b The decrease in χ^2 deviance for models 1 of boys' and girls' peer groups is compared with the deviance of the empty model, and of mixed-gender peer groups compared with the deviance of the model including only gender. Model 2 is compared with model 1.

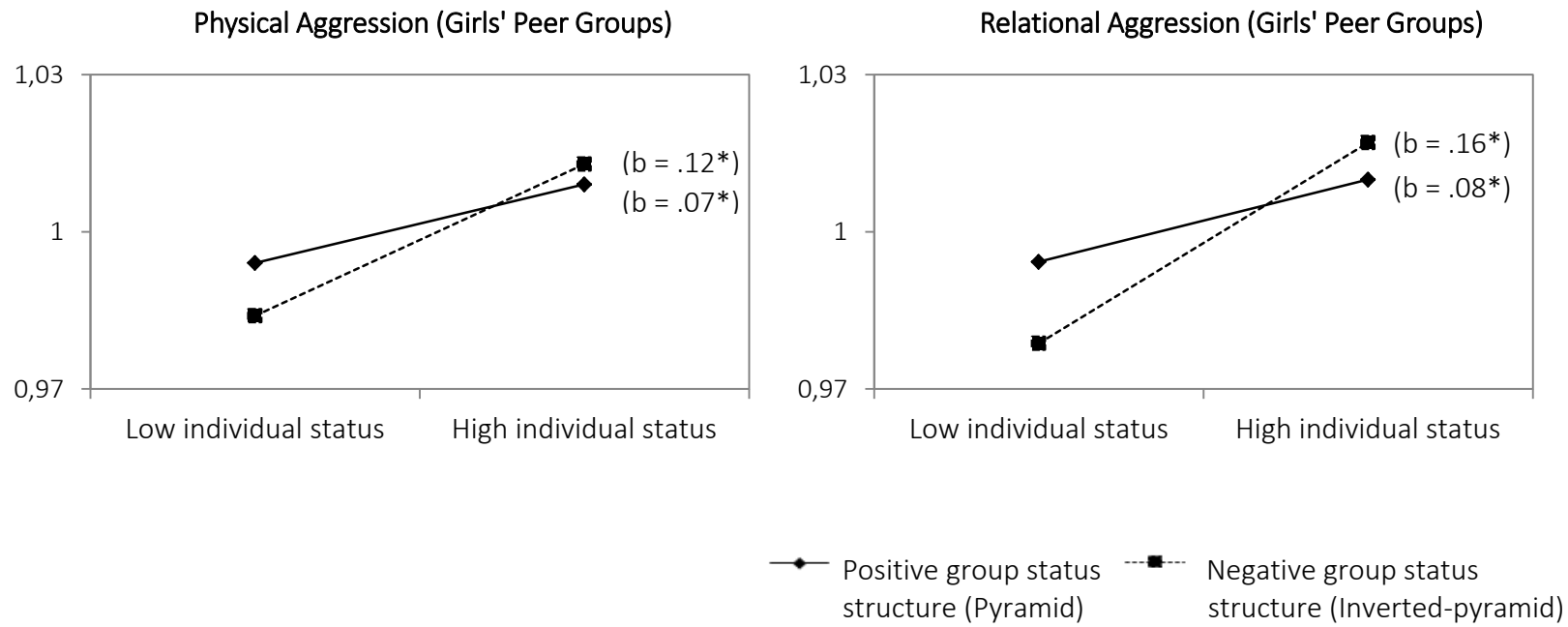


Figure. 2.1. Simple slopes between individual status and physical aggression and relational aggression in girls' peer groups for one standard deviation above the mean (positive peer group status structure) and one standard deviation below the mean (negative peer group status structure) (* $p < .05$)

Table 2.3a. Multilevel Models of Individual Status and Peer Group Hierarchization for Emotional and Instrumental Support

	Boys' peer groups				Girls' peer groups				Mixed-gender peer groups ^a			
	Emotional Support		Instrumental Support		Emotional Support		Instrumental Support		Emotional Support		Instrumental Support	
	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)
<i>Level 1</i>												
Individual status (IS)	.20*** (.05)	.14 (.09)	.12* (.06)	.05 (.10)	.22*** (.06)	.18 ⁺ (.11)	.18*** (.05)	.18 ⁺ (.10)	.35*** (.06)	.33*** (.08)	.23*** (.06)	.20** (.08)
<i>Level 2</i>												
Peer group status	.19 (.11)	.19 (.11)	.07 (.12)	.05 (.10)	.25** (.10)	.25** (.10)	.10 (.11)	.10 (.11)	.07 (.13)	.07 (.13)	.21 (.14)	.21 (.14)
Peer group size	-.020** (.009)	-.020** (.009)	-.010 ⁺ (.0054)	.010 (.0062)	-.01 (.01)	-.01 (.01)	-.004 (.012)	-.004 (.012)	-.001 (.001)	-.001 (.001)	.001 (.001)	-.0010 (.0012)
Peer group hierarchization (CH)	.06 (.15)	.06 (.15)	.06 (.16)	-.01 (.16)	-.31* (.13)	-.31* (.13)	-.17 (.13)	-.17 (.13)	.34 ⁺ (.19)	.34 ⁺ (.19)	-.27 (.21)	-.27 (.21)
<i>Cross-level interaction</i>												
IS × CH		.81 (.85)		.81 (.92)		.36 (.75)		.004 (.68)		.27 (.64)		.45 (.62)
<i>Df</i>	4	1	4	1	4	1	4	1	4	1	4	1
χ^2 deviance difference ^b	29.66***	.89	8.06 ⁺	0.76	26.48***	.23	13.67**	.00	52.10***	.18	18.94***	.52

Note. ⁺ $p < .1$. ; * $p < .05$; ** $p < .01$; *** $p < .001$.

^a For mixed-gender peer groups we also included gender as a control variable (Girl = 0 / Boy = 1). The effect of gender was for all models - .15***(.02).

^b The decrease in χ^2 deviance for models 1 of boys' and girls' peer groups is compared with the deviance of the empty model, and of mixed-gender peer groups compared with the deviance of the model including only gender. Model 2 is compared with model 1.

Table 2.3b. Multilevel Models of Individual Status and Peer group Status Structure for Emotional and Instrumental Support

	Boys' peer groups				Girls' peer groups				Mixed-gender peer groups ^a			
	Emotional Support		Instrumental Support		Emotional Support		Instrumental Support		Emotional Support		Instrumental Support	
	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)	Model 1 <i>b</i> (SE)	Model 2 <i>b</i> (SE)
<i>Level 1</i>												
Individual status (IS)	.16*** (.05)	.21*** (.05)	.09 ⁺ (.05)	.14* (.06)	.22*** (.06)	.26*** (.06)	.18*** (.05)	.21*** (.05)	.35*** (.06)	.35*** (.06)	.23*** (.06)	.24** (.08)
<i>Level 2</i>												
Peer group status	.23* (.11)	.23* (.11)	.11 (.11)	.11 (.11)	.070 (.072)	.070 (.072)	.002 (.072)	.002 (.072)	.06 (.09)	.06 (.09)	.01 (.10)	.01 (.10)
Peer group size	-.020* (.009)	-.020* (.009)	-.010 (.009)	-.010 (.009)	-.010 (.014)	-.010 (.014)	-.004 (.012)	-.004 (.012)	.0010 (.0012)	.0010 (.0012)	.0010 (.0012)	.0010 (.0012)
Peer group status structure (CSS)	-.09 (.24)	-.09 (.24)	-.04 (.24)	-.04 (.24)	-.07 (.14)	-.07 (.14)	.03 (.13)	.03 (.13)	-.36* (.17)	-.36* (.17)	-.36* (.18)	-.36* (.18)
<i>Cross-level interaction</i>												
IS × CSS		-1.54* (.71)		-1.45 ⁺ (.77)		-1.68** (.62)		-1.41* (.56)		.22 (.54)		-.03 (.52)
<i>Df</i>	4	1	4	1	4	1	4	1	4	1	4	1
χ^2 deviance difference ^b	168.49***	4.61*	177.71***	3.53 ⁺	21.00***	7.30**	11.79*	6.37*	53.62***	.16	21.17***	.00

Note. ⁺ $p < .1$. ; * $p < .05$; ** $p < .01$; *** $p < .001$.

^a For mixed-gender Peer groups we also included gender as a control variable (Girl = 0 / Boy = 1). The effect of gender was for all models - .15***(.02).

^b The decrease in χ^2 deviance for models 1 of boys' and girls' peer groups is compared with the deviance of the empty model, and of mixed-gender peer groups compared with the deviance of the model including only gender. Model 2 is compared with model 1.

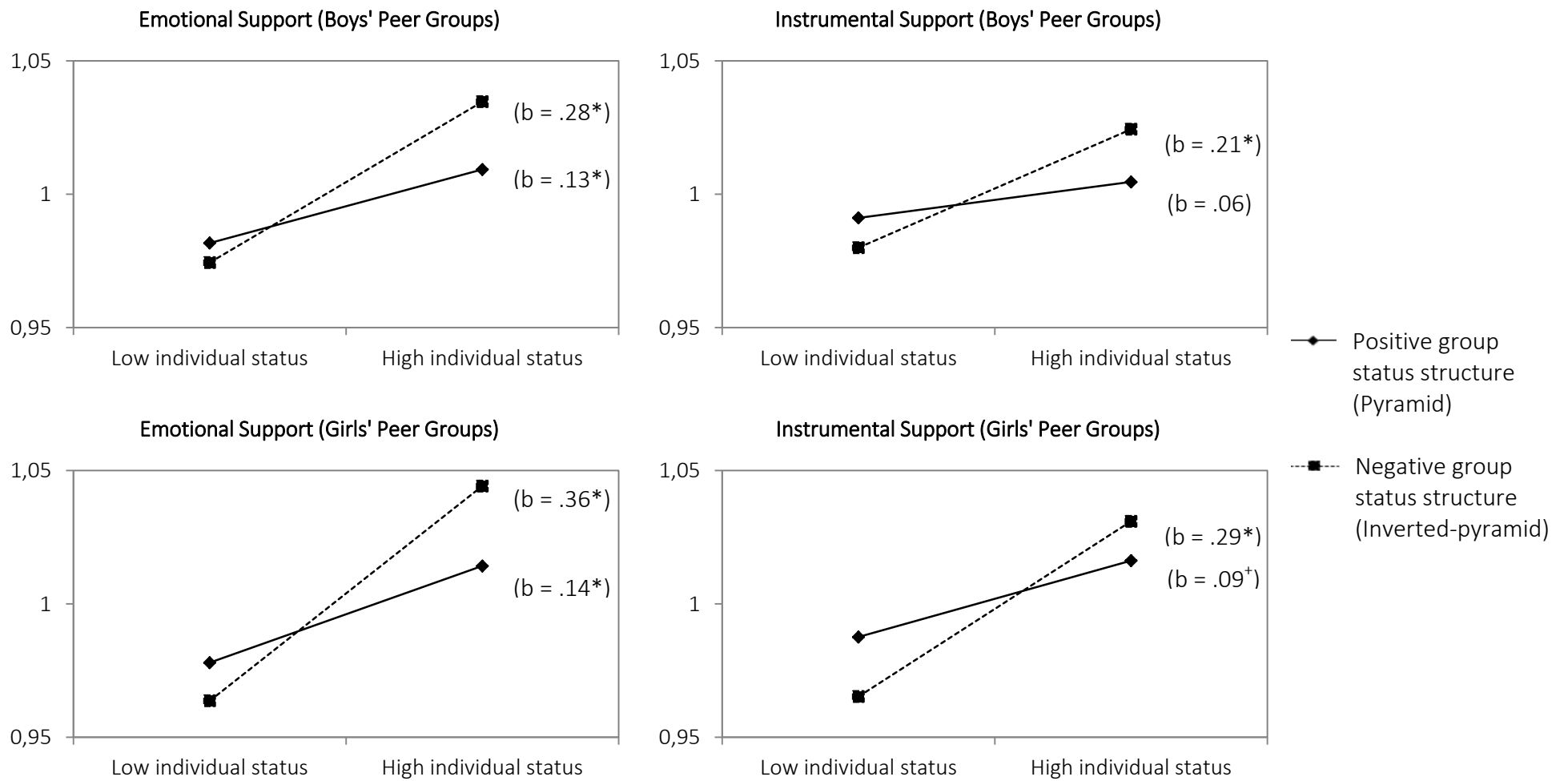


Fig. 2.2. Simple slopes between individual status and emotional support and instrumental support in boys' and girls' peer groups for one standard deviation above the mean (positive peer group status structure) and one standard deviation below the mean (negative peer group status structure) (* $p < .05$)

Again, models with peer group status structure were similar to those with peer group hierarchization (Models 1; Table 2.3b). However, in the models with status structure the relation between peer group status and emotional support was positive for boys' groups. Furthermore, we found a negative main effect of status structure in mixed-gender groups for emotional and instrumental support, suggesting that prosocial behavior was higher in peer groups where the group status structure reflected an inverted pyramid (i.e., more high status than low status adolescents). With regard to our hypotheses, peer group status structure moderated the relation between individual status and prosocial behavior (both emotional and instrumental support) in boys' ($R_1^2 = .04$, $R_2^2 = .04$, and $R_1^2 = .02$, $R_2^2 = .01$ respectively) and girls' ($R_1^2 = .06$, $R_2^2 = .04$, and $R_1^2 = .07$, $R_2^2 = .03$ respectively) peer groups (Models 2). Contrary to our expectations, in these groups individual status was particularly related to emotional support when the peer group status structure followed an inverted pyramid shape pattern with a majority of high status adolescents on the top.

Discussion

Peers, especially in groups, become very important in adolescence (e.g., Brown, 2004; Gifford-Smith & Brownell, 2003; Rasmussen & Salkind, 2008), because they offer a setting where adolescents spend time with close others, and find a sense of belonging and support (e.g., Brown, 1990; Ellis & Zarbatany, 2007; Kwon & Lease, 2007; Prinstein & La Greca, 2002). Adolescent peer groups can be identified in an important way by their social stance in the peer domain, but although members of peer groups are quite similar, they also differ with regard to social status (e.g., Adler & Adler, 1998; Closson, 2009). Individuals may vary with regard to their individual social status, resulting in groups being either more hierarchical or more egalitarian. To date, much remains unknown about how these differences might affect the behavior of peer group members.

In this study, we therefore set out to examine differences in the hierarchical organization of peer relations in peer groups, more specifically in what way the relationship between adolescents' individual status, and aggression and prosocial behavior depended on variation (i.e., standard deviation) in individual social status within peer groups (i.e., peer group

hierarchization), and the structure of status scores by subtracting the peer group status median from the mean (i.e., peer group status structure), to capture different configurations of a hierarchy in peer groups (pyramid shape, inverted pyramid, or equal distribution of social status scores). It was argued that adolescents generally strive for status, which would encourage them to maintain the status they have in a context where there is a lot of competition for status. Such competition should be mostly present in groups and contexts with small differences in status. Accordingly, we expected to find a stronger relation between individual status and aggression in egalitarian peer groups and in groups with more high status than low status peers (inverted-pyramid shape) because competition for status is likely to be higher in these groups. Partially in line with these expectations, we found a moderating effect of peer group status structure, but not hierarchization, on the relation between individual status and physical and relational aggression in girls' groups. The results for peer group status structure showed a consistent pattern in girls' groups; the relation between adolescents' status and their aggressive behavior appeared stronger when they resided in groups that were not hierarchically organized.

Furthermore, we expected that in the more hierarchical groups and in those with fewer high status than low status peers (pyramid shape), an individual's status would be more strongly related to prosocial behavior, because those groups have less competition for status, and thus more room for prosociality. However, we found evidence that individual status is actually more strongly related to prosocial behavior in boys' and girls' peer groups with more high status adolescents relative to low status peers. Apparently adolescents in groups with status structure showing an inverted-pyramid shape, were perceived to be more aggressive, but also more cooperative than adolescents in hierarchies.

The underlying mechanisms that could explain these findings might be found by considering to whom the behaviors are directed. Previous research has shown that conflicts between groups can actually further strengthen in-group relations, specifically when groups compete for resources and power (e.g., Brewer, 1999; Sherif & Sherif, 1953). Hierarchical groups could benefit from being aggressive to members of other peer groups instead of fellow members, not only to gain resources but also to maintain the 'good natured'

hierarchical structure of their own group. In non-hierarchical peer groups however, aggression might be used against group members to compete over resources, power, or leadership within the peer group. With regard to prosociality, behavior might be mostly directed at (in-)group members to maintain well-balanced relationships in the peer group. Research has shown that peer groups are often characterized by an environment that offers connectedness, acceptance, and support (Hartup, 1993; Kwon & Lease, 2007; Prinstein & La Greca, 2002; Savin-Williams & Berndt, 1990). Hence, hierarchical peer groups might experience less conflict in their peer group, but also have a less cohesive atmosphere, while egalitarian peer groups might offer more of a safe haven with occasional clashes over status.

We also found some gender-related nuances to the main findings. For girls' peer groups we found significant effects of status structure on the relation between individual status and aggression, but not for boys' and mixed-gender peer groups. This finding is somewhat surprising, because, although relational aggression is often found to be higher for girls than for boys, physical aggression is often found to be more prominent for boys than girls (e.g., Dijkstra et al., 2009; Hyde, 1984; Pellegrini & Archer, 2005; Rose et al., 2004; Vaillancourt & Hymel, 2006). Also, boys' interactions are often part of dominance hierarchies where aggression plays an important role (Geary et al. 2003). Furthermore, the expression of aggression differs for boys and girls. Boys' aggression and conflicts are often less disruptive of ongoing group activity. Boys reconcile after a fight more quickly than girls and are more likely to shrug off maltreatment by other boys, whereas girls are more likely to become upset by aggressive acts of others, and aggression tends to be expressed more in close relationships instead of in the larger peer group (e.g., Crick et al., 1999; Moffitt, Caspi, Rutler, & Silva, 2001; Putallaz & Bierman, 2004; Underwood, 2003). Also, because girls are more likely to form close relationships with a fewer number of other girls, they are more likely to be sensitive to rejection, because when they are rejected, they have very few others or no one else with whom they (can) have a close relationship. It is thus possible that the structure of a peer group can have a greater effect on the status-aggression relationship of girls than boys, because aggressive acts against group members have more severe consequences for girls than for boys. This might explain why we found a significant moderating effect of

status structure for girls' but not boys' peer groups. With regard to mixed-gender peer groups, possibly there is more competition for status in same-gender than in mixed-gender peer groups. For example, it has been argued that conflicts between same-sex adolescents are more common than between opposite-sex peers when it comes to resource control, to attract the opposite sex, for example (Pellegrini & Long, 2003). This might explain why we found no effect of hierarchy structure on the relation between individual status and aggression in mixed-gender peer groups.

Furthermore, in boys' and girls' peer groups we found significant effects of peer group status structure on the relation between individual status and prosocial behavior, but not in mixed-gender peer groups. Possibly, mixed-gender peer groups are inherently different from same-gender peer groups. For example, prosocial behavior in itself is more likely to occur between same-sex rather than other-sex peers, because needs are more easily recognized and communication is more effortless between individuals who are similar to each other (Byrne, 1971; McPherson, Smith-Lovin, & Cook, 2001). Adolescents in mixed-gender groups are likely to have fewer same-sex others who they would ask for help, and considering a hierarchy would only further diminish the number of possible others. It might be the case that the presence or absence of a hierarchy no longer matters in mixed-gender peer groups, because the number of individuals one would ask for or give help to is already very low.

Apparently, different processes take place in mixed-gender peer groups compared to same-gender groups with regard to aggression and prosocial behavior. However, to draw clear conclusions on the associations between our variables of interest, the results need to be thoroughly replicated in future studies. Thus, studying (the differences between same- and) mixed-gender peer groups might be especially interesting for future research.

Strengths, Limitations, and Directions for Future Research

The main strength of our study lies in that we have demonstrated the importance of not only comparing differences between individuals and peer groups of adolescents, but also to take into account the internal structures of adolescent peer groups. To better understand behavior of adolescents, it is shown that the internal hierarchy of peer relations in groups can affect the

behavioral outcomes of its members in different ways. In this respect, we introduced status structure as a new measure of hierarchy in groups. Results of this study indicate that this approach is particularly fruitful as it reveals how social status is related to behavior in groups. Our analyses showed that standard deviation does not appear to be an informative measure of configurations or structures of hierarchies, and one should consider its effect if standard deviation is used as a measure of hierarchy. Furthermore, this study showed gender peer group specific findings that warrant a closer look in future research.

One limitation of our study is that we did not examine to whom the behaviors were directed. Directionality of behaviors might explain why we found the relation between status and both aggression and prosocial behavior to be stronger in non-hierarchical peer groups as mentioned before. Related to this, obtaining observations of behaviors other than those reported by classmates, or using more items, could also give more insight into the relation between adolescent behaviors. Peer groups could form at grade or even school level so that relations with members transcend the classroom. This might explain why 20% of adolescents in our sample did not belong to a group. Furthermore, although peer nominations are generally considered a reliable measure of behavior, as it is based on multiple informants (see for instance Veenstra et al., 2007), using only one item can be considered a limitation. A next step in research would be to untangle to whom aggression and prosociality is directed, within or across group boundaries, whether these behaviors are exhibited more by higher or lower status adolescents (do they occur more top-down or bottom-up), and to what extent this differs for hierarchical and egalitarian groups. Future research should also focus on collecting data across classes and grades when studying peer groups or adolescent peer relations.

