



## They get the power!

Consequences and antecedents of aggressive, prosocial, and academic popularity norms in adolescents' classrooms

Lydia Laninga-Wijnen

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**THEY GET THE POWER!**

CONSEQUENCES AND ANTECEDENTS OF AGGRESSIVE, PROSOCIAL,  
AND ACADEMIC POPULARITY NORMS IN ADOLESCENTS'  
CLASSROOMS

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# **THEY GET THE POWER! CONSEQUENCES AND ANTECEDENTS OF AGGRESSIVE, PROSOCIAL, AND ACADEMIC POPULARITY NORMS IN ADOLESCENTS' CLASSROOMS**

Zij krijgen de macht! Consequenties en voorspellers  
van agressieve, prosociale en academische  
populariteitsnormen in schoolklassen tijdens de  
puberteit

(met een samenvatting in het Nederlands)

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**Chapter**

**1**

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Introduction

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### 1.1 Introduction

Ushered in with pubertal and biological changes, peer relationships take on unique significance when young people reach adolescence. Neurological changes in the social brain enhance adolescents' desire to connect and bond with their peers (Baumeister & Leary, 1995), and establishing high-quality friendships becomes a core developmental task as its fulfillment has crucial implications for adolescents' social and academic functioning (Bagwell & Bukowski, 2018). Moreover, adolescents become increasingly sensitive to what their peers think about them, and they are motivated to actively pursue being noticed, approved, and powerful among their peers (Chein et al., 2011; Prinstein, 2018). They prioritize *popularity* – a social reputation characterized by power, prestige and admiration – over other social and relational goals (LaFontana & Cillessen, 2010). At the same time, in most countries, adolescents transition from smaller elementary schools to larger secondary schools, accompanied by an influx of new and unfamiliar peers, causing destabilization and reorganization of adolescents' social landscape. This poses a major challenge to adolescents: their increasing desire for peer affection and status has to be fulfilled in a relatively new peer context.

Amidst these turbulent changes, classrooms pose an important developmental context to adolescents, as adolescents spend a large part of the day at school with their classmates. Yet, classrooms vary greatly from each other: some classrooms constitute a positive, safe, and stimulating learning environment, whereas others may be characterized by negative peer relationships and proliferating aggression which distract adolescents from learning and hamper their social-emotional adjustment (Jones, Brown, Hoglund, & Aber, 2010; Wentzel, Filesett, & Looney, 2007). A way to capture the classroom as social context is by assessing its *peer norms* (Chang, 2004). Peer norms reflect a certain level of consensus on what behaviors are expected or typical in a classroom (Shaw, 1981; Veenstra, Dijkstra, & Kreager, 2018). In particular peer norms for *social* (prosocial and aggressive) and *academic* (achievement and motivation) behaviors may matter, as classrooms are inherently social, dynamic contexts

where adolescents form relationships with their peers and where academic capacities are supposed to be maximized (Rodkin & Ryan, 2012).

The most common way to capture social or academic peer norms is by assessing *descriptive norms*: the average perceived behavior of *all* individuals in a setting such as the classroom (Wright et al., 1986). Alternatively, a norm salience perspective argues that *status norms* may be particularly relevant to adolescents (Henry et al., 2000). Status norms reflect the extent to which behaviors are *rewarded* with high status (acceptance, popularity), or *punished* with low status (rejection, unpopularity) among peers. As adolescents increasingly desire for popularity, perhaps because it provides them access to valuable social and material resources (Hawley, 1999), particularly popular peers may set a norm ("*popularity norm*") within classrooms for which behaviors are considered attractive and valuable (Dijkstra & Gest, 2015) and function as role models (Bandura, 1977). Therefore, popularity norms may provide important rules on how adolescents should behave in order to fit in with the expectations of the peer group and to prevent being seen as a "social misfit" (social misfit theory; Wright et al., 1986). As such, the power of popularity norms may lie in its capacity to steer adolescents' peer preferences – for instance, whom they prefer as friends – and to strengthen adolescents' behavioral conformity processes (Therborn, 2002). Ultimately, popularity norms may be central in shaping the simultaneous development, or coevolution, between these peer and behavioral dynamics (Veenstra, Dijkstra, Van Zalk, & Steglich, 2013).