Another limitation of our study is given our cross-sectional data, that we could not draw any conclusions of causality of peer group hierarchization and status structure on aggression and prosociality. Longitudinal data could give more insight into a possible causal relation and could also deal with the idea that differences in relationships and behavior can result from specific selection and socialization processes (Veenstra, Dijkstra, Steglich, & Van Zalk, 2013). For example, aggressive adolescents might have higher status

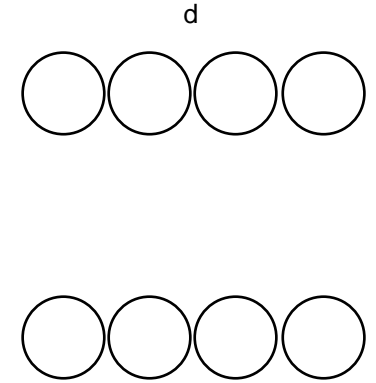
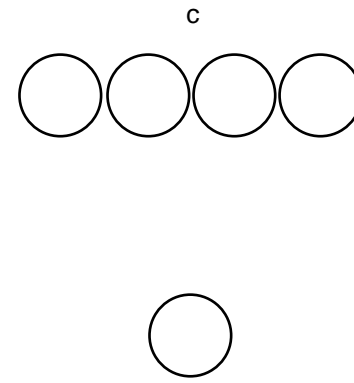
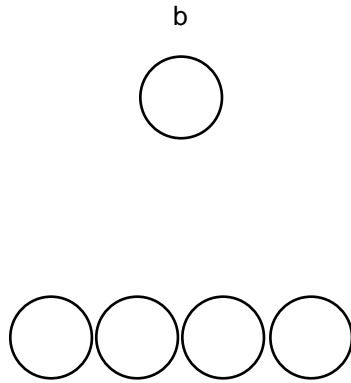
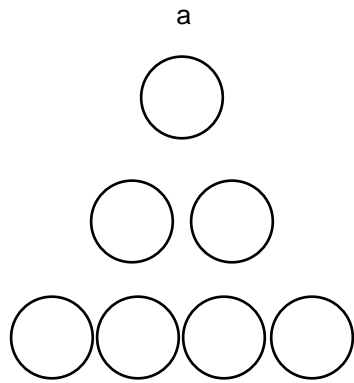
orientations and therefore choose friends who are relatively lower in status (creating a more hierarchical structure). In doing so they might need less aggression, because they compete less for status. However, peer groups could also become more hierarchical or egalitarian over time due to group members mimicking (social normative) behavior of others in their group. In more egalitarian peer groups for example, adolescents might copy aggressive behavior, because they realize that this could lead to status enhancement. In more hierarchical peer groups, however, group members might observe that aggression is not part of the social norm, maybe is even frowned upon, and members would therefore mimic other types of behavior. Longitudinal (social network) modeling (see Snijders et al., 2010) could give the opportunity to study selection and socialization processes as they happen over time, and would be recommended for use in future research.

Conclusion

Despite the limitations of this study, we found that the relation between adolescents' individual status and aggression and prosocial behavior differs for different levels of peer group status structure, and types of gender peer groups. There appear to be different mechanisms at play *within* peer groups when bearing in mind the internal structures of those groups. Our results at the peer group level furthermore revealed that standard deviation might be less adequate as a measure for assessing hierarchies in peer groups. This stresses the importance of peer group context and taking into account internal group structures when considering adolescent aggressive and prosocial behaviors. Recommendations for future research include carefully considering the context under study and which factors need to be taken into account with regard to the context. For example, contemplating directionality of behaviors and differences between same- and mixed-gender groupings would be a very interesting next step in adolescent research. Recognizing the importance of peer groups and their characteristics can help us better understand why adolescents display aggressive and prosocial behaviors, and how internal group dynamics might facilitate or inhibit these behaviors.

Appendix 2.1. Possible Configurations of Peer Group Hierarchies: Pyramid (a, b), Inverted Pyramid (c), Symmetrical (d)

Individual status in the peer group ↑



Appendix 2.2. Descriptive Statistics of All Participants, Adolescents Not in a Peer group, and Adolescents in Peer groups

	Adolescents not in a peer group	Adolescents in peer groups	Difference	
	(<i>N</i> = 638)	(<i>N</i> = 2674; <i>N</i> _{peer groups} = 534)	t (df)	p
	Mean (SD)	Mean (SD)		
Gender (boy = 1)	.52 ^a	.50 ^a	.82 (3310)	.41
Individual status	.08 (.10) ^b	.11 (.13) ^a	-7.39 (3310)	< .01
Physical aggression	.09 (.17) ^a	.07 (.14) ^b	2.69 (3310)	< .01
Relational aggression	.11 (.13) ^b	.13 (.13) ^a	-2.62 (3310)	< .01
Emotional support	.10 (.08) ^b	.16 (.11) ^a	-15.48 (3310)	< .01
Instrumental support	.13 (.10) ^b	.21 (.11) ^a	-17.08 (3310)	< .01

Note. Means in the same row that do not share superscripts differ at $p < .05$ in the Bonferroni test.

Appendix 2.3. Correlations Between Individual Status, Peer Group Status, Peer Group Size, Peer Group Hierarchization, Peer Group Status Structure, and the Behavioral Outcomes for Boys' and Girls' Peer Groups

	1	2	3	4	5	6	7	8	9
1. Individual status		.15**	.13**	.13**	.07*				
2. Physical aggression	.21**		.14**	-.08**	-.11**				
3. Relational aggression	.14**	.30**		-.01	-.02				
4. Emotional support	.09**	-.00	-.04		.55**				
5. Instrumental support	.05	-.04	-.02	.54**					
6. Peer group status							.12**	.71**	.11**
7. Peer group size						.12**		.25**	.14**
8. Peer group hierarchization						.73**	.11**		.50**
9. Peer group status structure						-.04	.04	.30**	

Note. Boys' peer groups above and girls' peer groups below the diagonal (** $p < .01$; * $p < .05$).

Appendix 2.4. Correlations Between Individual Status, Peer Group Status, Peer Group Size, Peer Group Hierarchization, Peer Group Status Structure, and the Behavioral Outcomes for Mixed-Gender Peer Groups

	1	2	3	4	5	6	7	8	9
1. Individual status		.23**	.24**	.23**	.19**				
2. Physical aggression	.15**		.31**	-.07	-.07				
3. Relational aggression	.36**	.25**		-.00	.02				
4. Emotional support	.20**	-.10	-.02		.47**				
5. Instrumental support	.07	-.26**	-.07	.53**					
6. Peer group status							.06	.78**	-.24**
7. Peer group size						.08		.06	.15**
8. Peer group hierarchization						.76**	.07		.05
9. Peer group status structure						-.28**	.15**	.07	

Note. Boys above and girls below the diagonal (** $p < .01$).

CHAPTER 3

Delinquency Influence in Peer Groups: The Role of Adolescents' Relative Social Status and Group Cohesion as Moderators*

* This chapter is co-authored with Jan Kornelis Dijkstra, Christian Steglich, Wilma Vollebergh, and René Veenstra and is currently under review by an international peer-reviewed journal. Earlier versions of this chapter were presented at the Society for Research in Child Development (SRCD), Seattle, WA, United States, April 2013, the Sunbelt Social Networks Conference, Hamburg, Germany, May 2013, and the European Conference on Social Networks (EUSN), Barcelona, Spain, July 2014.

Abstract

Adolescent peer groups form an important setting where delinquency proliferates through peer influence. Although many studies have examined peer influence in delinquency in groups of adolescents, not so much is known about peer group characteristics that could enhance or inhibit the proliferation of delinquency. This study tested whether adolescents' *relative social status* and *structural cohesion* among peer group members are important moderators for the proliferation of delinquency among adolescents. We hypothesized that influence processes would be stronger for adolescents with a relatively low social status, compared to peers in their group, and in structurally cohesive peer groups. Hypotheses were tested in a sample of 1,309 students from the SNARE study (50.1% boys, *M* age = 13.19) using longitudinal social network analysis (RSiena). The results showed strong influencing processes, but no moderating effects for either relative social status or structural cohesion on peer influence in delinquency. These findings suggest that peer influence in adolescent delinquency is relevant across different settings, thus strengthening the pervasive nature of these processes.

Peer groups offer a social setting where adolescents spend a great amount of time with each other, find social support, and feel connected and accepted (see also Brown, 1990; Hartup, 1993; Kwon & Lease, 2007), but also provide a context where adolescents can influence one another with regard to risky behaviors, such as delinquency (Dishion et al., 1995; Henry et al., 2001; Patterson et al., 2000). To date, most research has focused on influence in delinquency in the overall peer network, showing that adolescents are strongly influenced by their peers to get involved in delinquent behaviors (e.g., Burk et al., 2008; Haynie et al., 2014; Kerr et al., 2012; Svensson et al., 2012; Weerman, 2011). Only a few studies have examined when peer influence processes are more or less likely to occur. Most of these studies focused on the impact of individual characteristics, such as psychopathic traits (Kerr et al., 2012) or immigrant status (Svensson et al., 2012).

However, besides individual characteristics, interpersonal processes might also play an important role in whether or not peer influence is likely. Adolescents mostly interact in intimate groups of peers, rather than the overall network (Brown & Klute, 2003; Gifford-Smith & Brownell, 2003; Hallinan, 1980; Rasmussen & Salkind, 2008; Wölfer & Cortina, 2014), and it is here where influence in delinquency is most likely (Dishion et al., 1995; Henry et al., 2001; Patterson et al., 2000). Therefore, we propose that not only individual characteristics, but also features of (individuals in) peer groups are potentially important factors for the enhancement or inhibition of peer influence in delinquency. Specifically, we aim to examine features of peer groups related to two important goals in adolescence: the goals for social status and belongingness (e.g., Buhrmester, 1990; Cillessen & Rose, 2005; Coleman, 1961; Rubin et al., 2006). On the one hand we will examine the vertical order of relations in peer groups: adolescents' *relative social status* (perceived popularity) compared to other peer group members as a moderator of peer influence processes in the realm of delinquency. On the other hand, we aim to examine the horizontal connections between group members: *structural cohesion* among peer group members (i.e., the extent to which members of a peer group are connected to one another) as a moderator.

Peer Influence Processes

Two important goals for adolescents are social status and belonging. Social status, or perceived popularity, has shown to be of great importance in adolescence (Buhrmester, 1990; Cillessen & Rose, 2005; Jarvinen & Nicholls, 1996; Ojanen et al., 2005). Those with higher status are seen as more attractive for affiliation and have

the ability to exert power and influence over other individuals (Adler & Adler, 1998; Dijkstra et al., 2010; Eder, 1985; Merten, 1997; Parkhurst & Hopmeyer, 1998). Belongingness is of fundamental importance for adolescents to gain social support, become accepted, and for their social-emotional development (Baumeister & Leary, 1995; Buhrmester, 1990; Coleman, 1961; Juvonen, 2006; Newman et al., 2007; Rubin et al., 2006). Finding a place among peers reduces feelings of loneliness, is related to being more sociable and having higher self-esteem, and can prevent negative feelings such as anxiety and depression. An important way to achieve social status and belongingness is by imitating the behavior of high status others and conforming to other peer's behavior.

Social Status

Adolescents attain status, or become popular, by displaying peer-valued characteristics associated with status, such as athletic ability, physical attractiveness and academic performance (e.g., Adler & Adler, 1995; 1998; Cairns & Cairns, 1995; Dijkstra et al., 2009; Eder & Parker, 1987), as well as displaying risky behaviors (Dijkstra, Lindenberg, & Veenstra, 2007; Dijkstra et al., 2009). Studies have shown that behaviors relevant to peer influence, such as delinquency, are associated with having high social status among peers (e.g., Allen, Porter, McFarland, Marsh, & McElhaney, 2005; Dishion, Poulin, & Burraston, 2001; Mayeux, Sandstrom, & Cillessen, 2008; Pattiselanno, Dijkstra, Steglich, Vollebergh, & Veenstra, 2015). Conversely, adolescents displaying lower levels of risky behaviors have on average lower social status than adolescents who engage more in risky behaviors.

Although adolescents with lower social status are less likely to display risky behavior, they may be more prone to be influenced in those behaviors, not only because higher status individuals can exert power and thus influence what lower status peers do, but also because lower status adolescents can be motivated to change their behavior to attain high status themselves (Cialdini & Richardson, 1980; Dijkstra et al., 2010). Other adolescents can increase their own social status by imitating peers who already have high status and bask in their reflected glory. By mimicking the behavior of popular others, adolescent have the chance to become popular themselves. This way, adolescents with higher social status tend not only to actively influence others, but also become role models to their peers and passively evoke imitation of their behavior by their peers.

Thus, if high status adolescents in peer groups display delinquent behavior, other peer group members, particularly the lower status ones, may imitate them. Higher status peer group members might function as role models who set the

norms and consequently evoke a tendency particularly in those lower in status to imitate their delinquent behavior. Accordingly, we expect susceptibility to peer influence in delinquency to be especially strong for adolescents with relatively lower social status in the peer group compared to the status of other peer group members, yielding stronger social mimicry of higher status members, compared to adolescents with relatively higher social status in the peer group (Hypothesis 1).

Cohesion

Besides imitation of high status peers, conforming to peers' behavior in general is an important factor for achieving the goal of belonging. Conforming to "correct" behavior makes acceptance and belonging more likely (Coleman, 1961; Horne, 2001). A way by which individuals can conform to desirable behavior is by observing and imitating the behavior of others (Bandura & McClelland, 1977; Cialdini et al., 1991; Keizer, Lindenberg, & Steg, 2008). Particularly in new or ambiguous situations, observing behavior is an important means of behavioral conformity. If a context approves of deviant behavior and considers it the norm, individuals will be more likely to imitate that behavior (Akers, 1977; 2009; Sutherland et al., 1992). Particularly in adolescence, deviant behavior such as delinquency becomes more normative (Moffitt, 1993), and thus has a higher chance of being imitated. However, there may be differences in imitating peers, depending on how cohesive (individuals in) peer groups are.

In some groups, all adolescents interact regularly and are interconnected, resulting in more cohesive groups. In other peer groups, adolescents do not always interact regularly with each other, making the group more loose-knit. How well individuals in a peer group are interconnected could strengthen the transmission of norms, rules, and behavioral conformity, because cohesion facilitates and regulates information flow among peer group members (Horne, 2001). In a cohesive peer group, group members of the same individual also consider each other as peer group members, and can thus compare (and double-check) what behavior is considered desirable in the group. Because belonging to the peer group, gaining social approval, and avoiding social rejection is important for adolescents (e.g., Brown, 1990; Brown, 2004; Coleman, 1961), it becomes even more likely that they are influenced by other peer group members when behaviors regarded as desirable in that group are highly salient. Adolescents in cohesive peer groups will thus feel a stronger urge to conform to desirable behavior than adolescents in more loose-knit peer groups (Kreager, Rulison, & Moody, 2011).

Thus, adolescents are often confronted by new contexts and situations, wherein conforming to desirable behavior such as delinquency helps them find a place of belonging and acceptance. When desirable behavior becomes highly salient, conforming and imitating those behaviors is even more likely. Hence, the pressure to conform is likely to be higher in cohesive peer groups than in more loose-knit peer groups. Following this reasoning, we hypothesize that adolescents are more susceptible to peer influence in delinquency in more cohesive peer groups than in more loose-knit peer groups (Hypothesis 2).

The Present Study

To our knowledge this study is the first to examine the effect of social status and cohesiveness in peer groups on peer influence processes in those groups. We attempt to make a first step in exploring features in groups that may enhance or inhibit the proliferation of delinquency among adolescent peer groups. Because peer groups might differ (greatly) in size and research has shown that clustering of behavior can also be influenced by the number of sources of social influence (Latané, 1981), we control for the number of peer group members (peer group size) in our analyses.

Furthermore, relative social status and structural cohesion are based on the perceptions of individuals in the peer group. That is, adolescent's relative social status is based on one's individual status (as a reputational measure) relative to the average status of others in their peer group, as perceived by the individual, whereas peer group cohesion refers to the extent to which the different peer group 'members', as identified by the adolescent, are interconnected among each other. Analyses will be conducted with stochastic actor-based modeling (RSiena; Snijders et al., 2010) using a large longitudinal sample of adolescent boys and girls. Examining peer group characteristics and relations within peer groups can help to gain insight into how proliferation of delinquency via peer influence is affected when considering this context and its relations.

Method

Participants and Procedure

Data stem from the SNARE (Social Network Analysis of Risk behavior in Early adolescence) project; a longitudinal project on the social development of early adolescents with a specific focus on adolescents' involvement in risk behavior. Two secondary schools were asked and willing to participate: One in the middle and the

other in the north of the Netherlands. Subsequently, all first- and second-year secondary school students from these schools were invited to enroll in SNARE (2011-2012). All eligible students and their parents received an information letter, asking for their participation. If students wished to refrain from participation, or if their parents disagreed with their children's participation, they were requested to send a reply card or email within ten days. One year later (2012-2013) all new first year students were again approached for participation in the study. In total, 1,826 students were approached for this study, of which 40 students (2.2%) declined to participate for various reasons, for example, the parent and/or adolescent had no interest, the adolescent was dyslectic, or it was too time consuming. A total of 1,786 students participated in SNARE (50.1% male, 83.9% Dutch).

Pre-assessment took place in September 2011, just as students entered the first or second year of secondary school. This was followed by three regular measurement waves in October, December, and April. For the present study we used data from the first three regular waves (October, December, and April) of both first- and second-year students. Of all 1,786 students who participated in the data collection, we focused on the first cohort (students enrolled in SNARE in 2011-2012), resulting in a subsample of 1,309 students (49% boys). The mean age of the sample was 13.19 (ranging from 11 to 15, $SD = .71$). Of the respondents, 13.1% followed pre-vocational education with a practical-oriented pathway (VMBO-bg), 14.8% followed pre-vocational education with a theoretical-oriented pathway (VMBO-th), and 60.6% followed pre-university/senior general secondary education (HAVO/VWO). One of the two schools in SNARE runs at four 'locations', each with its own school management, that can be considered as independent schools. We thus had two schools at five school locations and therefore refer to 'school locations' instead of schools when we discuss our sample and data.

During the assessments a teacher and research assistants were present. The research assistant briefly introduced the questionnaire containing both self-reports as well as peer nominations, which the students filled in on the computer in class. Data were collected via the questionnaires using CS socio software (www.sociometric-study.com) developed especially for this study and allowed students to fill in sociometric questions. The assessment of the questionnaires took place during regular lessons in approximately 45 minutes. Any students absent on the day were assessed within a month, if possible. The anonymity and privacy of the students were guaranteed. The study was approved by the Internal Review Board of one of the participating universities.

Measures

Peer group networks. Peer group networks were derived from unlimited nominations in school locations, across classes and grades on the items ‘Who are your best friends?’ and ‘Who are part of the group you hang out with the most?’ Nominations for both questions were used to construct networks per school location, covering grades 1 and 2. Whereas peer networks are generally derived from peer nominations regarding (best) friends (see Veenstra et al., 2013), using the second item as well allowed us to construct networks that include all individuals who are part of an adolescent’s more intimate peer group. For this, friendship and “group” networks were merged into a single network. The nominations for both questions were summed per individual and a total score of 2 was recoded into 1, resulting in one big network covering both friendship and group-membership nominations. About 75% of the individuals an adolescent socializes with are also their best friends and 25% are not considered best friends, but are part of their peer group.

Peer group size was determined by the number of peers who an adolescent nominated in the peer group networks. This resulted in an average size of 8.67 ($SD = .94$) adolescents. This number is in line with other studies (e.g., Bagwell, Coie, Terry, & Lochman, 2000; Gest, Farmer, Cairns, & Xie, 2003). Although other studies have found peer group sizes averaging five to six (e.g., Espelage, Holt, & Henkel, 2003; Farmer et al., 2002; Ryan, 2001), this may be attributed to differences in the context in which the questions were asked (class versus school) or the measures themselves (e.g., friendship versus group-membership questions).

Relative social status. First, *individual status* was assessed by individual proportion scores calculated from the number of in-class nominations received to the questions ‘Who is most popular?’ and ‘Who is least popular’. Proportional scores were then calculated by dividing the total number of nominations received by the number of nominating classmates for both measures, and subtracted from one another (most popular – least popular). This resulted in a reputational measure of social status for each individual (see Cillessen & Rose, 2005).

Next, we calculated the *peer group’s average status* among adolescents in those “peer groups”. For this, the peer group is based on peer group networks, in which group ‘members’ are identified by the adolescent (i.e., a nomination). The peer group is thus based on an individual adolescent’s perspective. Adolescents’ *relative social status* was based on an individual’s status minus the average status of all individuals in the peer group, resulting in negative scores (indicating that one’s

status is lower than the average status of the peer group), zero scores (one's status is similar to the average status of the peer group), and positive scores (one's status is higher than the average status of the peer group).

Structural cohesion. We used peer group network nominations to identify relevant relations between individuals in a peer group. Cohesion was then calculated as the clustering coefficient (local density) of each adolescent's peer group (excluding the respondent him/herself), indicating the degree to which all other individuals to whom an adolescent is related nominated each other as peer group members, ranging from 0 (loose-knit) to 1 (cohesive peer groups) (Borgatti et al., 2013, p. 156). The average level of structural cohesion ranged from .50 to .52 (*SD* range from .03 to .06) across all school locations.

Delinquency (T1/T2/T3). Self-reports were used to assess delinquency (17 items) (Nijhof, Scholte, Overbeek, & Engels, 2010; Van der Laan, Veenstra, Bogaerts, Verhulst, & Ormel, 2010). We asked students how often they had been involved in different types of delinquency in the last month, covering a wide range of behaviors such as theft, vandalism, aggression, weapon use and weapon carrying, truancy, contact with police, and fare dodging (see Appendix 3.1). The internal consistency of this measure of delinquency ranged from $\alpha = .82$ to .92. Answer categories were measured on a five-point scale; never (0), 1-3 times (1), 4-6 times (2), 7-12 times (3), and more than 12 times (4). Answers were subsequently dummy-coded into no (0) or yes (1) and summed, resulting in variety scores for delinquency. This indicates the extent to which adolescents had been involved in various delinquent acts in the last month. Subsequently, these scores were categorized into no acts (0), one act (1), two acts (2), and more than two acts (3), because RSiena does not allow for the use of continuous dependent variables at this moment (Ripley et al., 2014). The average level of delinquency ranged from .48 to .58 across all school locations (*SD* range from .92 to 1.02).

Analytical Strategy

Longitudinal social network modeling (SIENA in R, version 1.1.286; Steglich, Snijders, & Pearson, 2010) was used to examine the proliferation of delinquency in adolescent peer group networks. SIENA models the co-evolution of social networks and behavior over time, while controlling for structural network effects (Ripley et al., 2014). In so doing, SIENA can untangle influence processes (behavioral dynamics) from selection processes (network dynamics) regarding delinquency.

In our models, we added commonly used structural network effects and other network effects to best capture the peer group structure and come to a good

fit of the model (Ripley et al., 2014; Veenstra et al., 2013). Specifically, we included the following effects to control for structural network effects and improve model fit: *outdegree/density* (tendency to create relations), *reciprocity* (tendency to reciprocate a peer group network nomination), *transitive triplets* (tendency that when a respondent nominates two others in the peer group network, number one in the network also nominates number two; in case of friendships often referred to as the tendency that “friends of a friend are my friends”), *transitive reciprocated triplets* (tendency for triads to reciprocate peer group network nominations), *three cycles* (tendency for a (non-) hierarchical structure), *indegree popularity* (tendency for those who receive many peer group network nominations to receive extra nominations), *indegree activity* (activity of popular individuals; nominating others in the peer group network when being nominated often oneself), *outdegree activity* (activity of active individuals; nominating more others in the peer group network when already nominating often oneself), and *truncated outdegree* (sinks; individuals who nominate no one).

We also controlled for selection effects by examining whether boys nominate (*gender ego*) and were nominated (*gender alter*) more often than girls, and whether students of the same gender were more likely to select each other in the peer group network (gender homophily; measured with the *same-gender* effect). Similarly, we examined whether students in the same class (class homophily; measured with the *same-class* effect) or same grade (grade homophily; measured with the *same-grade* effect) selected each other more often than students in different classes or grades. Furthermore, we controlled for whether more delinquent students nominate (*delinquency ego*) and were nominated (*delinquency alter*) more often than less delinquent students, and whether students tended to select each other when they had similar levels of delinquent behavior (delinquency homophily; measured with the *ego x alter selection* effect).

We tested our main hypotheses separately for relative social status and structural cohesion in two steps. First, we included several behavioral dynamic effects that model changes in delinquency (Models 1). The *linear shape* effect modeled the overall tendency toward delinquency, whereas the *quadratic shape* parameter modeled the feedback effect of delinquency on itself, resulting in either regression to the mean (negative parameter) or polarization (positive parameter). In the behavioral part of the models we also controlled for the tendency that boys are more likely than girls to score highly on delinquent behavior (*effect from gender*), that students in higher grades are more likely to score highly on delinquent

behavior than students in lower grades (*effect from grade*), and that students in larger peer groups are more likely to score highly on delinquent behavior than students in smaller peer groups (*effect from peer group size*). Delinquency influence (*average alter*) examined whether there was a tendency for adolescents for whom peer group network relations had a higher score on delinquency also tended to develop higher levels of delinquency themselves over time (or vice versa).

Next, we included the main effects of relative social status, structural cohesion and their interaction with delinquency influence, respectively, to test our hypotheses (Models 2). The main effect of relative social status modeled the tendency that students with higher relative social status were more likely to score highly on delinquent behavior than students with a lower relative social status or vice versa (*effect from relative social status*). For models with relative social status we also controlled for the tendency that students with a higher individual status are more likely to score highly on delinquent behavior than students with a lower individual status (*effect from individual status*), and that students who ‘reside’ in a peer group with higher status are more likely to score highly on delinquent behavior than students who reside in a peer group with lower status (*effect from peer group status*). The main effect of structural cohesion modeled the tendency that students who resided in a more cohesive peer group were more likely to score highly on delinquent behavior than students who resided in a more loose-knit peer group or vice versa (*effect from structural cohesion*). The interaction between the main effect of relative social status and influence in delinquency examined the hypothesis whether peer influence in delinquency was especially strong for adolescents with a relatively lower social status in the peer group compared to adolescents with a relatively higher social status in the peer group. The interaction between the main effect of structural cohesion and influence in delinquency examined the hypothesis whether peer influence in delinquency was more likely in more cohesive peer groups than in more loose-knit peer groups. We combined the results of the separate analyses per school location in a meta-analysis using the *siena08* function in *RSiena* (Ripley et al., 2014; Snijders & Baerveldt, 2003).

Examining the goodness of fit (GoF) of our models allowed us to test if the observed scores at the end of a period were congruent with the simulated values for the end of that period (Lospinoso, 2012; Ripley et al., 2014). This way, we could see whether structures in the network and the behavior are properly captured with the fitted models. We assessed the indegree distribution, outdegree distribution, geodesic distribution, and triad census for the peer group networks. For

delinquency, we assessed Moran's I and the behavior distributions. When the GoF of models with a given set of parameters was poorly estimated, we included additional parameters to obtain a better fit. We also removed parameters that did not significantly add to the model to see how that affected the GoF. Going back and forth, including and excluding parameters, we tried to end up with a parsimonious model that showed the best possible fit (GoF statistics per school location and fit plots available upon request). The results of the overall GoF estimation across all five school locations showed a good fit of the models for the indegree, outdegree, and geodesic distributions ($p = .35, .26, \text{ and } .28$ respectively). Triadic structures were more difficult to fit properly ($p < 0.01$), but the current models offer the best possible fit for the data. Furthermore, the Moran's I distributions and the behavioral distributions for delinquency both showed a very good fit ($p = .36, \text{ and } .55$ respectively).

Results

Descriptive Statistics

Table 3.1 provides descriptive information about the sample, status and cohesion measures, network characteristics, and delinquency. For ease of reading, we refer to peer group members when we discuss the results regarding peer group network relations. About half the sample consisted of boys, and 52 percent of the respondents were in the second grade of secondary education. As for the peer group network, about 4% of all respondents at their school location were nominated as peer group members across the three waves, and between 51% and 63% of relations with peer group members were reciprocated. The degree to which peer group members showed similar delinquent behaviors was relatively low, but positive (*Moran's I* = .08, .10, and .08, *SD* = .05 respectively). The Jaccard index indicated that about half the relations between peer group members were stable. Delinquency among adolescents was also quite stable (70%) for both periods, and there was a positive correlation for delinquency between the time points ($r_{\text{Fall-Winter}} = .53, p < .05, r_{\text{Winter-Spring}} = .61, p < .05, \text{ and } r_{\text{Fall-Spring}} = .49, p < .05$).

Furthermore, correlations were found for the same waves between peer group size and relative social status (Table 3.2). Peer group size was positively related to relative social status ($r = .10 \text{ to } .12, p < .01$), indicating that adolescents in larger peer groups had relatively higher social status than adolescents in smaller peer groups. Peer group size and relative social status correlated negatively with structural cohesion, suggesting that group-membership relations among

Table 3.1. Descriptive Statistics of the Sample, Network Characteristics, and Delinquency

	Time 1 (Fall)	Time 2 (Winter)	Time 3 (Spring)
	Est. (SD)	Est. (SD)	Est. (SD)
<i>Sample</i>			
Boys (proportion)	.49 (.05)	.49 (.05)	.49 (.05)
Age	13.22 (0.71)	13.45 (0.76)	13.78 (0.76)
Grade 2 (proportion)	.52 (.04)	.52 (.04)	.52 (.04)
Peer group status	.07 (.02)	.09 (.01)	.09 (.02)
Relative social status	-.06 (.01)	-.06 (.01)	-.06 (.01)
Structural cohesion	.50 (.05)	.50 (.03)	.52 (.06)
<i>Peer group network</i>			
Peer group size (nominations given) (Mean, SD)	8.79 (1.00)	9.13 (1.13)	8.62 (0.90)
Nominations received (Mean, SD)	8.67 (0.94)	8.83 (1.18)	8.32 (0.95)
Density (proportion)	.04 (.02)	.04 (.01)	.04 (.01)
Reciprocity (proportion)	.56 (.06)	.51 (.07)	.63 (.08)
Missing (proportion)	.01 (.01)	.03 (.02)	.04 (.02)
<i>Delinquency (proportion)</i>			
0	.71 (.09)	.70 (.05)	.69 (.04)
1	.14 (.04)	.13 (.02)	.13 (.02)
2	.06 (.04)	.07 (.01)	.05 (.02)
3	.09 (.03)	.11 (.04)	.13 (.03)
Missing	.04 (.03)	.06 (.03)	.08 (.04)
Network autocorrelation			
Moran's <i>I</i>	.08 (.05)	.10 (.05)	.08 (.05)
<i>Transitions/Change</i>			
	Fall – Winter	Winter - Spring	
Peer group relations			
Distance	1483 (945)	1494 (977)	
Jaccard	.52 (.03)	.50 (.04)	
Delinquency			
Decrease (proportion)	.13 (.05)	.14 (.04)	
Increase (proportion)	.17 (.04)	.16 (.03)	
Stable (proportion)	.70 (.06)	.70 (.05)	

Table 3.2. Correlations Between Peer Group Size, Relative Social Status, Structural Cohesion, and Delinquency

	2	3	4	5	6	7	8	9	10	11	12
1. Peer Group Size T1	.55**	.45**	.12**	.07*	.09**	-.08**	-.10**	-.16**	.03	-.00	-.00
2. Peer Group Size T2		.49**	.14**	.10**	.08**	-.06*	-.11**	-.13**	-.03	.05	.02
3. Peer Group Size T3			.10**	.10**	.12**	-.08**	-.09**	-.10**	-.01	-.00	.04
4. Relative Social Status T1				.73**	.62**	-.16**	-.17**	-.14**	.09**	.09**	.05
5. Relative Social Status T2					.73**	-.18**	-.16**	-.13**	.03	.09**	.07*
6. Relative Social Status T3						-.17**	-.20**	-.16**	.04	.08**	.06*
7. Structural Cohesion T1							.50**	.43**	-.11**	-.11**	-.10**
8. Structural Cohesion T2								.51**	-.10**	-.09**	-.12**
9. Structural Cohesion T3									-.04	-.09**	-.06*
10. Delinquency T1										.54**	.52**
11. Delinquency T2											.61**
12. Delinquency T3											

Note. ** $p < .01$; * $p < .05$.

adolescents in larger peer groups were less cohesive than relations among adolescents in smaller peer groups ($r = -.08$ to $-.11$, $p < .01$) and that adolescents with relatively high social status resided in more loose-knit peer groups than in cohesive peer groups ($r = -.16$, $p < .01$). All these correlations were statistically significant, but not very strong.

With regard to delinquency, peer group size did not relate to delinquency. There was a positive relationship between an adolescent's relative social status and delinquency ($r = .06$ to $.09$, $p < .05$). Adolescents with relatively high social status compared to others in the peer groups were more delinquent than those with relatively low social status. Lastly, structural cohesion was related to less delinquency ($r = -.06$ to $-.11$, $p < .05$). Adolescents in cohesive peer groups were less delinquent than adolescents in loose-knit peer groups.

Peer Group Network Dynamics

Table 3.3 summarizes the meta-analysis of the five school locations for the effect of relative social status and structural cohesion on influence in delinquency. Peer group network effects showed a low density in the network (*outdegree*; $b = -1.94$, $p < .001$), which implies that respondents were selective as to whom they nominated as members of their peer group (Models 1). Respondents also tended to reciprocate peer group-membership nominations (*reciprocity*; $b = 2.23$ and 2.25 , $p < .001$), nominated peer group members of peer group members as their own peer group members (*transitive triplets*; $b = .41$, $p < .001$), but tended not to reciprocate group-membership nominations in triads (*transitive reciprocated triplets*; $b = -.28$ and $-.29$, $p < .001$). In line with this, there also was a tendency for a hierarchical ordering in the network (*three cycles*; $b = -.09$ and $-.08$, $p < .001$), of those who were often nominated as a peer group member to also nominate many others as peer group members (*indegree activity*; $b = -.80$ and $-.83$, $p < .001$), and of not nominating anyone as a peer group member (*truncated outdegree*; $b = -2.27$ and -2.18 , $p < .001$). Furthermore, the gender-homophily effect indicated that there was a tendency for same-gender peers to select each other as peer group members ($b = .69$, $p < .001$). Similarly, respondents in the same grade (*grade homophily*) or same class (*class homophily*) were more likely to select each other as peer group members than respondents who were not in the same grade or class ($b = .40$, $p < .001$, and $b = .74$, $p < .001$ respectively). Respondents in higher grades were more likely to be nominated as peer group members than respondents in lower grades (*grade alter*; $b = .20$, $p < .001$), and respondents in lower grades tended to nominate more peer group members than respondents in higher grades (*grade ego*;

Table 3.3. RSiena Meta-Analysis of Network and Behavioral Dynamics for Delinquency and the Moderating Effect of Relative Social Status and Structural Cohesion on Delinquency Influence

	Relative Social Status		Structural Cohesion	
	Model 1 <i>b</i> (<i>SE</i>)	Model 2 <i>b</i> (<i>SE</i>)	Model 1 <i>b</i> (<i>SE</i>)	Model 2 <i>b</i> (<i>SE</i>)
<i>Peer group network dynamics</i>				
Density	-1.94*** (.44)	-1.99*** (.46)	-1.94*** (.46)	-2.00*** (.45)
Reciprocity	2.23*** (.08)	2.27*** (.09)	2.25*** (.10)	2.25*** (.09)
Transitive triplets	.41*** (.02)	.41*** (.02)	.41*** (.02)	.41*** (.02)
Transitive reciprocated triplets	-.28*** (.02)	-.29*** (.02)	-.29*** (.02)	-.28*** (.02)
Three cycles	-.09*** (.02)	-.09*** (.01)	-.08*** (.01)	-.09*** (.01)
Indegree popularity (sqrt)	.02 (.06)	.04 (.05)	.03 (.05)	.03 (.05)
Indegree activity (sqrt)	-.80*** (.14)	-.82*** (.12)	-.83*** (.12)	-.80*** (.11)
Outdegree activity (sqrt)	.05 (.04)	.07 ⁺ (.04)	.06 (.04)	.06 ⁺ (.04)
Truncated outdegree	-2.27*** (.42)	-2.23*** (.42)	-2.18*** (.42)	-2.23*** (.42)
Gender alter (receiver effect)	.07 (.05)	.07 (.05)	.07 (.05)	.07 (.05)
Gender ego (sender effect)	-.10 (.07)	-.10 (.07)	-.10 (.07)	-.09 (.07)
Gender homophily	.69*** (.11)	.69*** (.11)	.69*** (.11)	.69*** (.11)
Grade alter (receiver effect)	.20*** (.04)	.20*** (.04)	.20*** (.04)	.20*** (.04)
Grade ego (sender effect)	-.15* (.06)	-.15* (.06)	-.14* (.06)	-.14* (.06)
Grade homophily	.40*** (.10)	.40 (.10)	.40*** (.10)	.41*** (.10)
Class homophily	.74*** (.19)	.75 (.19)	.74*** (.19)	.74*** (.19)
Delinquency alter (receiver effect)	-.02 (.02)	-.02 (.02)	-.02 (.02)	-.02 (.02)
Delinquency ego (sender effect)	.02 (.02)	.02 (.02)	.02 (.02)	.02 (.01)
Delinquency homophily	.06*** (.02)	.06** (.02)	.06*** (.02)	.06** (.02)
<i>Delinquency dynamics</i>				
Linear shape	-1.62*** (.13)	-1.63*** (.12)	-1.62*** (.13)	-1.63*** (.13)
Quadratic shape	.66*** (.03)	.65*** (.03)	.67*** (.03)	.65*** (.03)
Effect from gender (boy = 1)	.21*** (.07)	.21** (.08)	.19** (.06)	.21** (.06)
Effect from grade	.12* (.06)	.10+ (.06)	.12* (.06)	.09 (.06)
Effect from peer group size	.004 (.010)	.004 (.010)	.004 (.004)	.004 (.010)
Delinquency influence	.35* (.14)	.35* (.15)	.43** (.13)	.43** (.14)
Effect from individual status	.13 (.12)	.20 (.61)		
Effect from peer group status	.45* (.21)	.39 (.64)		
Effect from relative social status		-.13 (.64)		
Delinquency influence x relative social status		.84 (.62)		
Effect from structural cohesion				-.46 (.46)
Delinquency influence x structural cohesion				.06 (.59)

Note. ⁺ $p < .1$. ; * $p < .05$; ** $p < .01$; *** $p < .001$.

$b = -.15, p < .05$). Lastly, respondents who showed higher levels of delinquency were not nominated more often as peer group members and did not nominate more peer group members, but it was more likely for respondents with similar levels of delinquency to be peer group members, than respondents with different levels of delinquency (*delinquency homophily*; $b = .06, p < .001$).

Delinquency Dynamics

With regard to the behavioral dynamics, we found that adolescents had a low tendency toward delinquency (*linear shape*; $b = -1.62, p < .001$), but those with a higher score on delinquency were more likely to have higher scores for delinquency over time, and vice versa (*polarization*; *quadratic shape*; $b = .66$ and $.67, p < .001$). Furthermore, boys tended to score higher on delinquency than girls (*effect from gender*; $b = .21$ and $.19, p < .001$). The same holds for grade; respondents in higher grades had a stronger tendency to score highly on delinquency than respondents in lower grades (*effect from grade*; $b = .12, p < .05$). Peer influence in delinquency was positively present in all models ($b = .35, p < .05$ and $b = .43, p < .01$). Model 1 for relative social status also shows that individuals in peer groups with higher group status scored higher on delinquency than individuals in peer groups with lower group status (*effect from peer group status*; $b = .45, p < .05$). However, no moderating effect of either relative social status (Hypothesis 1) or structural cohesion (Hypothesis 2) on delinquency influence was found (Models 2). Although adolescent's delinquency was influenced by peer group members' delinquency, susceptibility to peer influence was not more likely for adolescents with a relatively low social status compared to adolescents with a relatively high status, or when the peer group was more cohesive.

Discussion

Although it is known that peers become an increasingly important factor of influence during adolescence, the conditions that enhance or inhibit peer influence in delinquency are relatively unexplored. Structural features of (individuals in) peer groups might steer group dynamics into a situation where peer influence in delinquency becomes more or less likely. In this study we examined such features as the extent to which an adolescent's relative social status compared to peer group members and cohesion among peer group members. More specifically, we examined whether susceptibility to adolescent influence in delinquency depended on relative social status and structural cohesion among peer group members.

We expected that adolescents with relatively low social status would be more susceptible to peer influence than adolescents with relatively high social status, because popular peer group members are likely to evoke social mimicry among those lower in status. Lower status group members may want to bask in the reflected glory of high status peer group members. Furthermore, we expected peer influence to be stronger for adolescents who resided in a structurally cohesive peer group rather than a loose-knit peer group, because cohesive peer groups offer more clarity on desirable behavior, and pressure to conform to that behavior is stronger.

Similar to other studies focusing on friendship (e.g., Burk et al., 2008; Haynie et al., 2014; Kerr et al., 2012; Svensson et al., 2012; Weerman, 2011), we consistently found a positive influence effect of delinquency among adolescents in the peer group networks. This indicates that peer influence in delinquency transcends friendships, whereby also individuals who are part of the group an adolescent hangs out with most often are influential factors for adolescents' delinquency. However, we found no moderating effect of the examined structural features of (individuals in) peer groups, that is, relative social status and structural cohesion, on peer influence in delinquency. In this study it does not look like adolescents with low relative social status are more susceptible to peer influence than adolescents with relatively high social status, or that adolescents in a structurally cohesive peer group are more susceptible than adolescents in a loose-knit peer group.

Researchers do raise the question whether peer influence could be moderated by individual or contextual characteristics (see Veenstra et al., 2013), but studies examining moderation are relatively scarce, although modeling moderation with regard to peer influence can be investigated quite well. The fact that only a few studies find moderation on peer influence might lead to the conclusion that peer influence in adolescence is more generally applicable across different contexts and situations than thought to be. If so, then studies examining the fundamentals of selection and influence in adolescence already offer quite a complete image of what happens, and moderation might be hard to find simply because it is not so common.

However, there could also be other reasons why we found no moderating effect of relative social status on the susceptibility to influence in delinquency. For one, our measure of delinquent behaviors differentiates little with regard to engagement in delinquency in our sample and it might be interesting to examine a

less extreme scale of deviant behavior in this sample of early adolescents. Secondly, not finding a moderating effect may be related to how motivated adolescents are to attain high social status. Some adolescents might be more motivated than others, depending on their goals. Individuals committed to attaining high social status will be more likely to move to what is helpful to achieve their goal (Caravita & Cillessen, 2012; LaFontana & Cillessen, 2010), and thus will be more likely to imitate the behavior of successful, high status others in the peer group, as argued before. However, those who do not aim (so strongly) at status will be less inclined to conform to the behavior of high status others. For example, Hurrelmann and Engel (1992) showed that adolescents' delinquency was related to goals for prestige and success. Other studies on antisocial behavior showed similar results, where behavior was particularly related to one's goals for prestige in terms of popularity or status (Sijtsema, Veenstra, Lindenberg, & Salmivalli, 2009). Thus, to fully grasp when social status or popularity relates to susceptibility to peer influence, studies should also consider possible differences in status motivation or goals that adolescents might have.

Other studies also suggest that not all individuals are likely to be influenced in behaviors associated with high status peers, but by more general normative group behavior that is not necessarily related to high status or popularity (Dishion et al., 2001; Killeya-Jones, 2007). Perhaps in some peer groups, high status adolescents are role models only for some, such as individuals who desire high status themselves. This may relate to why a moderating effect of structural cohesion was missing. Some individuals in peer groups might be inclined to follow a different behavioral norm than others, because of differences in individual norm salience in different peer groups. Research has, for example, shown that the impact of behavioral norms depends on whether that norm is important for an individual (Cialdini et al., 1991). When behavior is unimportant or irrelevant to an individual, it is unlikely that they will conform to that behavior. Although adolescents in cohesive peer groups would be more likely to agree upon behavioral norms, that does not mean that the same behavior is salient for each individual in the group. Another explanation for not finding a moderating effect of structural cohesion is that adolescents in our sample were embedded in the peer group network in a similar way, resulting in a very low variance in cohesion. Testing our hypothesis in a sample with more variations or extremes regarding cohesiveness between adolescents in the peer group network would be more informative when examining the effect of structural cohesion on adolescents' delinquency.

This study and its analyses regards peer influence as ‘modeling observed behavior’, which might be seen as following descriptive norms. Where descriptive norms clearly demonstrate how others act in specific situations (Bandura & McClelland, 1977; Cialdini et al., 1991; Keizer et al., 2008), it is also likely that individuals will conform to a norm when it is supported by a general indication of what others approve or disapprove (i.e., injunctive norms) (Cialdini et al., 1991; Reno, Cialdini, & Kallgren, 1993). Especially focal injunctive norms have shown to induce norm-conforming behaviors because they are relevant to a wide range of settings. Thus, accounting for individual differences in norm salience might give a better understanding of the underlying mechanisms that differentiate between susceptibility to peer influence in adolescent peer groups.

Furthermore, in our analyses, relative social status and structural cohesion are endogenous to the peer group network, thus officially violating the model assumptions (exogenous variables). However, this makes the tests reported in our study statistically conservative. If peer groups change a lot, we may have captured the wrong peer group members for assessing influence, in which case the estimated moderators likely underestimate the true effects. If the groups are very stable, our estimates are accurate. Given that we found no moderating effects, we are certain that our findings deal with true effects and we are confident that we stay on the safe side in drawing our conclusions.

Limitations and Suggestions for Future Research

We consider the perception an adolescent has of who belongs to their peer group to contain most individuals who can influence their delinquent behavior, but possibly someone not identified as a peer group member can influence the adolescent through this person’s effect on the group’s social norm. Measures that specifically identify peer groups are often based on finding unique (non-overlapping) groups of individuals and analyses with those measures also take into account individuals that an adolescent might not have nominated as a group member him- or herself (Cairns, Perrin, & Cairns, 1985; Kreager et al., 2011; Moody, 2001; Richards & Rice, 1981). However, the external validity of other measures, such as NEGOPY, RNM, Social Cognitive Maps, or Moody’s CROWDs routine has not been consequently assessed. It is thus difficult to determine which individuals actually do have an influence on adolescent behavior. It would be insightful to study if the configuration of peer groups as determined by various statistical methods matches reality.

Furthermore, we do not assess the underlying mechanisms that affect how relative social status and structural cohesion relate to influence in delinquency. As mentioned before, the motivation or goal directedness of adolescents might have an effect on how inclined they are to conform to certain behavior. Similarly, it is not clear which social norms are salient for an individual in a peer group. Therefore, future studies should also focus on testing goals and norms, to enable determining how social status and cohesion actually relate to the proliferation of delinquency in peer groups.

Conclusion

Our study is the first to consider structural features of (individuals in) peer groups as moderating factors of peer influence in a longitudinal framework. Our findings are in line with many other studies; there is clear evidence for peer influence in delinquency. However, our results do not show that peer influence in delinquency was moderated by relative social status or structural cohesion. This may be due to other underlying mechanisms, such as differences in individual goals or norm conformity, but it is also possible that peer influence in delinquency occurs in a wide range of settings. Our findings thus strengthen the pervasive nature of peer influence processes.

Appendix 3.1. Delinquency items

Question (In the last month)

How often have you stolen a bike or moped?

How often have you stolen something from a store (shoplifting)?

How often have you stolen something else (not a bike or something from a store) worth less than 25 euros?

How often have you stolen something else (not a bike or something from a store) worth more than 25 euros?

How often have you bought or sold anything that you suspected was stolen?

How often have you purposely damaged or wrecked something on the streets, such as walls, subway, train, bus shelters, traffic signs, garbage cans?

How often have you purposely damaged or wrecked property belonging to people that you know (at home, from another pupil)?

How often have you purposely damaged or wrecked property that belongs to a school (building, furniture, books, plants)?

How often have you trespassed or broken into a building (we do not mean unoccupied or deserted buildings)?

How often have you purposely set fire to, for example a shed, forest, roadside, basement, or building?

How often have you seriously fought or quarreled with people you do not know (e.g., on a sports field, train station, festival, or in the streets)?

How often have you hit or injured another person by hand, which led to that person having to go to the doctor or get treated for their injury?

How often have you carried a weapon (e.g., a dangerous knife, bat, firearm, brass knuckles)?

How often have you used or threatened someone with a weapon during a fight or quarrel?

How often have you played truant (skipping school)?

How often have you come into contact with the police for doing something you weren't allowed to do?

How often have you traveled on a bus or train without paying (fare dodging)?

CHAPTER 4

Reconsidering Delinquency in Peer Processes: Examining Selection and Influence for Overall Delinquency and Specific Delinquent Acts Using a Two-Mode Network Approach*

* This chapter is co-authored with Christian Steglich, René Veenstra, Wilma Vollebergh, and Jan Kornelis Dijkstra and is currently under review by an international peer-reviewed journal.

Abstract

Interacting and spending time with delinquent peers is one of the strongest predictors of adolescents' own delinquency. With the increasing number of studies examining peer influence in delinquency, one aspect that remains unclear is whether adolescents are influenced in a general range of delinquency or in more specific delinquent acts. Research on selection and peer influence processes in delinquency implicitly assumes these processes to work for delinquency in general rather than for specific delinquent acts. This study tests this assumption by examining both processes with a collapsed measure of different delinquent behaviors versus specific delinquent acts as a two-mode network using longitudinal social network analysis (RSIENA), in a sample ($N = 1,309$, $M_{\text{age}} = 13.19$, boys = 50.1%) from the SNARE study. Selection was found for delinquency in general, but not for some delinquent acts, whereas influence was found for both overall delinquency and some delinquent acts. These findings reveal that selection processes might be best understood by looking at delinquency in general, whereas influence also pertains to some delinquent acts, thus increasing our knowledge of how selection and influence processes in adolescent delinquency work and how they relate to the theories about those processes.

Research has shown that delinquency often occurs in adolescence with the majority of individuals confining their delinquent behavior to this life phase (e.g., Gottfredson & Hirschi, 1990; Hirschi & Gottfredson, 1983; Moffitt, 1993) and peers play a significant role in the origins of this delinquency (Rubin et al., 2006). The introduction of longitudinal social network modeling (stochastic actor-based models) (SIENA models Snijders et al., 2010) has rapidly increased the number of studies specifically examining peer selection and influence processes, to get a better understanding of the effect that peers have on one another (for an overview see Veenstra et al., 2013). These studies reveal that adolescents both select peers based on their level of delinquency (e.g., Knecht et al., 2010; Osgood, Feinberg, & Ragan, 2015; Svensson et al., 2012; Tilton-Weaver et al., 2013) and are influenced by peers in their delinquent behavior (e.g., Burk et al., 2008; Kerr et al., 2012; Osgood et al., 2015; Svensson et al., 2012; Tilton-Weaver et al., 2013; Weerman, 2011).

What all these studies share is the use of a collapsed, overall measure of delinquency containing a wide variety of behaviors, such as theft, vandalism, or violence, each tapping into distinct delinquent acts. When considering selection and influence processes, the underlying assumption is that these processes pertain to delinquency in general rather than to specific delinquent acts. Thus, those who have a high level of delinquency tend to associate with each other or influence others who are not (so) delinquent, without distinguishing the delinquent acts the adolescents are engaged in exactly. The question is whether this assumption is correct or whether selection and influence processes are restricted particularly to the same delinquent acts committed. To our knowledge this study is the first to test this assumption, and to test it rather innovatively by examining delinquency as a two-mode network, thereby deepening our understanding of peer processes in the realm of adolescent delinquency.

Adolescents are likely to affiliate with others with whom they share similar levels of delinquency, but the delinquent acts they commit in common has never been examined. This is surprising, as selection processes are often understood by using the similarity attraction theory (Byrne, 1971). This theory assumes that individuals prefer to associate with similar others (homophily), because they are more predictable, can communicate with less effort, and find trust and belongingness with each other. Although studies on selection processes in delinquency describe homophily as the result of attraction to those who show similar levels of delinquency, one could argue that this similarity attraction principle

should apply particularly to specific, identical, delinquent acts rather than to delinquency in general.

Likewise, an important assumption in research on peer influence is that adolescents are influenced by the delinquency of their peers irrespective of the exact delinquent behaviors their peers engage in. Most studies examining peer influence in delinquency use differential association theory and social learning theory to explain this influence (e.g., Burk et al., 2008; De Cuyper et al., 2009; Haynie et al., 2014; Knecht et al., 2010; Weerman, 2011). According to Sutherland's (1995) differential association theory, individuals learn delinquency and adopt delinquency-favorable attitudes through interacting with delinquent others. Social learning theory adds to this by emphasizing that behavioral modeling and reinforcement of delinquency play important roles in one's own delinquent behavior (Burgess & Akers, 1966). The question then is, if influence in delinquency works mainly through modeling and imitating peer behavior, what behaviors are then mimicked exactly. If one learns from others by observing and copying their behavior, it stands to reason that adolescents copy the same behaviors. For example, it would be more likely that adolescents mimic shoplifting peers by stealing something themselves rather than by vandalizing something. The implication is that peer influence processes do not necessarily pertain to delinquency in general, but to specific delinquent acts, meaning that adolescents imitate same delinquent behavior.

Hence, for a more stringent test of theories on selection and influence processes one should examine these processes for specific, same delinquent acts rather than delinquency in general. We hypothesize that both selection and influence processes in adolescent delinquency apply particularly to specific delinquent acts. Thus, adolescents select peers who show the same delinquent acts (Hypothesis 1) and are influenced by peers with whom they associate in the same delinquent acts (Hypothesis 2).

We test our hypotheses using stochastic actor-based modeling (RSIENA; Ripley et al., 2014; Snijders et al., 2010) in a large longitudinal sample of adolescent boys and girls. Similar to previous research, we first examine selection and influence processes for a collapsed measure of delinquency. Next, we test selection and influence processes for specific delinquent behaviors, by examining delinquent behaviors not as a collapsed measure, but as a two-mode network. In this novel approach delinquent acts are dummy-coded and subsequently treated as a network (Lomi & Stadtfeld, 2014). That is, respondents could either engage in a specific

delinquent act (represented by a relation between respondent and the delinquent act) or not (represented by the absence of a relation between respondent and delinquent act). When respondents who have nominated the same item (both committed the same delinquent act) associate with one another at a later time point, this is considered selection. When peers with whom one associates nominate a specific delinquent act and respondents also nominate this same act over time, this is considered to be influence. Note that if respondents are connected with peers who engage, for instance, in weapon carrying, but they themselves start to engage in theft, this is not considered as influence in a two-mode network. That is, in a two-mode network influence as well as selection are only counted as such when they pertain to the exact same type of behavior. Hence, with this approach, we can actually test similarities between related adolescents for the same delinquent acts with effects that truly correspond to the theory.

Method

Participants and Procedure

Data stem from the SNARE (Social Network Analysis of Risk behavior in Early adolescence) project; a longitudinal project on the social development of early adolescents with a specific focus on adolescents' involvement in risk behavior. Five school locations participated in the SNARE study. Subsequently, all first- and second-year students from these locations were approached for enrollment in SNARE (2011-2012). A year later (2012-2013) all new first year students were again approached for participation in the study. All eligible students and their parents received an information letter inviting the students to participate. If students or their parents wished to refrain from participation, they were asked to send a reply card within ten days. In total, 1,786 students participated in SNARE (83.9% Dutch), and 40 students (2.2%) declined to participate.

For the present study we used data of the first three regular waves (October, December, and April) of both first- and second-year students of the first cohort, a subsample of 1,309 students (50% boys), with a mean age of 13.19 (ranging from 11 to 15, $SD = .71$). Of the participants, 39.4% followed pre-vocational education (VMBO) and 60.6% followed pre-university/senior general secondary education (HAVO/VWO). During the assessments a teacher and research assistants were present. The research assistant briefly introduced the questionnaire, containing both self-reports as well as peer nominations, which the students filled in on the computer in class. Data were collected with CS socio software (www.sociometric-

study.com) developed especially for this study. The assessment of the questionnaires took place during regular lessons in approximately 45 minutes. Any students absent on the day were assessed within a month, if possible. The anonymity and privacy of the students were guaranteed. The study was approved by the Internal Review Board of one of the participating universities.

Measures

Peer networks (T1/T2/T3). Peer networks were derived from unlimited friendship and group-membership nominations in school locations, across classes and grades, on the items ‘Who are your best friends?’ and ‘Who are part of the group you hang out with the most?’ The nominations for both questions were summed per individual and a total score of 2 was recoded into 1, which were used to construct networks per school location. By using both questions we could construct networks that include individuals with whom adolescents have a close relationship and we consider as the most influencing factors. Furthermore, by asking respondents not only about class members, but also about their friends and ‘group’ members outside of class, we could identify important peers both in and outside their class. For the sake of clarity we refer to “peer group” or “peer group members” when discussing the results regarding network dynamics.

Delinquency (T1/T2/T3). Self-reports were used to assess delinquency (11 items) (Nijhof et al., 2010; Van der Laan et al., 2010). We asked respondents how often they had been involved in theft, vandalism, aggressive acts, weapon use and carrying, truancy, fare dodging, and had contact with the police in the last month. The internal consistency of this measure of delinquency ranged from $\alpha = .82$ to $.92$. Answer categories were measured on a five-point scale, running from never (0), 1-3 times (1), 4-6 times (2), 7-12 times (3), to more than 12 times (4). Answers were dummy-coded into no (0) or yes (1) and summed to construct a variety score that measured the extent to which adolescents had been involved in each delinquent act. Subsequently, these scores were categorized into no acts (0), one act (1), two acts (2), and more than two acts (3) in the last month, because SIENA does not allow for the use of continuous dependent variables (Ripley et al., 2014). The average level of delinquency ranged from $.48$ to $.58$ across all school locations (SD range from $.92$ to 1.02).

To create the two-mode network of delinquency, we dummy-coded the separate items into no (0) and yes (1), and created a matrix of items (columns) and respondents (rows). This network was then entered in the models as a dependent network, whereby it is possible to share a common relationship through delinquent

acts. Parameters regarding the two-mode network then have the ability to detect involvement in the delinquent acts (items) as a result or consequence of a relationship (tie) in the peer networks.

Analytical Strategy

Longitudinal social network modeling (RSIENA, version 1.1.286; Snijders, Lomi, & Torló, 2013) was used to examine similarities between befriended adolescents for a collapsed measure of delinquency and the same delinquent acts. RSIENA models the co-evolution of social networks and behavior over time (Ripley et al., 2014; Snijders et al., 2010). Specifically, changes in individual behavior are modeled as the result of behaviors of related peers (influence effect) and changes in relationships are modeled as the result of pre-existing similarities in behavior (selection effect). The network of relations and the (network of) behavior of individuals are two dependent variables that can have an effect on each other. As a result, in RSIENA it is possible to untangle influence processes (behavioral dynamics) from selection processes (network dynamics) regarding delinquency.

Network Effects

In our models, we added network effects to capture the peer group structure and optimize the GoF of the model (RSIENA; Ripley et al., 2014; Veenstra et al., 2013). These effects were: *outdegree/density* (tendency to create relations with peer group members), *reciprocity* (tendency to reciprocate a group-membership nomination), *transitive triplets* (tendency to nominate a group member of a group member as one's own group member), *transitive reciprocated triplets* (tendency for triads to reciprocate group-membership nominations), *three cycles* (tendency for a (non-)hierarchical structure), *indegree popularity* (square root; tendency for receivers of many group-membership nominations to receive even more group membership nominations), *indegree activity* (activity of popular individuals; nominating others as group member when often nominated oneself), *outdegree activity* (activity of active individuals; nominating more others as group member when already often nominating oneself), and *truncated outdegree* (sinks; individuals who nominate no one).

We also controlled for selection effects by examining whether boys nominate (*gender ego*) and were nominated (*gender alter*) more often than girls, and whether respondents of the same gender (gender homophily; measured with the *same-gender effect*) were more likely to select each other as group members. Similarly, we examined whether respondents in the same grade (grade homophily;

measured with the *same-grade effect*) or same class (class homophily; measured with the *same-class effect*) selected each other more often than respondents residing in different grades or classes, whether more delinquent respondents nominate (*delinquency ego*) and were nominated (*delinquency alter*) more often than less delinquent respondents.

To examine hypothesis 1, we first tested whether there was a tendency for respondents to select each other when they had similar levels of delinquent behavior (delinquency homophily measured with the *ego x alter selection effect*) (see Table 4.2). Second, in the models with delinquency as a two-mode network, we tested whether adolescents who nominated the same item formed a relationship at a later time point (delinquency homophily based on the *from agreement effect*) (see Figure 4.1).

Behavioral Effects

The *linear shape* effect models the overall tendency toward delinquency, whereas the *quadratic shape* parameter models the feedback effect of delinquency on itself, resulting in either regression to the mean (negative parameter) or polarization by a tendency to the extremes of the scale (positive parameter). In the behavioral part of the models we controlled for the tendency that boys were more likely than girls to score highly on delinquent behavior (*effect from gender*), and that respondents in higher grades were more likely to score highly on delinquent behavior than respondents in lower grades (*effect from grade*).

For the two-mode network models, each item of a delinquent act was treated as a nomination. Delinquency is thus modeled as a network, whereby we controlled for the tendency to nominate delinquent acts (*outdegree/density*), the tendency for individuals to share indirect relations through shared delinquent acts (*four cycles*), the tendency for delinquent acts that receive many delinquency nominations to receive extra nominations (*indegree popularity*), the tendency for those who nominate many delinquent acts to nominate extra delinquent acts (*outdegree activity*), and the tendency for individuals not to nominate any delinquent acts (*truncated outdegree; sinks*). In the two-mode network models we also controlled for the tendency that boys were more likely than girls to nominate delinquent acts (*effect of gender*), and that respondents in higher grades were more likely to nominate delinquent acts than respondents in lower grades (*effect of grade*).

To test hypothesis 2, we first examined the *average alter effect* in the delinquency scale analyses, reflecting the general tendency for influence in delinquency (see Table 4.2). The tendency for influence in same delinquent acts was estimated by the *to agreement effect* in the two-mode network analyses, which reflected whether individuals tend to nominate the exact same item as their peer(s) (see Figure 4.1).

We combined the outcomes of the separate analyses per school location in a meta-analysis using the *siena08* function in *RSiena* (Ripley et al., 2014; Snijders & Baerveldt, 2003). Examining the goodness of fit (GoF) of our models in all five school locations allowed us to test whether the observed scores at the end of a period were congruent with simulated values for the end of that period (Lospinoso, 2012; Ripley et al., 2014). This way, we could see whether structures in the peer group network and behavioral network are properly captured with the fitted models. We assessed the indegree distribution, outdegree distribution, geodesic distribution, and triad census for the peer group networks. For the two-mode delinquency networks, we assessed the indegree and outdegree distributions. When the GoF of models with a given set of parameters was poorly estimated, we included additional parameters to obtain a better fit. We also removed parameters that did not add significantly to the model to see how that affected the GoF. Going back and forth, including and excluding parameters, we tried to end up with a parsimonious model that showed the best possible fit (GoF statistics per school location and fit plots available upon request). The results of the overall GoF estimation across all five school locations showed a good fit of models for the indegree and outdegree distributions of the peer group networks ($p = .39$ and $.35$, respectively), but a poorer fit for the geodesic distributions ($p = .04$). Triadic structures were even more difficult to fit properly fit ($p < .01$), but current models

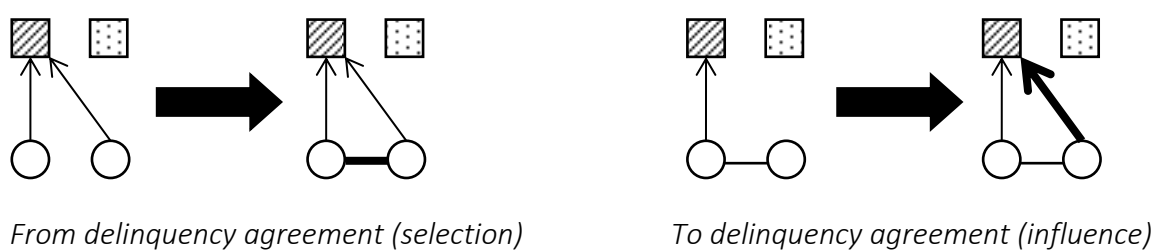


Figure 4.1. Graphical representations of selection and influence effects in a two-mode network SIENA model (circles are individuals; squares are specific delinquent acts; an arrow represents engagement in the delinquent act; a line represents a relation between individuals).

offer the best possible fit for the data. For the two-mode networks, the indegree distributions across the five school locations showed a good fit ($p = .36$), but the outdegree distributions showed a less good fit ($p = .01$).

Results

Descriptive Statistics

As Table 4.1 shows, about half of the sample were boys, with 52 percent of the respondents in the second grade. Adolescents nominated between 8.62 and 9.13 peers (SD ranging from .90 to 1.13) as peer group members, and were nominated as peer group members by between 8.32 and 8.83 (SD ranging from .94 to 1.18) peers. The density of the peer network was relatively low; about 4% of all adolescents at their school location were nominated as peer group members across the three waves, and across time points the percentage of reciprocated relations was 56%, 51%, and 63% respectively. The Jaccard index indicated that about half of the relations between peers were stable.

The distribution of delinquency was quite skewed, with most adolescents not committing any delinquent act (about 70%). The degree to which peers showed similar delinquent behaviors was relatively low, but positive (*Moran's I* = .08, .10, and .08, $SD = .05$ respectively). Delinquency among adolescents was in general also quite stable (70%). For delinquency as a two-mode network, Table 4.1 shows that respondents on average 'nominated' between .71 and .99 (SD ranging from .17 to .26) delinquent acts (item) and that delinquent acts were committed by between 9.49 ($SD = 3.58$) and 14.64 ($SD = 5.44$) respondents. The average degree (density) of the two-mode network indicated that adolescents 'nominated' between 4% and 6% of the delinquent acts. The Jaccard index for delinquency as a two-mode network indicated that about 20% to 24% of the nominations of delinquent items was stable.

Network Dynamics

Table 4.2 shows the results of the SIENA meta-analyses for the models with delinquency as a scale and with delinquency as a two-mode network. For both analyses we found a low density in the peer network (*outdegree*; $b = -2.01$ and $b = -1.93$, $p < .01$ respectively), indicating that respondents were selective as to who they nominated as belonging to their peer group. Respondents also tended to reciprocate peer nominations (*reciprocity*; $b = 2.23$ and $b = 2.25$, $p < .001$ respectively), nominated peer group members of peer group members as their own peer group members (both models $b = .41$, $p < .001$), and tended not to reciprocate

Table 4.1. Descriptive Statistics of the Sample, Network Characteristics, and Delinquency in Delinquency as a Scale and as a Two-Mode Network

	Time 1 (Fall)	Time 2 (Winter)	Time 3 (Spring)
	Est. (SD)	Est. (SD)	Est. (SD)
<i>Sample</i>			
Boys	49%	49%	49%
Age	13.22 (.71)	13.45 (.76)	13.78 (.76)
Grade 2	52%	52%	52%
<i>Peer network</i>			
Nominations given (Mean, SD)	8.79 (1.00)	9.13 (1.13)	8.62 (0.90)
Nominations received (Mean, SD)	8.67 (0.94)	8.83 (1.18)	8.32 (0.95)
Density (proportion)	.04 (.02)	.04 (.01)	.04 (.01)
Reciprocity (proportion)	.56 (.06)	.51 (.07)	.63 (.08)
Missing (proportion)	.01 (.01)	.03 (.02)	.04 (.02)
<i>Delinquency as a scale</i>			
0	71%	70%	69%
1	14%	13%	13%
2	6%	7%	5%
3	9%	11%	13%
Missing	4%	6%	8%
<i>Network autocorrelation</i>			
Moran's <i>I</i>	.08 (.05)	.10 (.05)	.08 (.05)
<i>Delinquency as a two-mode network</i>			
Nominations received on delinquency items (Mean, SD)	.71 (.26)	.84 (.20)	.99 (.17)
Number of times a delinquency item has been mentioned (Mean, SD)	9.49 (3.58)	12.22 (4.44)	14.64 (5.44)
Density	4%	5%	6%
Missing	4%	6%	6%
<i>Transitions/Change</i>			
	Fall – Winter	Winter - Spring	
<i>Peer network relations</i>			
Distance	1483 (945)	1494 (977)	
Jaccard	.52 (0.03)	.50 (.04)	
<i>Delinquency as a scale</i>			
Decrease	13%	14%	
Increase	17%	16%	
Stable	70%	70%	
<i>Delinquency network relations</i>			
Distance	234 (65)	269 (109)	
Jaccard	.20 (.04)	.24 (.06)	

Note. ** $p < .01$.

Table 4.2. RSIENA Meta-Analysis of Peer Group Network and Delinquency Dynamics for Delinquency as a Scale and for Two-mode Network Models

	Delinquency scale	Two-mode network
	<i>b</i> (<i>SE</i>)	<i>b</i> (<i>SE</i>)
<i>Peer group network dynamics</i>		
Density	-2.01** (.45)	-1.93** (.45)
Reciprocity	2.23*** (.09)	2.25*** (.10)
Transitive triplets	.41*** (.02)	.41*** (.02)
Transitive reciprocated triplets	-.29*** (.01)	-.29*** (.01)
Three cycles	-.09*** (.01)	-.09*** (.01)
Indegree popularity (sqrt)	.03 (.05)	.03 (.05)
Indegree activity (sqrt)	-.77*** (.10)	-.82*** (.12)
Outdegree activity (sqrt)	.06 (.04)	.06 (.04)
Truncated outdegree	-2.23*** (.40)	-2.18*** (.41)
Gender alter (receiver effect)	.06 (.05)	.06 (.05)
Gender ego (sender effect)	-.09 (.07)	-.09 (.07)
Gender homophily	.69*** (.11)	.70*** (.11)
Grade homophily	.38** (.10)	.38*** (.10)
Class homophily	.73** (.19)	.72** (.19)
Delinquency alter (receiver effect)	-.01 (.02)	
Delinquency ego (sender effect)	.02 (.01)	
Delinquency homophily ^a	.07** (.02)	.06 (.07)
<i>Delinquency dynamics</i>		
Linear shape	-1.61*** (.14)	
Quadratic shape	.67*** (.03)	
Density		-3.17*** (.21)
Four cycles		-.004* (.001)
Indegree popularity (sqrt)		.25*** (.05)
Outdegree activity (sqrt)		.54*** (.03)
Truncated outdegree		-2.58*** (.10)
Effect from/of gender on delinquency (boy = 1)	.21*** (.06)	.17*** (.03)
Effect from/of grade on delinquency	.14** (.03)	.10** (.02)
Delinquency influence ^b	.43** (.14)	.17** (.05)

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. ^a Delinquency homophily is measured with the “egoXaltX” interaction effect in regular SIENA models and measured with the “from delinquency agreement” effect in two-mode network models. ^b Delinquency influence is measured with the “average alter” effect in regular SIENA models and with the “to delinquency agreement” effect in two-mode network models.

nominations in triads (*transitive triplets*; both models $b = -.29$, $p < .001$). There was also a tendency for hierarchical ordering in the network (*three cycles*; both models $b = -.09$, $p < .001$), a tendency in those often nominated to nominate few others (*indegree activity*; $b = -.77$ and $b = -.82$, $p < .001$ respectively), and of not nominating anyone (*truncated outdegree*; $b = -2.23$ and $b = -2.18$, $p < .001$ respectively). Furthermore, the gender-homophily effect indicated a tendency for boys to select boys as peer group members, and girls to select girls as peer group members ($b = .69$ and $b = .70$, $p < .001$ respectively). Similarly, respondents in the same grade (*grade homophily*; $b = .38$, $p < .01$) or same class (*class homophily*; $b = .73$ and $b = .72$, $p < .01$ respectively) were more likely to select each other as peer group members than respondents not in the same grade or class.

For our main variables of interest, in the models with delinquency as a scale, respondents with higher levels of delinquency were not nominated more often than peer group members and did not nominate more peer group members. With regard to hypothesis 1, we found that respondents with similar levels of delinquency were more likely to be peer group members than respondents who had different levels of delinquency (*homophily effect*; $b = .07$, $p < .01$). In contrast, we found no homophily effect of delinquency in the models with delinquency as a two-mode network. Although hypothesized, there was no tendency for respondents who nominated the same delinquent act to become peer group members over time.

Delinquency Dynamics

With regard to the delinquency dynamics of the models with delinquency as a scale, meta-analysis showed a low tendency toward delinquency (*linear shape*; $b = -1.61$, $p < .001$), but respondents with a higher score on delinquency were more likely to have higher scores for delinquency over time, and vice versa (polarization; *quadratic shape*; $b = .67$, $p < .001$). The two-mode network models also showed a low density in the delinquency network (*outdegree*; $b = -3.17$, $p < .001$), indicating that respondents had a low tendency to nominate delinquent acts. There was a negative tendency for individuals to share a relation through a delinquent act (*four cycles*; $b = -.004$, $p < .05$), indicating a tendency to be unique in one's behavior. There was also a tendency for those who received many delinquency nominations to have extra delinquency nominations over time (*indegree popularity*; $b = .25$, $p < .001$), a tendency of those who nominated many delinquent acts to nominate extra delinquent acts (*outdegree popularity*; $b = .54$, $p < .001$), and a tendency for individuals not to nominate any delinquent acts (*truncated outdegree*; $b = -2.58$, $p <$

.001). Furthermore, boys tended to score higher on delinquency than girls (*effect from gender*; $b = .21, p < .001$), nominated more delinquent acts over time (*effect of gender*; $b = .17, p < .001$), respondents in higher grades had a stronger tendency to score higher on delinquency than those in lower grades (*effect from grade*; $b = .14, p < .01$), and nominated more delinquent acts over time (*effect of grade*; $b = .10, p < .01$).

Lastly, Table 4.2 shows a positive delinquency influence effect in both models with delinquency as a scale ($b = .43, p < .01$) and delinquency as a two-mode network ($b = .17, p < .01$). As expected in hypothesis 2, respondents' delinquency appeared to be influenced by peer group members' delinquency in general, but also for specific delinquent acts.

Discussion

With the increased knowledge of the importance of peers for delinquent behavior, a growing number of studies has examined peer selection and influence processes with regard to adolescent delinquency (e.g., Burk, Steglich, & Snijders, 2007; Burk et al., 2008; Kerr et al., 2012; Svensson et al., 2012; Tilton-Weaver et al., 2013; Weerman, 2011). All of these studies focus on delinquency as a collapsed measure of different types of delinquent acts. However, one could wonder whether selection and influence processes in delinquency take place on a general level or perhaps on a lower level with regard to specific same behaviors. This study, therefore, examined the general tendency for selection and influence in delinquency as well as selection and influence in same delinquent acts using a relatively novel approach within a SIENA framework, which treated involvement in delinquent acts as a tie (nomination).

We expected that selection in delinquency would concern same delinquent acts, because the theory argues that adolescents tend to select each other the more similar they are. Homophily (Byrne, 1971) is a central aspect of the theory underlying peer selection in delinquency, and it is argued that adolescents are attracted to and will associate with peers who show similar levels of delinquency. Adolescents would be most similar to each other when they engage in the same delinquent acts. However, contrary to our expectations, the analyses showed that adolescents who already behaved delinquently generally tended to associate with each other over time (selection effect), but adolescents did not necessarily hang out with others who displayed the exact same delinquent acts. Selection processes do

not appear to take place on the behavior-specific level, but on the overall deviancy level.

Furthermore, it was expected that influence in delinquency would not (only) be general, but also specific, because mimicking behavior of peers is central to the assumed mechanism of peer influence. Adolescents learn favored acts by observing and mimicking peers' delinquent behavior (Burgess & Akers, 1966; Sutherland et al., 1995). Our study showed that if peers were delinquent, adolescents themselves were indeed more likely to behave delinquently over time as well. However, in line with the theory and our expectations, when looking closer at specific delinquent acts, the results showed clear evidence for influence in same delinquent behaviors. Adolescents indeed tended to mimic identical delinquent acts of peers who were considered best friends or members of the peer group. This finding shows that, although one could consider delinquency a latent construct, influence in delinquency might take place on a more specific level, that is, on the level of specific delinquent acts.

While our findings showed that influence concerns same delinquent acts, it is still possible that adolescents are also influenced by other (types) of delinquent acts. Future research might focus on comparing selection and influence processes in same delinquent acts compared to different delinquent acts in a two-mode network approach. This way, one could test whether adolescents select peers and are influenced by peers in other as well as same delinquent acts. Such effects cannot be tested in the current SIENA framework but would be informative.

Another interesting next step in research would be to examine why, contrary to influence processes, selection processes do not appear to take place for specific same delinquent acts. One explanation is that if adolescents do not have a relationship with peers they will have less information on those peers' behavior. The observation of behavior may be based on the overall perception one has about the behavior of others. This reasoning becomes even clearer when taking the context in which delinquency occurs into account. It is argued that individuals are more likely to engage in delinquency when they find themselves in a context that also offers opportunities for engaging in delinquent acts (Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996). That context often consists of time spent in unstructured socializing with peers without the presence of authority figures. In this context adolescents learn from peers how to engage in delinquent acts, because deviance in this setting is easier, more rewarding and adolescents have time to spare due to the lack of structure. Going back to peer selection, not being part of

this context makes it unlikely that adolescents know what behaviors others are engaged in exactly, but they can form an idea about others' behaviors based on their reputation. Adolescents form ideas about their peers' behavior not only by observation, but also by interacting and communicating with others (Cialdini et al., 1991). Thus, it is possible that selecting peers will be based mostly on others' reputation or an overall perception regarding their behavior, while peer influence happens more on a behavior-specific level. In future research, examining how adolescents perceive their peers to behave could prove fruitful for gaining a better understanding of how peer selection and influence processes work.

To conclude, the implications of this study not only address adolescent delinquency, but might also suggest studying other behaviors on a more specific level. This could apply to other forms of negative externalizing behaviors, such as substance use, but could also apply to for example health-related behaviors, where selection and influence might take place with regard to specific behaviors. For example, selection and influence processes have shown to be relevant for sports or other physical activities (e.g., De la Haye, Robins, Mohr, & Wilson, 2011; Gesell, Tesdahl, & Ruchman, 2012; Shoham et al., 2012; Simpkins, Schaefer, Price, & Vest, 2013). Studies on these topics might profit from using a two-mode network approach, for examining selection and influence processes and test whether adolescents select on and learn from specific behaviors of peers. An important take-home message is therefore also, that examining behaviors as a network, on the item level, could be applied to a wider range of behavior, depending on the research question at hand.

CHAPTER 5

Direct Versus Indirect Peer Influence: The Effect of Actual and Perceived Substance Use by Peers on Adolescents' Own Substance Use*

* This chapter is co-authored with Jan Kornelis Dijkstra, Christian Steglich, and René Veenstra and is currently under review by an international peer-reviewed journal. An earlier version of this chapter was presented at the Society for Research in Child Development (SRCD), Philadelphia, PA, United States, March 2015.

Abstract

The prevalence of substance use, such as smoking tobacco or drinking alcohol, increases gradually during adolescence, and peers have shown to play an important role in the proliferation of these behaviors. Much research has focused on examining peer influence in adolescence. In most studies peer influence is assumed to work through social learning and behavioral modeling. However, adolescents might also be influenced by their perception of peers' substance use. This study therefore tests whether adolescents in peer groups are directly influenced by the tobacco and alcohol use of their peers and indirectly by their perceptions of their peers' behavior. The hypotheses are tested in a large longitudinal sample of early adolescent boys (50.1%) and girls in the Social Network Analyses of Risk behavior in Early adolescence (SNARE) study ($N = 1,309$, M age = 13.19). Peer influence of actual substance use by peers was found for both tobacco and alcohol use. However, there was no effect of perceived substance use of peers on adolescents' own substance use. Furthermore, respondents underestimated the substance use of their close peers. Early adolescents might be unaware of or unwilling to report their peers' behavior, particularly when it concerns deviancy among close peers, and perceptions of behavior might be harder to measure properly than expected.

Peers play an increasingly significant role during adolescence (Rubin et al., 2006). Particularly peers with whom adolescents spend a lot of time and share more intimate relationships, such as friendships, are important for their development (see also Brown, 2004; Brown & Larson, 2009; Hartup, 1993). Adolescents find social support, acceptance, and a sense of belonging among peers, who also affect their behavioral development. Peer behavior is evidently an important influencing factor on an adolescent's own behavior and studies specifically focusing on peer influence processes in adolescence have steadily increased in the past years (see for example Veenstra et al., 2013). Also with regard to substance use, such as smoking tobacco or drinking alcohol, peer behavior has shown to be related to and influential on the (early) adolescent's own tobacco and alcohol use (e.g., Bot, Engels, Knibbe, & Meeus, 2005; Engels, Knibbe, De Vries, Drop, & Van Breukelen, 1999; Kiuru, Burk, Laursen, Salmela-Aro, & Nurmi, 2010; Mathys, Burk, & Cillessen, 2013; Mercken, Steglich, Knibbe, & De Vries, 2012; Osgood et al., 2013; Sieving, Perry, Williams, 2002; Simons-Morton & Farhat, 2010), though results sometimes differ depending on the type of substance use studied or the timing of the studies.

With regard to tobacco use, results of studies on peer influence have been mixed. Some studies find evidence for influence in for example early adolescence, but not so much in middle or late adolescence (e.g., Haas & Schaefer, 2014; Hall & Valente, 2007; Mathys et al., 2013). This corresponds with the idea that because tobacco use is addictive, peer influence mainly plays a role when the adolescent start smoking. Studies on alcohol use also show mixed evidence throughout adolescence, but mainly indicate that alcohol use by peers has an important influence on adolescents' own drinking behavior (e.g., Mathys et al., 2013; Mercken et al., 2012; Osgood et al., 2013). Although recent social network studies have focused extensively on peer influence processes regarding substance use and a wide variety of related factors, far less is known about the ways in which peer influence tends to work.

Most studies expect peer influence to be a result of behavioral modeling, where adolescents mimic the behavior of peers (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Bandura, 1986; Bandura & McClelland, 1977). However, adolescents not only tend to conform to observed actual peer behavior, but can also conform to expectations they have about behavior (Cialdini et al., 1991). Thus, the idea adolescents have about others' behavior can influence their own behavior. It is likely that, on the one hand, influence is direct and works through mimicking the actual substance use of peers. On the other hand, influence can also be indirect

whereby perceptions of peers' substance use might play a role in how adolescents engage in substance use themselves. This study sets out to examine the direct and indirect influences of peers on adolescents' substance use, specifically tobacco and alcohol use, and tests the effects of actual and perceived substance use of peers on adolescents' own substance use.

Influence of Actual and Perceived Substance Use by Peers

It is generally assumed that the influence of peers' substance use on adolescents' own substance use works mainly through social learning or behavioral modeling of peers' substance use. Through observation, imitation, and modeling, individuals learn which behaviors are appropriate in a certain context and depict what others do given certain circumstances (Bandura & McClelland, 1977). Individuals are inclined to mimic behavior especially when a situation is unclear or ambiguous, and deduce how to behave from the behaviors they observe (Cialdini et al., 1991). Particularly in early adolescence, adolescents find themselves in a new context where it is not always clear how to behave in a desirable way. At this stage of development, adolescents often form new relations with peers and conforming to the behavior of others becomes salient.

Adolescents are likely to conform to the substance use of peers because it increases their chances of being accepted and finding a sense of belonging among peers, which is one of the most important goals in adolescence (e.g., Baumeister & Leary, 1995; Berndt, 1979; Coleman, 1961; Juvonen, 2006; Rubin et al., 2006). Social modeling of deviant behaviors, such as substance use, then occurs when this behavior is considered normative (Burgess & Akers, 1966; Sutherland et al., 1995). By observing and mimicking others' substance use, adolescents learn how to act desirably and increase their chances of becoming accepted by peers. Thus, conforming to the actual substance use of peers is likely, because adolescents want to behave in a way considered desirable to increase peer acceptance. Therefore, we expect peers' substance use to have a direct influence on adolescents' own tobacco and alcohol use (Hypothesis 1).

However, social modeling of actual peer behavior might not be the only way that influences adolescents. Adolescents are also introduced to peer behavior by interacting and communicating with others (Cialdini et al., 1991). This familiarizes adolescents with attitudes and behaviors that are (dis)approved of and can help them decide what is considered desirable. They can form expectations of how to

behave, without necessarily having seen actual behavior. Perceptions of peer behavior can influence adolescents' own behavior as much as actual peer behavior.

Perceived behavior is often subject to a false consensus bias (Marks & Miller, 1987; 1988), when individuals tend to project their own behavior (inaccurately) onto what (they think) others do, especially for behaviors that have a relatively low prevalence. This bias can in turn reinforce how adolescents tend to behave themselves (e.g., Otten, Engels, & Prinstein, 2009; Prinstein & Wang, 2005; Young, Barnes, Meldrum, & Weerman, 2011; Young & Weerman, 2013). Studies show that the relationship between the perception of peer behavior and adolescents' own behavior is common and sometimes even stronger than the relationship between peer-reported behavior and adolescents' own behavior (Boman et al., 2011; Kandel, 1996; Prinstein & Wang, 2005; Weerman & Smeenk, 2005), indicating that it might be important to study perceptions of peer behavior in relation to adolescents' own behavior. Thus, although most studies assume that adolescents are influenced by actual peer behavior, perceived behavior of others might influence adolescents' own behavior as well. We therefore expect that the perceptions adolescents have about the substance use of peers influences their own substance use (Hypothesis 2).

Our hypotheses are tested using stochastic actor-based modeling (RSIENA; Ripley et al., 2014; Snijders et al., 2010) in a large longitudinal sample of adolescent boys and girls. We first examine the discrepancy between adolescents' self-reported substance use and peer-reported substance use to see how accurate adolescents are in their perceptions of the tobacco and alcohol use of peers. Next, we test whether there is direct peer influence on tobacco and alcohol use. We conclude by examining whether the perception of peers' substance use has an indirect influence on adolescents own substance use. For this we use a novel method whereby perceived substance use consists of a network in which adolescents could nominate which of their close peers engage in substance use. This allows us to examine how adolescents perceive each individual in the peer group engaging in substance use, and examine the combined effect of those perceptions on adolescents' own substance use.

Method

Participants and Procedure

Data stem from the SNARE (Social Network Analysis of Risk behavior in Early adolescence) project; a longitudinal project on the social development of early

adolescents specifically focused on adolescents' involvement in risk behavior. Two secondary schools participated: one in the middle and one in the north of the Netherlands. All first- and second-year students from these schools were invited to enroll in SNARE (2011-2012). All eligible students received an information letter for themselves and their parents, in which they were asked to participate. If students wished to refrain from participation, or if their parents disagreed with their children's participation, they were requested to send a reply card or email within ten days. In total, 1826 students were approached for this study, of which 40 students (2.2%) refused to participate for several reasons, for example, the parent and/or adolescent had no interest, the adolescent was dyslectic, or it was too time consuming. A total of 1786 students participated in SNARE (83.9% Dutch).

Pre-assessment took place in September 2011, just as students entered the first or second year of secondary school. This was followed by three regular measurement waves in October, December, and April. For the present study we used data from the first three regular waves (October, December, and April) of both first- and second-year students. Of all 1,786 students who participated in the data collection, we focused on the first cohort (students enrolled in SNARE in 2011-2012), resulting in a subsample of 1,309 students (49% boys). The mean age of the sample was 13.19 (ranging from 11 to 15, $SD = .71$). Of the respondents, 39.4% followed pre-vocational education (VMBO) and 60.6% followed pre-university/senior general secondary education (HAVO/VWO). One of the two schools in SNARE runs at four 'locations', each with its own school management, that can be considered as independent schools. We thus had two schools at five school locations and therefore refer to 'school locations' instead of schools when we discuss our sample and data.

During the assessments a teacher and research assistants were present. The research assistant briefly introduced the questionnaire, containing both self-reports as well as peer nominations, which the students filled in on the computer in class. Data were collected with CS socio software (www.sociometric-study.com) developed especially for this study.. The assessment of the questionnaires took place during regular lessons in approximately 45 minutes. Any students absent on the day were assessed within a month, if possible. The anonymity and privacy of the students were guaranteed. The study was approved by the Internal Review Board of one of the participating universities.

Measures

Peer (group) networks were derived from unlimited friendship and group-membership nominations in classes on the items ‘Who are your best friends?’ and ‘Who are part of the group you hang out with the most?’ Nominations for both questions were summed per individual and a total score of 2 was recoded into 1, which was used to construct networks per school location. Using both above-mentioned questions allowed us to construct networks that included individuals who can be considered close peers and belonging to an adolescent’s intimate peer group. For ease of reading, we will refer to the ‘peer group’ when we discuss the peer network (effects).

Tobacco use. Self-reports were used to assess tobacco use. We asked respondents how often they had smoked tobacco in the last month. Answer categories were measured on a seven-point scale, ranging from never to more than 20 times (e.g., Monshouwer et al., 2011). Because the onset of smoking tobacco is most important in early adolescence and the prevalence of tobacco use is highly skewed in the data, the answers were dummy-coded, resulting in a variable that measured whether adolescents had (1) or had not (0) smoked in the last month.

Alcohol use. Self-reports were also used to assess alcohol use. We asked respondents how often they had drunk alcohol in the last month (Wallace et al., 2002). Answer categories were measured on a 13-point scale, ranging from 0 times to over 40 times or glasses, so that adolescents could indicate how often they had drunk alcohol in that month. Answers on this scale were categorized into never (0), once (1), 2–4 times (2), and 5 times or more (3).

Perceived tobacco / alcohol use. Perceptions of substance use (both tobacco use and alcohol use) were based on peer nominations in class on the items ‘Who smokes?’ and ‘Who drinks alcohol?’ respectively. We used only peer nominations of individuals in one’s peer group network (best friends and peers who are part of the group an adolescent hangs out with the most). The nominations were used to construct separate networks per type of substance use and school location, which resulted in networks of perceived substance use. Adolescents indicated which peer group ‘members’ they thought smoked and/or drank alcohol. Nominations between adolescents in different classes were replaced by structural zeroes, which indicated that respondents could not nominate students from other classes.

Analytical Strategy

Longitudinal social network modeling (RSIENA, version 1.1.286, Steglich, Snijders, & Pearson, 2010) was used to examine peer influence processes in early adolescent substance use and the effect of perceptions of close peers' substance use on adolescents' own behavior. RSIENA models the co-evolution of social networks and behaviors over time (Ripley et al., 2014; Snijders et al., 2010). Among others, changes in individual behavior are modeled as a result of the behavior of peers one has a relationship with (influence effect) and changes in relationships are modeled as the result of pre-existing similarities in behavior (selection effect). The network of relations and the behavior of individuals are dependent variables that can have an effect on each other. In our analyses, RSIENA can then examine influence processes (behavioral dynamics) while controlling for selection processes (network dynamics) in tobacco and alcohol use.

In our models, we added peer network effects to capture the network structure of 'peer groups' and optimize the goodness of fit of the models (Table 5.3). These effects were the following: *outdegree/density* (tendency to create relations with peer group members), *reciprocity* (tendency to reciprocate a group-membership nomination), *transitive triplets* (tendency to nominate a group member of a group member as one's own group member), *transitive reciprocated triplets* (tendency for triads to reciprocate group-membership nominations), *three cycles* (tendency for a (non-)hierarchical structure), *indegree popularity* (tendency for those who receive many group-membership nominations to receive more group-membership nominations), *indegree activity* (activity of popular individuals; nominating others as group member when often nominated oneself), *outdegree activity* (activity of active individuals; nominating many others as group member when one is already often nominating oneself), and *truncated outdegree* (sinks; individuals who nominate no one).

We also controlled for selection effects by examining whether boys nominate (*gender ego*) and were nominated (*gender sender*) more often as group members than girls, and whether respondents of the same gender (gender homophily; measured with the *same-gender effect*) were more likely to select each other as group members. Lastly, we controlled for whether those who smoked tobacco or drank alcohol nominate (*tobacco / alcohol use ego*) and were nominated (*tobacco / alcohol use alter*) more often than those who did not smoke tobacco or drank less alcohol, and whether there was a tendency for respondents to select

each other when they had similar levels of substance use (tobacco / alcohol use homophily; measured with the *ego x alter selection effect*).

In the behavioral part of the models, the *linear shape* effect modeled the overall tendency to substance use (either tobacco or alcohol), while the *quadratic shape* parameter modeled the feedback effect of substance use on itself, resulting in either regression to the mean (negative parameter) or polarization to the extremes of the scale (positive parameter). We controlled for the tendency that boys were more likely than girls to score highly on substance use (*effect from gender*), and that respondents in higher grades were more likely to score highly on substance use than respondents in lower grades (*effect from grade*). Furthermore, we controlled for the tendency that respondents who already drank alcohol at an earlier time point, would smoke tobacco at a later time point (*effect from alcohol use*), and the tendency that respondents who smoked tobacco at an earlier time point, would drink alcohol at a later time point (*effect from tobacco use*).

In Table 5.3, the *average alter effects* in the SIENA analyses reflect whether there was a tendency for adolescents for whom close peers scored higher on substance use to also develop higher levels of substance use themselves over time (or vice versa), thus reflecting the tendency for influence in tobacco and alcohol use (Models 1). In the last step (Models 2), we included an ‘influence’ effect of perceived substance use (*influence of perceptions of tobacco / alcohol use*) to examine if the perception of close peers’ substance use also influenced adolescents’ own substance use.

We conducted the analyses separately for the five school locations, and combined the outcomes in a meta-analysis using the *siena08* function in RSiena (Ripley et al., 2014; Snijders & Baerveldt, 2003). As it turned out, the estimates for tobacco use (behavioral part) of one school location could not converge for model 2. The results regarding tobacco use in the behavioral part in Table 5.3, model 2, are therefore based on the remaining four locations. Examining the goodness of fit of our models (GoF) allowed us to test whether the observed scores at the end of a period were congruent with the simulated values for the end of that period (Lospinoso, 2012; Ripley et al., 2014). This way, we could see whether structures in the peer group network and behaviors are properly captured with the fitted models. We assessed the indegree distribution, outdegree distribution, geodesic distribution, and triad census for the peer group networks. For smoking tobacco and drinking alcohol, we assessed the Moran’s I and behavior distributions. When the GoF of models with a given set of parameters was poorly estimated, we included additional parameters

to obtain a better fit. We also removed parameters that did not significantly add to the model to see how that affected the GoF. By going back and forth, including and excluding parameters, we ended up with a parsimonious model that showed the best possible fit (GoF statistics per school location and fit plots available upon request). The results of the overall GoF estimation across all five school locations showed a good to reasonable fit of the models for the indegree and outdegree distributions of the peer group networks ($p = .08$ and $.07$ respectively), but a less good fit for the geodesic distributions ($p = .01$). Triadic structures were especially difficult to fit properly ($p < .01$). The Moran's I distributions showed very good fit for both tobacco ($p = .43$) and alcohol use ($p = .14$). The behavior distributions for tobacco use across the five school locations also showed a good fit ($p = .33$), but the behavior distributions for alcohol use showed a poorer fit ($p = .02$). Still, the current models offer the best possible fit for the data.

Results

Descriptive Statistics

The results from the descriptive analyses showed that about half of the sample consisted of boys, with 52 percent of the respondents residing in the second grade of secondary education (Table 5.1). With regard to the peer group network, respondents nominated on average 6.65 other peers in their class as part of their peer group/as close peers. The average degree of the networks in class was moderate. Between 31% and 32% of respondents in class were nominated as a friend or group member across the three waves. About half of the relations in the network were reciprocal (49%, 50%, and 49%, respectively). The Jaccard index, indicating how relations between peers changed over time, appeared quite stable (Jaccard = $.58$ and $.54$). This showed that, although there are changes in the relationships of friends and group members, about 58% of the relations did not change between fall (Time 1) and winter (Time 2), and about 54% of the relations did not change between winter (Time 2) and spring (Time 3).

Self-reported substance use showed a prevalence of 7% to 14% for tobacco use and 19% to 24% for alcohol use. The average level of tobacco and alcohol use ranged from $.02$ to $.14$ (SD range from $.14$ to $.35$), and from $.17$ to $.50$ (SD range from $.58$ to $.94$) across all school locations. Most adolescents in our sample did not smoke tobacco or drink alcohol at all. The degree to which peers showed similar levels of substance use was positive and moderate for both tobacco use (Moran's $I = .18, .15,$ and $.20$ respectively) and alcohol use (Moran's $I = .14, .18,$ and $.20$). Self-

reported substance use appeared quite stable over time, particularly for smoking tobacco (93% and 89%).

With regard to perceived substance use, respondents nominated few peers as smokers or drinkers. Across all time points, they nominated about one individual (less than 1% of all close peers) who they perceived to use tobacco or alcohol (nominations given). Perceptions of substance use were quite unstable: 30% to 32% of the respondents did not change their perception of peers' tobacco use over time, and 25% to 26% of the respondents did not change their perception of peers' alcohol use. Most adolescents change their perceptions of their peers' substance use, but this is likely related to the low perception of substance use.

Table 5.2 furthermore shows how accurately respondents perceived the substance use of their close peers. The 'correct negative rates' show, when respondents themselves indicated that they did not engage in substance use, what percentage of peers also perceived them as not engaging in substance use. The 'correct positive rates' show that when respondents indicated that they themselves did engage in substance use, what percentage of peers also perceived them as engaging in substance use. Because perceived substance use was operationalized as a network, not nominating anyone would result in not perceiving substance use automatically. This might also explain the high congruence between not reporting to engage in substance use oneself and the perception of not engaging in substance use by peers (the correct negative rates are almost 100 percent). When we focus on the correct positive rate, we see that adolescents correctly perceive their close peers to engage in tobacco use in, 11%, 9%, and 10% of the cases, respectively. For alcohol use, the perception is correct in, 5%, 5%, and 7% of the cases, respectively. In 89% to 95% of the cases respondents indicated that close peers did not engage in substance use, whereas self-reports from respondents indicated that they did, thus indicating that adolescents underestimate or underreport on the substance use of close peers.

SIENA Results

We found a low density in the peer networks of close peers in classes ($b = -1.96, p < .001$), which indicates that respondents were selective as to who they nominated as being part of their peer group (Table 5.3). Respondents also tended to reciprocate peer nominations ($b = 2.23, p < .01$), nominated peer group members of peer group members as their own peer group members (*transitive triplets*; $b = .60, p < .001$), and tended not to reciprocate nominations in triads (*transitive reciprocated triplets*; $b = -.31, p < .01$). Those often nominated tended not to nominate many others

Table 5.1. Descriptive Statistics of the Sample, Peer Network Characteristics, Perceived Tobacco and Alcohol Use Networks, and Self-Reported Tobacco and Alcohol Use

	Time 1 (Fall)	Time 2 (Winter)	Time 3 (Spring)
	Est. (SD)	Est. (SD)	Est. (SD)
<i>Sample</i>			
Boys (proportion)	.49 (.05)	.49 (.05)	.49 (.05)
Age	13.22 (.71)	13.45 (.76)	13.78 (.76)
Grade 2 (proportion)	.52 (.04)	.52 (.04)	.52 (.04)
<i>Peer network</i>			
Nominations given (Mean, SD)	6.53 (0.86)	6.80 (1.23)	6.62 (1.04)
Nominations received (Mean, SD)	6.52 (.86)	6.78 (1.24)	6.60 (1.04)
Average degree (proportion)	.31 (.03)	.32 (.03)	.32 (.04)
Reciprocity (proportion)	.49 (.04)	.50 (.05)	.49 (.06)
Missing (proportion)	.001 (.001)	.003 (.003)	.004 (.002)
<i>Tobacco use</i>			
0	93%	90%	86%
1	7%	10%	14%
Missing	4%	6%	8%
Network autocorrelation			
Moran's <i>I</i>	.18 (.12)	.15 (.05)	.20 (.08)
<i>Alcohol use</i>			
0	79%	81%	77%
1	8%	8%	8%
2	8%	8%	9%
3	5%	3%	7%
Missing	4%	7%	9%
Network autocorrelation			
Moran's <i>I</i>	.14 (.07)	.18 (.06)	.20 (.04)
<i>Perceived tobacco use network</i>			
Nominations given (Mean, SD)	.76 (.70)	.87 (.62)	1.28 (.77)
Nominations received (Mean, SD)	.82 (.64)	.94 (.54)	1.44 (.64)
Average degree (proportion)	.004 (.005)	.004 (.005)	.007 (.006)
Missing (proportion)	.003 (.004)	.014 (.024)	.013 (.021)
<i>Perceived alcohol use network</i>			
Nominations given (Mean, SD)	.76 (.49)	.49 (.30)	.79 (.43)
Nominations received (Mean, SD)	.81 (.43)	.88 (.49)	1.29 (.46)
Average degree (proportion)	.004 (.003)	.004 (.004)	.006 (.005)
Missing (proportion)	.004 (.004)	.013 (.024)	.013 (.021)

Table 5.1. Continued

<i>Transitions/Change</i>	Fall – Winter	Winter - Spring
Peer network relations		
Distance	958 (646)	983 (728)
Jaccard	.58 (.05)	.54 (.06)
Perceived tobacco use network relations		
Distance	139 (57)	201 (94)
Jaccard	.32 (.21)	.30 (.14)
Perceived alcohol use network relations		
Distance	176 (54)	224 (98)
Jaccard	.25 (.08)	.26 (.05)
Tobacco use		
Decrease	3%	3%
Increase	5%	8%
Stable	93%	89%
Alcohol use		
Decrease	10%	9%
Increase	10%	14%
Stable	80%	77%

Note. ** $p < .01$.

Table 5.2. Crosstabs of Self-Reported and Perceived Tobacco and Alcohol Use in the Peer Group

	Self-reported alcohol use / tobacco use, respectively					
	Time 1		Time 2		Time 3	
Perceived peers'	No	Yes	No	Yes	No	Yes
...tobacco use						
No	27576 (94%)	1475 (4%)	25920 (91%)	2050 (7%)	23969 (87%)	2939 (11%)
Yes	80 (1%)	181 (1%)	128 (1%)	214 (1%)	195 (1%)	322 (1%)
Correct negative rate	99%		99%		96%	
Correct positive rate	11%		9%		10%	
...alcohol use						
No	24286 (83%)	4471 (15%)	23285 (83%)	4396 (15%)	21333 (79%)	5081 (19%)
Yes	163 (1%)	232 (1%)	136 (1%)	223 (1%)	228 (1%)	354 (1%)
Correct negative rate	99%		99%		99%	
Correct positive rate	5%		5%		7%	

Table 5.3. RSIENA Meta-Analysis of Peer Network and Alcohol and Tobacco Use Dynamics

	Model 1 <i>b</i> (<i>SE</i>)	Model 2 <i>b</i> (<i>SE</i>)
<i>Network dynamics</i>		
Density	-1.96*** (.42)	-1.86*** (.44)
Reciprocity	2.23** (.29)	2.28** (.22)
Transitive triplets	.60*** (.06)	.53*** (.05)
Transitive reciprocated triplets	-.31** (.07)	-.30** (.05)
Three cycles	-.04 (.05)	-.07 (.04)
Indegree popularity (sqrt)	-.14 ⁺ (.09)	-.15 ⁺ (.06)
Indegree activity (sqrt)	-1.70** (.34)	-1.49* (.34)
Outdegree activity (sqrt)	.03 (.08)	.01 (.09)
Truncated outdegree	-.08 (.70)	-.19 (.61)
Gender alter (receiver effect)	-.02 (.07)	-.09 (.08)
Gender ego (sender effect)	.17 (.09)	.20 (.10)
Gender homophily	.65* (.18)	.64* (.19)
Tobacco use alter (receiver effect)	-.21 (.20)	-.43 (.48)
Tobacco use ego (sender effect)	-.43 (.26)	-1.04 ⁺ (.34)
Tobacco use homophily	2.24* (.58)	2.31 ⁺ (.81)
Alcohol use alter (receiver effect)	-.13 ⁺ (.06)	-.23 ⁺ (.09)
Alcohol use ego (sender effect)	.27* (.09)	.30 ⁺ (.14)
Alcohol use homophily	.01 (.08)	.12 (.14)
<i>Tobacco use dynamics</i>		
Linear shape	-1.50* (.39)	-1.43* (.48)
Effect from gender (boy = 1)	-.38 (.29)	-.17 (.32)
Effect from grade	.11 (.37)	.19 (.56)
Effect from alcohol use	1.26** (.18)	1.37* (.33)
Tobacco use of close peers (influence; average alter)	.92* (.42)	2.00* (.36)
Influence of perception of tobacco use		-.54 (1.16)
<i>Alcohol use dynamics</i>		
Linear shape	-1.69*** (.15)	-1.66*** (.18)
Quadratic shape	.69** (.10)	.70** (.10)
Effect from gender (boy = 1)	.19 (.10)	.18 (.13)
Effect from grade	.29 ⁺ (.12)	.46 ⁺ (.20)
Effect from tobacco use	.29 (.25)	.34 (.69)
Alcohol use by close peers (influence; average alter)	1.63* (.70)	2.26* (.95)
Influence of perception of alcohol use		-1.15 (1.09)

Note. In the estimates for tobacco use dynamics one school location was excluded due to unsatisfying model convergence. ⁺ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

(*indegree activity*; $b = -1.70, p < .01$). The gender-homophily effect indicated a tendency for same-gender peers to nominate each other as part of their peer group ($b = .65, p < .05$). With regard to substance use, respondents who smoked tobacco were likely to affiliate with others who also smoked tobacco (*tobacco use homophily*; $b = 2.24, p < .05$). Those who drank alcohol were not more likely to affiliate with each other, but did have a stronger tendency to select more peer group members over time than respondents who did not drink alcohol (*alcohol use ego*; $b = .27, p < .05$). In the behavioral part of the models, the linear shape effect showed a low tendency toward tobacco and alcohol use (*linear shape*; $b = -1.50, p < .05$, and $b = -1.69, p < .001$ respectively) and respondents with a higher score on alcohol use were more likely to have higher scores for alcohol use over time, and vice versa (*quadratic shape*; polarization; $b = .69, p < .01$). Furthermore, there was also an effect of respondents' alcohol use on their tobacco use (*effect from alcohol use*; $b = 1.26, p < .01$), but not of tobacco use on their alcohol use, indicating that adolescents who smoked tobacco did not necessarily tend to score higher on drinking behavior over time, but adolescents who consumed alcohol, tended to score higher on smoking tobacco at a later time point.

To answer our hypotheses, we found in model 1 that there was indeed a direct influence of peers' actual substance use of both tobacco ($b = .92, p < .05$) and alcohol use ($b = 1.63, p < .05$) among close peers but no influence of the perception of peers' substance use on adolescents' own substance use (Model 2), indicating that the perception adolescents had of the behavior of their peers did not affect their own behavior.

Discussion

Whether peers smoke tobacco or drink alcohol has shown to be an important influence on adolescent's own substance use (e.g., Kiuru et al., 2010; e.g., Mathys et al., 2013; Osgood et al., 2013; Simons-Morton & Farhat, 2010). Adolescents tend to conform and mimic the actual behavior of peers through behavioral modeling, to find a sense of belonging and acceptance (Bandura & McClelland, 1977; Burgess & Akers, 1966; Cialdini et al., 1991). However, besides the direct influence of peers' actual substance use, adolescents can also be influenced by the perception they have of peers' behavior (Cialdini et al., 1991). This study, therefore, set out to examine whether adolescents are directly influenced in smoking tobacco and drinking alcohol by the actual substance use of their peers or also more indirectly through any perceptions they have of peers' substance use.

It was expected that both a direct influence of the substance use of peers (with whom they had a close relationship: best friends and individuals with whom they hang out with most often), and perceptions of close peers' substance use would affect the extent to which adolescents would engage in substance use themselves. The findings of this study showed that adolescents were indeed influenced by the actual substance use of peers in the peer group in both tobacco use and alcohol use. However, perceptions of the substance use of their close peers did not have an effect on adolescent's smoking tobacco or drinking alcohol. From these findings we might conclude that perceptions of peer behavior do not influence adolescents in their own substance use. However, the fact that we did not find an effect of perceived substance use on adolescents' own substance use may be due to how perceptions of the behavior of close peers are formed.

It is likely that the way adolescents think their close peers behave is partly based on their observation of those peers' behaviors. Adolescents spend a lot of time socializing with close peers (Brown, 2004; Gifford-Smith & Brownell, 2003; Rasmussen & Salkind, 2008), and it is unlikely that perceptions of close peers' behavior are independent of observed behavior. Hence, perceptions of substance use by close peers might not play a role, because they overlap with observed substance use of peers. This way, adolescents are mainly influenced directly by peers with whom they have a close relationship.

However, if perceptions of close peer behavior are indeed based on observations of those behaviors, it is strange that we found much disagreement between self-reported and perceived behavior of close peers (see Table 4.2). From previous research, we would expect adolescents to misperceive the behavior of their peers, by overestimating, rather than underestimating, the prevalence of that behavior (Boman et al., 2011; Kandel, 1996; Otten, Engels, & Prinstein, 2009; Prinstein & Wang, 2005; Weerman & Smeenk, 2005). What might occur in peer groups is that adolescents are unwilling to report on the substance use of close peers. Therefore, our measure of perception might not adequately capture the true perceptions of peers' substance use, at least when it comes to close peers. Adolescents might underreport the substance use of close peers because they do not want to 'tell on' peers in the group, which might be the case if they nominated them. It may be fruitful to examine perceptions of behaviors in a sample of adolescents who do not share (close) relationships. There might be a difference in how accurate adolescents are in (their willingness to report) their assessments of behavior of different 'types' of peers. Examining (the discrepancy between self-

reported substance use and) perceived substance use in a sample of unconnected peers, one can rule out behavioral modeling of observed peers behavior and the risk of underreporting on peer group members, thus better testing the effect of perceived substance use on adolescents' own substance use.

Furthermore, particularly adolescents who are not affiliated (yet) might be influenced by the perceptions they have on how others behave, but these perceptions might be based on a more wide-ranged view of peer behavior. Adolescents' perceptions of others' behavior can also be based on more general ideas or social norms of how they are expected to behave (Sherif, 1966; Spears, Oakes, Ellemers, & Haslam, 1997). These general social norms might be formed by what adolescents consider to be stereotypical such that the mere idea of how the stereotypical adolescent would behave could affect their own behavior. Thus, adolescents might be influenced by the perceptions of how others behave, but on a more general level that goes beyond their direct context of peers. It might be worthwhile to examine to what extent adolescents identify themselves with more general characteristics or stereotypes of how adolescents would behave, to see if they are influenced by more overall perceptions of adolescents' behaviors.

Lastly, many datasets that focus on peer influence and network data contain information on relationships between peers. Conversely, they contain information about unconnected adolescents as well. There might be much to gain, if we consider that 'non-relationships' between adolescents are just as interesting to study as relationships between adolescents. Furthermore, the current study focuses on social networks in classes, but (non-)relationships between adolescents can also transcend the classroom. Therefore, future studies might benefit from examining social networks and (perceived) behaviors across classes and/or grades, and not only examine peer influence processes between peers who share a relationship, but also between peers who do not share a relationship could be an interesting and potentially fruitful avenue for future research.

Conclusion

Our study examined the actual and perceived substance use of peers and their influence on adolescents' own substance use. Our findings showed that adolescents are influenced by the behavior of their close peers, but not by what they think those peers do. Furthermore, perceptions of peers' substance use were studied using a novel method – a network of nominations – in which adolescents could nominate whether their close peers engaged in substance use or not. Although this measure of perceptions of behavior might not be the best operationalization of

perceived behavior for adolescents sharing a close relationship, it was informative in demonstrating a discrepancy in what adolescents do and what others think they do. For future studies, it is important to consider how and when adolescents (are willing to) report on their peers' behaviors, particularly when it concerns sensitive subjects or behaviors among close peers. Both actual and perceived peer behavior might have an effect on adolescents' own behavior, but perceptions of behavior might be more difficult to capture and might be based on a more general idea of peer behavior than expected.

CHAPTER 6

General Discussion and Conclusion

The relevance of peers for the social-emotional wellbeing of adolescents has been widely acknowledged and scholars agree that being accepted, especially by others in the peer group, is of fundamental importance to finding social support, a sense of belonging, and feeling connected (e.g., Rubin, Bukowski, & Laursen, 2009; Rubin et al., 2006). Although being part of a peer group offer many benefits, peer groups also form a setting where adolescents can influence each other in less positive ways: risk behavior among peers is shown to be one of the most important factors for an adolescent's own risk behavior (e.g., Dishion et al., 1995; Henry et al., 2001; Kerr et al., 2012; Patterson et al., 2000; Svensson et al., 2012; Weerman, 2011). Although scholars have become skillful in disentangling the influences from other processes, far less is known about how and under which conditions adolescents are influenced by their peers in their risky behaviors. This dissertation, therefore, aimed to examine when adolescents are more likely to adopt risk behaviors and how they accomplish this. This concluding chapter summarizes the main findings, reflects on the findings and discusses the implications of this dissertation and directions for future research.

Summary of Main Findings

Features of Peer Groups

Adolescents mostly look to each other in peer groups to see how to behave, but their motivation to engage in behaviors is very important to whether or not they actually behave in one way or another. For adolescents, the goal of trying to fit in or becoming accepted by peers is most important (e.g., Baumeister & Leary, 1995; Berndt, 1979; Coleman, 1961; Rubin et al., 2006) and often reached via three pathways, namely by gaining status, affection, and behavioral confirmation (Lindenberg, 1996; 2001; Ormel et al., 1999; Ormel, 2002). It is through these needs that differences in the susceptibility to the risk behaviors of peers might exist.

The needs for status and affection can be satisfied by behaving in a way that is attractive to others, for example by attaining high social status or becoming popular (Buhrmester, 1990; Cillessen & Rose, 2005; Jarvinen & Nicholls, 1996; Ojanen et al., 2005). In peer groups some adolescents are likely to have a higher social status than others, leading to possible differences in hierarchies in those groups. Ethnographic studies such as by Adler and Adler (1998) and Eder (1985) have given insight into this. Take the statement of a girl who describes the hierarchy in her group: "We had three levels, kind of. There was Denise in the center, and then me and Christy kind of just close to the center, and then there was another level beyond us, way beyond us." (Adler & Adler, 1998, p. 78), and compare this

with the following statement about a group with no such hierarchy: “They were not identified by a single core person, [...], and no leader dominated the delineations of the borders.” (Adler & Adler, 1998, p. 86). The differences in social status in peer groups might inform us of why some adolescents are more susceptible to peer influence than others, because they might elicit different behavioral responses from its members.

Chapter two argued that competition for status in egalitarian peer groups would be stronger, because adolescents would be more aware of others who could challenge their position and compete with them for status (Adler & Adler, 1998; Eder, 1985). To maintain their social status, adolescents would be more inclined to display aggression to emphasize a powerful and dominant position among peers (Cillessen & Mayeux, 2004; Dijkstra et al., 2009). In hierarchical peer groups there would be less competition, and the hierarchy would stabilize relationships and decrease group hostility (Pellegrini & Long, 2002; Savin-Williams, 1979). In contrast, prosocial behavior would be less likely in egalitarian peer groups due to the costly risk of the prosocial act not being reciprocated (Clark & Mils, 1993) and because it might expose one’s weaknesses (Ryan et al., 2001; Shim et al., 2013).

The results of chapter two showed, partially in line with expectations, that adolescents residing in peer groups that were more egalitarian, particularly in same-gender egalitarian peer groups, tended to be more aggressive (as expected) and more prosocial (contrary to our expectations). We argued that behavioral directedness of aggression and prosocial behavior might explain the findings, because both behaviors can be functional for several reasons, such as gaining resources for one’s group or maintaining balanced relationships in the peer group. Chapter two also found gender-related nuances to the main findings, specifically with regard to same-gender versus mixed-gender peer groups. Different processes seemed to be at play in mixed-gender peer groups compared to same-gender peer groups. To conclude, our study importantly showed that our measure, for better identifying different hierarchical structures in peer groups, could detect the subtle effects in the analyses, whereas the most common measure of hierarchy (i.e., the standard deviation) could not.

Chapter three continued to examine how an adolescents’ position in the hierarchy would affect his or her behavior, by testing whether those who were lower in status were more or less likely than those of higher statuses to be influenced by peers’ behavior, in order to increase their social status. We argued that adolescents can display risk behaviors to make themselves more attractive and

become higher in status (Dijkstra et al., 2007; Dijkstra et al., 2009). Especially by imitating the behavior of high status peers they might bask in the reflected glory of those higher in status, and thus we expected adolescents with a relatively low social status to be more likely to be influenced by peers' behavior than adolescents with a relatively high social status. Although chapter two indicated that the hierarchical structure of a peer group can affect how members of those peer groups behave, the findings of the study in chapter three would appear to suggest that peer influence is not moderated by differences in status of individual members in those groups. An adolescent's individual position in the peer group did not make them more or less likely to be influenced in risk behavior in our study.

Chapter three also examined whether adolescents were more or less likely to be influenced in their risky behavior depending on the cohesiveness of their peer group. We argued that the need for behavioral confirmation can be met by imitating the observed behavior of peers and by learning, in their interactions with others, which behaviors are accepted or rejected by peers (i.e., by showing "correct" behaviors) (Bandura & McClelland, 1977; Cialdini et al., 1991; Keizer et al., 2008). This would be of crucial importance for becoming accepted by those peers and finding a place where they fit in (Coleman, 1961; Horne, 2001). Especially when what is desirable becomes salient in the peer group, we expected that adolescents would be most likely to be influenced by the behavior of their peers. This would be the case in cohesive peer groups, because well-interconnected adolescents in a peer group would strengthen the transmission of norms, rules, and behavioral conformity (Horne, 2001). The findings of chapter three, however, showed that adolescents in cohesive peer groups were no more or less likely to be influenced by their peers than adolescents in loose-knit peer groups.

Although the initial effects of group dynamics on adolescent risk behavior seemed promising, all things considered, it seems that adolescents' susceptibility to peer influence was not related to individual social status or to the cohesiveness of the relations in the peer group. The dynamics in peer groups and the features of (individuals in) peer groups do not appear to cause differences in adolescents' conforming to the behavior of peers. This might be the result of other underlying mechanisms, such as individual goals or norm conformity, but it is also possible that peer influence in risk behaviors is more general than we think. Researchers raise the question whether peer influence could be moderated by individual or contextual characteristics (see Veenstra et al., 2013), but the relative scarcity of those types of

studies only strengthens our belief in the persistent nature of peer influence processes across different contexts.

Mechanisms of Peer Influence

In the other two empirical chapters of this dissertation, we wanted to take a closer look at the theorized mechanisms for peer influence, and also partly peer selection. Most studies examining peer influence in risk behaviors in adolescence create their outcome measures from several items on a scale, particularly when it comes to delinquency (e.g., Burk et al., 2008; De Cuyper et al., 2009; Haynie et al., 2014; Knecht et al., 2010; Weerman, 2011). They mostly use a collapsed measure of self-reports which expect that adolescents associate with others who display behaviors, or adolescents will mimic behaviors that fall in line with one or more of the items on the scale. As a result, peer influence in risk behaviors is measured and identified as peer influence in any form of risk behavior. However, most of the studies mentioned assume that the crucial process for peer influence in risk behaviors is the direct mimicking of observed behavior. If this is indeed the case, then using a collapsed measure in analyses of peer influence would not necessarily be an intuitive step to take. We, therefore, wanted to investigate if adolescents are indeed inclined to adjust their behavior to the observed behavior of peers, by firstly examining whether adolescents directly imitated each other's specific behavior (on the item level) or whether they mimicked more general deviant behaviors, and secondly, by examining whether adolescents directly imitated each other's behavior or more indirectly via the perception they form of their peers' behaviors.

Chapter four used a relatively novel method of examining peer influence, with delinquency as a two-mode network versus a collapsed scale measure. In peer influence with delinquency as a two-mode network, influence (and selection) are only seen as such when the exact same types of behavior are involved. This way, when adolescents connected with peers who engaged in, for example, weapon carrying, started engaging in weapon carrying, this would be considered influence, but if they started engaging in theft, this would not be considered as influence.

The findings showed that adolescents are not (only) influenced in general in their delinquent behavior, but (also) on a specific-behavior level. Adolescents were likely to mimic the same behavior as the behavior their peers were engaged in, thus confirming that peer influence does occur through the process of behavioral modeling as argued in other literature. Peer selection on the other hand did not appear to play on the behavior-specific level. Adolescents tended to associate with others who were similar in their engagement in any type of deviant behavior. The

study in chapter four also has implications for other types of behavior. For example, health-related behavior, such as sports or other physical activities, can consist of (time spent in) several behavioral acts. Although peer selection and influence have shown to be relevant processes with regard to these behaviors (e.g., De la Haye et al., 2011; Gesell et al., 2012; Shoham et al., 2012; Simpkins et al., 2013), analyses usually combine different behavioral acts in a latent construct, whereas examining, for example, influence in specific health behaviors might give more insight into how exactly individuals influence one another.

In chapter five we wanted to test another possible mechanism by which peer influence might work. We argued that although adolescents learn which behaviors are desirable through observation, imitation, and modeling (Bandura & McClelland, 1977), they are also inclined to create a perception of what peers do by interacting and communicating with them (Cialdini et al., 1991). Thus, when considering peer influence in risk behaviors, adolescents might indeed mimic what they see their peers do, but could also be influenced in their behavior by how they perceive their peers to behave. The findings of chapter five again showed that the presumed mechanism of behavioral modeling is indeed most likely to be the mechanism that drives peer influence. Here we found no evidence that adolescents' perceptions of what their close peers do influenced their own risk behavior. The study in this chapter raised questions on the operationalization of perceptions of behavior. The way we currently operationalize perceived behavior, might be subject to social desirability meaning that adolescents are unwilling to report on the risky behavior of their peers, especially peers with whom they have shared a close relationship (friends and peer group members). The chapter therefore offers some suggestions on how to deal with these issues.

Combining the expectations and findings of chapters four and five, we consistently found that peers are directly influenced by the risky behavior of their peers. Adolescents tend to mimic the same behaviors that close peers display and not (only) risk behavior in general or what they perceive their peers do. Moreover, adolescents in peer groups seem to either unwittingly or deliberately misperceive the behavior of close peers, which indicates that examining the discrepancy between self-reported and peer-reported behavior might also be a fruitful avenue for future research.

Reflections on This Dissertation

Peer influence among adolescents has been found for a wide variety of behaviors, such as aggression (Rulison, Gest, & Loken, 2013; Sijtsema et al., 2010), delinquency (Burk et al., 2008; Svensson et al., 2012; Weerman, 2011), substance use (De la Haye, Green, Kennedy, Pollard, & Tucker, 2013; Mercken, Steglich, Sinclair, Holliday, & Moore, 2012; Osgood et al., 2013; Steglich, Snijders, & Pearson, 2010), but also weapon carrying (Dijkstra, Gest, Lindenberg, Veenstra, & Cillessen, 2012), bullying (Sentse, Kiuru, Veenstra, & Salmivalli, 2014), or internalizing problems (Giletta et al., 2011; Van Workum, Scholte, Cillessen, Lodder, & Giletta, 2013; Van Zalk, Kerr, Branje, Stattin, & Meeus, 2010).

The goals adolescents have in life might influence how they behave, and determine how vulnerable they are to the influence of others. In the realm of peer relations, goal-framing has shown its value for understanding and predicting peer behavior and affiliations (e.g., Dijkstra et al., 2007). Although we expected group dynamics and peer processes to have an effect on behavioral outcomes, this dissertation showed that adolescents do not tend to differ in individual behavior when we consider those dynamics and processes. Although scholars tend to examine peer processes for different individual characteristics or contexts, peer influence in risk behavior might be more general and persistent in peer groups. Adolescents are likely to adjust their behavior to the behavior of close peers to reach their goals, irrespective of the situation in the peer group. Apparently, more often than not, this is done by simply looking at what others do.

Chapter two introduced a new measure of hierarchy that better reveals the internal status structures of peer groups. In other studies, standard deviation is often used as a measure to detect hierarchies (e.g., Garandean et al., 2013; Zwaan et al., 2013), but this measure lacks the ability to identify what kind of hierarchical structure is present. Our measure of status structure can detect if a hierarchy consists of more or fewer individuals with a higher or lower status, thus it can identify whether a hierarchy is shaped more like a pyramid, is more egalitarian, or is shaped more like inverted pyramid. Chapter two showed that the internal hierarchy of peer relations in groups can affect behavioral outcomes of its members, but only when considering the hierarchical *structure*.

Another innovative aspect of this dissertation that goes beyond the more traditional examination of peer influence is that we converted a dependent behavioral variable from a scale into a two-mode network. When peers with whom one associates nominated a specific item and adolescents also nominated the same

behavioral act over time, this was considered peer influence. Chapter four also focused on peer selection, which for a two-mode network implies that adolescents would have to nominate the same behavioral act and associate with each other at a later time point. This approach to examining behavior is still novel in child and adolescent research and, depending on the questions researchers seek to investigate, it can offer many benefits. Behaviors allegedly copied from others can possibly be detected better when using a two-mode network approach.

Put together, this dissertation not only offers new insights into the processes associated with adolescent risk behaviors and peer groups, but also gives general new insights for individuals working in adolescent research or with adolescents in practice. Although peer influence processes are persistent, we found that adolescents often influence each other in specific behaviors. Possibly this might be because peer influence is most likely to occur in certain settings (Osgood et al., 2013). Minimizing opportunities of where risky behaviors tend to occur could help reduce peer influence because it may prevent influence being exerted in specific behavioral acts (e.g., by reducing unsupervised ‘hangouts’).

Furthermore, I believe that the worth of social network analysis should be emphasized for peer group research. We can do so much more when we have information about the (indirect) relations between individuals, the structure of networks and groups, and the (risk) behavior of adolescents. A recent article by Wölfer, Faber, and Hewstone (2015) discusses how social network analysis is underused in the field of group research. The authors correctly note that social network analysis can potentially help understand intra- and intergroup processes in addition to traditional analyses. Researchers examining group processes can use social networks to look closer at contextual factors, such as characteristics of (individuals in) peer groups, to advance the research on relations and behaviors in and between groups. With these means we can gain a better understanding of functionality or directionality of behaviors, social norms, the development of social identity, susceptibility to peer influence, the formation and dissolution of intra- and intergroup ties, and the longitudinal effect of group membership on different behaviors, and vice versa. There should be few obstacles to stepping into the line of social network analysis research, because many inexpensive software programs can analyze social networks and much information is available on how to perform analyses (see for example <http://www.stats.ox.ac.uk/~snijders/siena/>). However, we should keep some considerations in mind when conducting longitudinal social network analyses. I reflect on some of these issues in the following section.

Using SIENA

SIENA is now widely used in child and adolescent research to examine with whom children and adolescents choose to hang out with, to study the formation and dissolution of relations, and investigate how children and adolescents change their attitudes and behaviors when considering the attitudes and behaviors of the peers they have relations with. Obtaining the right data for analysis to answer research questions or hypotheses can be a complex matter with regard to the use of SIENA. Therefore, I would like to address a couple of things to think about before one starts using SIENA, to increase the feasibility of future studies and projects.

As a researcher using SIENA, it is important to realize that starting off with different choices can have very different outcomes. There are some things everyone should think about even before running any analyses at all. In general, it is crucial to think about why one wants or needs to use SIENA. Setting up models is not easy to do when you are just starting to use the program. The one thing that can save time and frustration later on is to think about whether or how one's data, study, or project is suitable for SIENA analysis. For that, I advise researchers to always be led by their theory and mechanisms.

For example, try to think about how research questions or hypotheses translate into SIENA effects. With regard to the 'influence effect' in SIENA, researchers mostly look at two options: the *average alter effect* and the *average similarity effect*. Both can examine whether individuals adjust their behavior or characteristics to that of their peers. The average alter effect says something about whether individuals who have relations with others with *higher levels* of the behavior or characteristic will themselves have a *higher* tendency to *high* levels of that behavior or characteristic. However, the latter effect implies becoming more *similar* (assimilation) and can also mean a reduction of the behavior or characteristic. Depending on one's theory or the mechanism of interest, researchers might be more interested in one of these effects than the other.

Next, consider the practical aspects of the sample, letting the theory and mechanisms lead. For example, researchers should contemplate the boundaries of the network. When you are interested in friendships, the question arises whether these friendships remain in, for example, a class, or cross class boundaries. In the latter case you might want data on the relationships across classes or even grades. Questions that might also arise include: Do the boundaries of the network change over time? Do adolescents for example change classes? Or can individuals affiliate in other contexts, such as a sports club or in extracurricular activities? All of these

questions are very important to think about, because they ultimately determine how valuable and complete network data are for SIENA analyses.

Finally, researchers should think about what behaviors are expected to be influenced and where or when this influence takes place. Think of where influence takes place, not just as contexts or opportunities, but also consider where on a scale this influence is most likely to occur. For example, will you be influenced by your peers in the first beer you drink or in the tenth? This last notion is particularly important in deciding how to categorize your outcome variable (as SIENA at the moment cannot process continuous outcome variables). The data might have more variation at a different end of the scale, but if one does not expect influence there, then it makes no sense examining it. Also, outliers on that scale can have a substantial, yet meaningless effect on the models, and the important thing is to always bring a scale back to where meaningful movements are made. Again, always keep thinking about which mechanisms drive the research questions and hypotheses, and thus the effects.

SIENA develops rapidly and it is important to be aware of knowledge about the ‘new standards’ of doing analyses and reporting of results, such as goodness of fit. I firmly believe that it is necessary to keep oneself informed about developments in SIENA, and discuss issues with others who work with the program and with experts. To perform well designed and executed analyses that will help the field of adolescent research in a proper manner, this is of vital importance.

Further Implications and Directions for Future Research

With this dissertation I wanted to obtain a better understanding of the processes that go on in adolescent peer groups, and go beyond the examination of relations between adolescents and their behavior, wishing to examine more closely how and under which conditions adolescents become similar to each other with regard to their risky behaviors. Although the findings did not always match expectations, they do show that peer groups are complex, and I hope to have advanced the research on adolescent influence processes, not only with regard to risk behaviors, but also in a more general sense. In our studies we can conclude that even more underlying processes are likely to be going on than expected beforehand. Although we know quite a lot about when behaviors are displayed, we know far less about to whom those behaviors are directed. Possibly, functional behaviors such as aggression, apply particularly when we consider intergroup processes. Studies have shown that conflicts *between* groups can actually strengthen in-group relations, specifically in

situations where groups compete for resources and power (e.g., Brewer, 1999; Sherif & Sherif, 1953), which would imply that behaviors such as aggression might be expressed mostly to outgroup members. Social network analysis could help examine the directionality of behaviors, because it facilitates testing relationships among adolescents in peer groups, but also their behavior to each other and others. Thus, if we truly want to understand why adolescents display certain behaviors, we should examine options for testing the underlying mechanism that we expect to be at the basis of those behaviors.

Similarly, we argue that behavior arises from a goals and needs perspective. However, to know if these are the underlying processes, we should also test them in the same framework. If adolescents are for example more motivated to attain a higher status, they will be more likely to behave in a way that is helpful to achieving their goal (Caravita & Cillessen, 2012; LaFontana & Cillessen, 2010). Some might even be influenced in another goal, such as overall acceptance, rather than having a high status, making it possible that they are (also) influenced by behaviors regarded as normative by their peer group (Dishion et al., 2001; Killeya-Jones, 2007). Therefore, the literature on the motivations of adolescents' behavior would benefit greatly from a closer study of when adolescents move to one goal rather than another and how their (influence in) behaviors coincide with that. This will help us better understand why susceptibility to peer influence seems to be so general, and why we (and others) found no moderating effects of characteristics (of individuals) in peer groups.

Our findings also showed that adolescents tend to behave similarly to peers and appear to be influenced on a behavior-specific level. They imitate what others actually do rather than what they think others do. However, it should be noted that (chapter four) we found that those with a higher level of delinquency tended to influence others who were not (so) delinquent, without making the distinction what delinquent acts adolescents are exactly engaged in. To rule out that adolescents are influenced by other types of risky behavior, future research might want to examine sub-scales of delinquency or other risk behavior, studying influence in similar types of behavior or examining influence processes in same behavioral acts compared to different acts in a two-mode network approach. Unfortunately, this is not possible yet, but it could be programmed in the SIENA framework.

Furthermore, in chapter five, we, again, took a novel approach to examining a peer influence mechanism, using peer nominations of perceptions of behavior and constructing a network of perceived behavior. However, perceived behavior operationalized in this way might lead to an underreporting of perceived risk

behaviors because adolescents are unwilling to report on the risky behaviors of peers. Therefore, focusing on “relationships” between unconnected or less closely connected peers might be a better approach to examine the effect of perceptions of behavior on adolescents’ own behavior. More importantly, the chapter suggests taking a new perspective on current data on peer relations, which might open up a whole new direction in which to examine non-related peers and their (risk) behaviors.

Before closing, I want to address “the peer group”, or more specifically let the reader think about what “the peer group” is or may consist of. This dissertation has used two ways of identifying peer groups. First, we tried to identify peer groups using hierarchical clustering. Measures that specifically identify peer groups are often based on finding unique (non-overlapping) groups of individuals, but analyses with those measures also take into account individuals that an adolescent might not have nominated as a group member (Cairns et al., 1985; Kreager et al., 2011; Moody, 2001; Richards & Rice, 1981). The question is whether it is reasonable to assume that non-related peers have the same influence on adolescents as peers that have been identified as friends or group members. Furthermore, the external validity of other measures (e.g., NEGOPY, RNM, Social Cognitive Maps, or Moody’s CROWDs routine) has not been consequently assessed. It is thus difficult to determine which individuals actually do have an influence on adolescents’ behavior. After the first study, that is why I started wondering whether there is such a thing as “the” peer group. Perhaps there is no such thing. That is also why in the studies described in chapter three and onwards we identified peer groups from the individual’s perspective. I tried to identify peers that could directly influence the adolescents’ own behaviors. For the future I believe that there is a great need to examine closely what constitutes a peer group, to identify which peers are actually influential. One way of doing this could be by setting up a study that specifically looks at how methodologically relevant groups translate into reality, by creating a focus group among adolescents so that we can test the external validity of our methodological measures of peer groups.

Lastly, governments, schools, parents, and others invest greatly in trying to make our youth grow up as healthily as possible. Reducing adolescents’ engagement in risk behaviors is a part of that aim. It is important to realize that what we adults would like to see is not per se normative for adolescents. They are more likely to rebel against what we find safe and healthy for them. From this dissertation, we can (carefully) conclude that peer influence processes are

persistent and likely to exist throughout a diverse range of contexts. This means that generalized interventions against risk behaviors might work, but we should keep in mind that matters, such as individual characteristics (Franken et al., 2015; Kerr et al., 2012), might be more or less influenced or influential in those behaviors. When trying to battle the proliferation of risk behaviors by reducing peer influence in those behaviors, tailored approaches to specific forms of risk behaviors might be the best way to go. It is important to realize that adolescents (also) influence one another with regard to specific behaviors, and that intervening in those processes, such as making it harder if not impossible for adolescents to find themselves in situations where this behavior occurs can help reduce the transfer of a specific type of behavior from one adolescent to the other. Thus, interventions on the behavior-specific level that target adolescents in peer groups might be particularly fruitful, while acknowledging that peer influence is persistent and adolescents have a hard time resisting their peers.

Concluding Words

This dissertation posited that adolescents are influenced especially by the behavior of the members of their peer group. Adolescents pursue certain goals and needs, wherein conforming to peer members' behavior leads to success in reaching those goals and needs. I showed that peer groups might sometimes have different dynamics than expected, but these are quite similar to what the literature has already theorized. The adolescent realm is a complex world with many factors at play. Although we sometimes expect certain mechanisms to be present, sometimes they are and sometimes not. I believe that this dissertation offers further insight into peer processes in specifically adolescent peer groups and into their risky behavior. It also showed that it can go beyond the dimensions treated in this dissertation and indeed might apply to many more topics in adolescence. We have taken only the first steps on a winding road and I hope that readers of this dissertation will take up new ideas and considerations to continue the advances in the field of child and adolescent research and practice.

Some final quotes by students in the first year of our data collection:

“Als ik zakgeld krijg, dan geef ik het meestal gelijk terug, omdat ik het niet aan kan zien dat mijn ouders mij geld geven.”

“Ik voel me niet zo lekker in de klas. Ik wordt gepest en mijn vriend doet erg dom tegen me, verder ga ik met mijn vriend vaak gamen.”

“De leukste school ooit. ☺ En we hebben alleen maar aardige leerlingen. Voel me veilig en vertrouwd op deze school.”

“Er moet een rookverbod komen voor op het plein en wie dan rookt de ouders bellen en uurtjes geven.”

“Als jullie maar niks doorvertellen, dat is echt zwaar naaierij.”

“Ik vind dit een goed onderzoek en jullie moeten hier echt mee door gaan.”

“Ik vind de school net een gevangenis. Je mag er bijna niks. Er staan grote hekken omheen en er zijn camera's en een zoeklicht dat langzaam over de school heen gaat.”

“De schoolvakantie moet niet ingekort worden!! Weetje hoeveel stress school geeft een week extra is precies wat we nodig hebben, dus pak onze vakantie week niet af!!”

Nederlandstalige Samenvatting

(Summary in Dutch)

De adolescentie is de overgangsfase tussen de kindertijd en volwassenheid, waarin jongeren hun eigen identiteit proberen vorm te geven. Waar kinderen vooral kijken naar ouders en andere belangrijke volwassenen, kijken jongeren meer naar elkaar bij het nemen van beslissingen over hun gedrag. Relaties met leeftijdsgenoten zijn van fundamenteel belang om geaccepteerd te worden, steun te krijgen en erbij te horen (e.a., Baumeister & Leary, 1995; Buhrmester, 1990; Coleman, 1961; Juvonen, 2006; Newman et al., 2007; Rubin et al., 2006). Vooral groepen van leeftijdsgenoten zijn belangrijk, omdat jongeren hiermee de meeste tijd doorbrengen (Brown & Klute, 2003; Gifford-Smith & Brownell, 2003; Hallinan, 1980; Rasmussen & Salkind, 2008). Onder leeftijdsgenoten vinden jongeren sociale steun, verbondenheid, acceptatie en kijkt men het meest naar elkaar bij het nemen van beslissingen over gedrag (zie ook Brown, 1990; Hartup, 1993; Kwon & Lease, 2007).

Hoewel leeftijdsgenoten belangrijk zijn voor de sociaal-emotionele ontwikkeling van jongeren en het vertonen van prosociaal gedrag (Buhrmester, 1996; Rubin et al., 2006), kunnen zij elkaar ook beïnvloeden in minder gunstige aspecten, zoals risicogedrag. Wat volwassenen het liefst zien (positief gedrag), is niet altijd toonaangevend voor jongeren. In het bijzonder gedrag dat zorgt voor (een volwassen) status, maar (nog) niet acceptabel is om door jongeren vertoond te worden, is aantrekkelijk en leeftijdsgenoten stimuleren elkaar ook om deel te nemen in deze gedragingen (Moffitt, 1993). Onderzoek naar risicovolle gedragingen van jongeren, zoals agressie, criminaliteit of middelengebruik, laat dan ook zien dat leeftijdsgenoten een van de belangrijkste factoren zijn voor het eigen risicogedrag van jongeren (e.a., Dishion et al., 1995; Henry et al., 2001; Kerr et al., 2012; Patterson et al., 2000; Svensson et al., 2012; Weerman, 2011).

Door gebruik te maken van state-of-the-art analysetechnieken kunnen we tegenwoordig de relatie tussen het (risico)gedrag van jongeren en hun leeftijdsgenoten analyseren. Met behulp van zogenaamde sociale netwerkanalyse (SIENA; Ripley et al., 2014; Snijders et al., 2010) zijn we in staat te onderzoeken in hoeverre jongeren een impact hebben op elkaars leven. Deze methode kan hierbij zogeheten selectie- en invloedprocessen uit elkaar halen. Het selectieproces zoals hier bedoeld verwijst naar de tendens van mensen om relaties aan te gaan met soortelijke anderen (Byrne, 1971; Lazarsfeld & Merton, 1954). Met invloedprocessen wordt de menselijke tendens tot het aanpassen van gedrag aan het gedrag van andere mensen waar men sociale relaties mee heeft bedoeld (Cohen, 1977; Friedkin, 1998). Beide processen zorgen er voor dat jongeren in de adolescentie steeds meer op elkaar gaan lijken.

De meeste onderzoekers zijn het er over eens dat het selectieproces en het invloedsproces hand in hand gaan en inzichtelijk kunnen maken waarom jongeren de neiging hebben om op elkaar te lijken in hun (risico)gedrag. Over de mechanismen die hier aan ten grondslag liggen is echter nog veel onduidelijk. In dit proefschrift probeer ik in te gaan op de vragen hoe en onder welke omstandigheden jongeren op elkaar gaan lijken, waarbij vooral de aandacht uitgaat naar het invloedsproces. Daarbij toon ik aan hoe groepsdynamiek en processen tussen leeftijdsgenoten gerelateerd zijn aan het risicogedrag van jongeren. De uitgevoerde studies geven inzicht in de aspecten van beïnvloeding die een rol spelen in adolescent risicogedrag en de manier waarop het proces van beïnvloeding plaatsvindt. Centraal in de uitgevoerde empirische studies staat het idee dat het essentieel is voor jongeren om geaccepteerd te worden en erbij te horen (e.a., Baumeister & Leary, 1995; Berndt, 1979; Coleman, 1961; Rubin et al., 2006). Dit doel kan onder andere bereikt worden door het verkrijgen van status (populariteit), het ontvangen van affectie en goedkeuring of bevestiging in het gedrag dat men vertoont (Lindenberg, 1996; 2001; Ormel et al., 1999; Ormel, 2002). Deze drie subdoelen kunnen weer bereikt worden door gedrag te vertonen dat aantrekkelijk of gewenst/correct wordt gevonden door anderen.

In hoofdstuk twee is onderzocht hoe statusverschillen tussen jongeren in groepen gerelateerd zijn aan verschillen in het risicogedrag van deze jongeren. Hierbij wordt gesteld dat agressie en prosociaal gedrag functioneel zijn voor het behoud van sociale status of populariteit. Binnen sommige groepen van leeftijdsgenoten kan er meer concurrentie zijn voor deze status, wat het moeilijker maakt om die sociale status te behouden (Adler & Adler, 1998; Eder, 1985). Om deze status te behouden zouden jongeren meer geneigd zijn om agressief gedrag te vertonen om hun dominante positie onder leeftijdsgenoten te benadrukken (zie ook Cillessen & Mayeux, 2004; Dijkstra et al., 2009). Prosociaal gedrag zou daarentegen minder waarschijnlijk zijn, omdat het in een concurrerende context kostbaar kan zijn om zich prosociaal te gedragen (Clark & Mils, 1993), maar ook omdat het zoeken van hulp zwaktes naar voren kan brengen (Ryan et al., 2001; Shim et al., 2013). Daarom beargumenteren we in hoofdstuk twee dat concurrentie het grootst is in egalitaire groepen (groepen waar weinig verschillen tussen sociale status zijn), omdat jongeren zich hier meer bewust zijn van anderen die hun positie zouden kunnen aanvechten en met hen kunnen concurreren voor status. We verwachten dat de relatie tussen individuele status en agressie dan ook het hoogst is in egalitaire groepen. De relatie tussen individuele status en prosociaal gedrag zal juist minder

sterk zijn in egalitaire groepen, omdat het hier kostbaar en risicovol kan zijn om zich prosociaal te gedragen.

Uit de resultaten van hoofdstuk twee blijkt dat jongeren in egalitaire groepen, vooral als die alleen individuen bevatten van hetzelfde geslacht, agressiever zijn (zoals verwacht), maar ook prosocialer zijn (in tegenstelling tot onze verwachtingen). We beargumenteren dat deze resultaten mogelijk verklaard kunnen worden door te kijken naar wie jongeren hun gedrag uiten: we hebben nu alleen gekeken wie agressief zijn, maar niet tegen wie ze agressief zijn. Agressie kan namelijk ook worden geuit naar anderen buiten de groep, terwijl prosociaal gedrag mogelijk voornamelijk geuit wordt naar groepsleden. Ook vonden we in hoofdstuk twee dat er verschillen lijken te zijn tussen groepen van leeftijdsgenoten die bestaan uit hetzelfde geslacht en gemengde groepen. Het lijkt zo te zijn dat er verschillende processen plaatsvinden als we deze groepen met elkaar vergelijken. Tot slot introduceert hoofdstuk twee een nieuwe maat van hiërarchie, die adequater vastlegt hoe de structuur van een statushiërarchie tussen jongeren er uit kan zien, in tegenstelling tot de meest gebruikte maat voor hiërarchie: de standaard deviatie. Onze maat van hiërarchie is zodoende beter in staat is om verschillende hiërarchische structuren op te sporen en daarmee ook subtiele verschillen in de analyses.

In hoofdstuk drie wordt vervolgens onderzocht hoe verschillen in sociale status een effect hebben op het gedrag van individuele groepsleden. De verwachting was dat vooral jongeren met een lage sociale status worden beïnvloed door leeftijdsgenoten, niet alleen omdat jongeren met een hogere status meer macht en dus meer invloed hebben op leeftijdsgenoten met een lagere status, maar ook omdat jongeren hun eigen (lagere) sociale status kunnen verhogen door het gedrag van leeftijdsgenoten, die al een hoge sociale status hebben, na te doen (Cialdini & Richardson, 1980; Dijkstra et al., 2010). Uit de resultaten van hoofdstuk drie blijkt echter dat jongeren met een lagere status niet meer of minder beïnvloed worden dan jongeren met een hoge status. Dit kan mogelijk komen doordat jongeren verschillen in hoeverre ze graag een hoge status willen hebben. Uit onderzoek blijkt dat individuen die een bepaald doel nastreven, meer geneigd zijn om dingen te doen die hen helpen dat doel te bereiken (Caravita & Cillessen, 2012; LaFontana & Cillessen, 2010). Jongeren die die dus als doel 'het hebben van een hoge status' hebben, zullen mogelijk meer beïnvloed worden door het gedrag van anderen met een hoge status dan jongeren die niet dat doel hebben.

Hoofdstuk drie onderzoekt ook hoe cohesie (hechtheid van relaties) tussen jongeren in de groep een effect kan hebben op hoe die jongeren elkaar beïnvloeden. Door het tonen van correct of gewenst gedrag maken jongeren het waarschijnlijker dat zij door groepsleden geaccepteerd worden en bij de groep gaan horen (Coleman, 1961; Horne, 2001). Vooral wanneer er grote cohesie onder groepsleden bestaat, is het gemakkelijker om te herkennen wat gewenst gedrag is, omdat er meer contact is tussen jongeren, en dit kan de overdracht van normen, regels en gedrag versterken (Horne, 2001). De verwachting was daarom dat jongeren, waarvan onder de groepsleden sprake was van een hoge cohesie, meer beïnvloed zouden worden door het gedrag van die groepsleden, dan jongeren waarvan er sprake was van een lagere cohesie onder de groepsleden. De resultaten van hoofdstuk drie laten echter zien dat jongeren in cohesieve/hechte groepen niet meer of minder beïnvloed worden door leeftijdsgenoten in hun risicogedrag dan jongeren in minder hechte groepen. Een reden daarvoor kan zijn dat er een verschil bestaat in hoeverre het belangrijk is voor een jongere om zich in de groep te conformeren aan correct of gewenst gedrag: in sommige groepen is er misschien meer ruimte voor diversiteit. Uit onderzoek blijkt dat de impact van gedragsnormen afhankelijk is van hoe belangrijk die norm is voor het individu (Cialdini et al., 1991).

In hoofdstuk vier is verder onderzocht of jongeren beïnvloed worden door risicogedrag van een leeftijdsgenoot in het algemeen of dat jongeren het specifieke gedrag van die ander nadoen. In de meeste studies wordt aangenomen dat het direct imiteren van waargenomen gedrag van anderen het cruciale proces is voor invloed in risicogedrag (e.a., Burk et al., 2008; De Cuyper et al., 2009; Haynie et al., 2014; Knecht et al., 2010; Weerman, 2011). Echter, de onderliggende aanname is dat invloed (maar ook selectie) betrekking heeft op specifiek gedrag in plaats van op het gedrag in het algemeen. In hoofdstuk vier onderzoeken we daarom of jongeren elkaar selecteren als groepsgenoot of beïnvloeden in risicogedrag in het algemeen of in specifieke handelingen, waarbij we gebruik maken van een relatief nieuwe manier van het analyseren van een afhankelijke (gedrags)variabele, door deze in te voeren als een 'two-mode' netwerk in SIENA. Invloed (en selectie) worden daarbij alleen als zodanig gezien als het exact hetzelfde gedrag betreft (bijvoorbeeld als 'beide' jongeren wel eens een muur hebben beklad en niet als de één een muur heeft beklad en de ander vervolgens steelt).

De resultaten uit hoofdstuk vier laten zien dat jongeren niet (alleen) beïnvloed worden in delinquentie in het algemeen, maar ook in specifieke delinquente gedragingen. Jongeren zijn geneigd om exact hetzelfde gedrag te

vertonen als dat van hun leeftijdsgenoten. Selectie leek zich niet af te spelen voor specifiek gedrag. In dit geval selecteerden jongeren anderen als groepsgeenoot als zij ook delinquentie vertoonden, onafhankelijk van welk gedrag dat precies was. Het onderzoek in hoofdstuk vier heeft mogelijk ook implicaties voor ander soort gedrag, zoals gezondheidsgedrag (bijvoorbeeld sportactiviteiten), die meestal ook bestaan uit verschillende gedragingen. Er is al aangetoond dat selectie van en invloed door leeftijdsgenoten ook relevante processen zijn voor dit gedrag (e.a., De la Haye et al., 2011; Gesell et al., 2012; Shoham et al., 2012; Simpkins et al., 2013), maar ook hier combineren de meeste analyses verschillende gedragingen en kijkt men niet naar selectie of invloed in specifiek gedrag.

Hoofdstuk vijf onderzoekt tot slot of jongeren waargenomen gedrag van leeftijdsgenoten imiteren of dat ze worden beïnvloed door wat ze denken dat hun leeftijdsgenoten doen. Hoewel jongeren leren welk gedrag gepast is in een bepaalde context, door middel van observatie en imitatie (Bandura & McClelland, 1977), zijn ze zijn ook geneigd om een perceptie te creëren van wat anderen doen door communicatie en de omgang met leeftijdsgenoten (Cialdini et al., 1991). Op die manier leren jongeren ook welk gedrag gewenst of correct is zonder dat ze het gedrag zelf hebben gezien. Omdat jongeren ook kunnen worden beïnvloed door de perceptie van het gedrag van leeftijdsgenoten, onderzoekt hoofdstuk vijf dit mogelijke mechanisme voor invloed naast directe invloed van jongeren in de groep. De resultaten van hoofdstuk vijf laten echter zien dat directe invloed van gedrag van leeftijdsgenoten waarschijnlijker is dan een indirecte invloed van gepercipieerd gedrag. In dit hoofdstuk vonden we geen effect van wat jongeren denken dat hun leeftijdsgenoten in de groep doen op hun eigen risicogedrag. Een reden daarvoor kan zijn dat de perceptie van het gedrag van leeftijdsgenoten sterkt overlapt met wat leeftijdsgenoten echt doen. Vooral voor jongeren die elkaar goed kennen (zoals in een groep) is dit waarschijnlijk. Toch vonden we ook dat jongeren een slechte perceptie hebben van wat hun leeftijdsgenoten doen. In veel gevallen gaven ze aan dat hun groepsleden geen risicogedrag vertoonden, terwijl hun groepsleden zelf aangaven dat wel te doen. Het kan dus ook zijn dat jongeren hun leeftijdsgenoten niet willen 'verlinken' bij het invullen van de vragenlijst.

In dit proefschrift is onderzocht hoe en onder welke omstandigheden jongeren een rol spelen in elkaars risicogedrag. De focus ligt hierbij op de groepsdynamieken en processen tussen leeftijdsgenoten in groepen, en het effect daarvan op risicogedrag. Uit dit proefschrift blijkt dat, hoewel groepsdynamieken een effect kunnen hebben op het gedrag van jongeren, jongeren niet verschillen in hun

individuele gedrag of gevoeligheid voor invloed wanneer we rekening houden met die groepsfactoren. Ook blijkt het zo te zijn dat jongeren hun gedrag direct en specifiek aanpassen aan het gedrag van hun leeftijdsgenoten in de groep, ongeacht in wat voor soort situatie ze zich bevinden. Wetenschappers geven vaak aan dat processen tussen jongeren mogelijk kunnen verschillen per context. Echter, uit mijn onderzoek blijkt dat invloed in risicogedrag in groepen van leeftijdsgenoten algemener lijkt te zijn dan verwacht. Om te voorkomen dat jongeren betrokken raken bij risicogedrag, is het daarom mogelijk belangrijk om ons te richten op het specifieke gedrag dat voorkomt (en niet risicogedrag in het algemeen). Bovendien is het goed om te realiseren dat sociale invloed onder jongeren hardnekkig is, maar ook dat dit niet betekent dat deze invloed negatief hoeft te zijn, immers, sociale beïnvloeding kan er ook toe leiden dat jongeren niet deelnemen in risicogedrag.

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Kim Pattiselanno was born on November 11, 1986 in Delfzijl, the Netherlands. She obtained a Bachelor's degree in Psychology (2009) and a Master's degree in both Psychology (cum laude, 2010) and Sociology (2010), at the University of Groningen. In October 2010, Kim started as a PhD candidate and became a member of the Interuniversity Center for Social Science Theory and Methodology (ICS) at the University of Groningen, where she was in the project group that set up and coordinated the SNARE study. Her PhD project was part of the overarching project "The Group Dynamics of Adolescent Risk Behavior" (NWO Youth & Family Program, project number 431-09-027). After her PhD, Kim was appointed a position of lecturer at the Department of Sociology, University of Groningen, and has recently been appointed to the position of research lecturer at the School of Social Work and Arts Therapies at Stenden University of Applied Sciences, Leeuwarden.

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