Given the potential consequences of popularity norms for adolescents' peer relationships and behavior development, it is important to examine why certain popularity norms emerge in the first place. Following social impact theory (Latané, 1981), the formation of norms may be a function of 1) the *number of people* endorsing certain behaviors; 2) the *social dominance* (strength) of people enacting these behaviors, referring to power-related characteristics such as leadership qualities; and 3) the *immediacy* of these people, referring to the closeness in space or time (Latané & Wolf, 1981). Therefore, the classroom composition of students – based on their numbers, behaviors, and social dominance – may play a key role in the formation of norms. Moreover, certain types of students may strengthen

the formation of a strong *popularity hierarchy* (asymmetries in popularity within a classroom), which – following a balance of power perspective (Garandau et al., 2014) – would enhance the valence of aggression and decrease the valence of prosocial behavior in classrooms. Therefore, the classroom composition and structure are potential factors contributing to the development of popularity norms.

In this dissertation, I aim to examine the consequences of popularity norms for the coevolution between peer relationships (friendships) and aggressive, prosocial, and academic behaviors. I also aim to unravel antecedents of popularity norms by focusing on the classroom composition and structure.

### **1.2 The Consequences of Popularity Norms for the Coevolution of Friendships and Behavior**

Peer norms – and in particular popularity norms – for social and academic behaviors may have important implications for adolescents' peer relations and behavior, and for the coevolution between the two. Following social misfit theory (Wright, Giammarino, & Parad, 1986), adolescents who conform to the norm are more likely to be accepted by their peers, whereas those who deviate (e.g., are *dissimilar* from the group) are at risk of becoming a 'social misfit'. As such, peer norms may affect adolescents' peer preferences and affiliations. Moreover, because peer acceptance is important for adolescents' feelings of belongingness (Tarrant et al., 2001), affection, and trust (Leenders, 1998), adolescents try to conform to peer norms (Wright et al., 1986). Consequently, norms may not only play a role in peer relationships, but also in adolescents' behavioral development.

Most prior empirical studies tested social misfit theory (Wright et al., 1986) by focusing on the role of *descriptive norms* (the average perceived behavior in a group) in the link between peer relationships (acceptance) and behaviors. It was shown that aggressive behavior was related to peer acceptance only in high aggressive groups and not in low aggressive groups (Boivin, Dodge, & Coie, 1995; Chang, 2004; Stormshak, Bierman, Bruschi, Dodge, & Coie, 1999; Wright et al., 1986). Also, prosocial behavior and academic achievement were particularly related with peer acceptance in classrooms where these behaviors were the

descriptive norm (Chang, 2004; Dijkstra & Gest, 2015). Moreover, various studies found that aggressive descriptive norms strengthened adolescents' tendency to increase in aggression over time (Kellam, Ling, Merisca, Brown, & Ialongo, 1998; Kuppens, Grietens, Onghena, Michiels, & Subramanian, 2008; Mercer et al., 2009; Thomas, Bierman, & Powers, 2010; Thomas & Bierman, 2006). Again, similar findings emerged with regard to prosocial behavior (defending others against bullying, Pozzolini, Gini, & Vieno, 2012; helping, Berger & Rodkin, 2012) and academic behaviors (McCormick & Cappella, 2015). Consequently, adolescents may become increasingly similar to each other in behaviors that are the descriptive norm.

Although previous research provides valuable insights into how descriptive norms may shape peer relationships and adolescents' behavioral conformity processes, it is unlikely that *all students* in a classroom are equally influential. In adolescence, peer relationships are increasingly organized along the dimension of popularity (Cillessen & Marks, 2011; Dijkstra, Cillessen, & Borch, 2013). Popular adolescents are commonly assumed to be more powerful (Adler & Adler, 1998), attractive for affiliation (Dijkstra et al., 2013), visible (Lease, Kennedy, & Axelrod, 2002), and influential than others (Adler, Kless, & Adler, 1992). Therefore, particularly popular peers' behaviors may become a powerful norm for what is seen as attractive and valuable in a particular context. In line with this reasoning, one cross-sectional study found that associations between bullying and peer (dis)approval depended on involvement of popular adolescents in bullying (popularity norm), rather than on involvement of all classmates (descriptive norm; Dijkstra et al., 2008). In a follow-up study, similar patterns were found for prosocial behavior and academic achievement (Dijkstra & Gest, 2015). These findings suggest that popularity norms – rather than descriptive norms – matter for the extent to which behaviors relate to peer (dis-)approval.

Consequently, it is likely that adolescents especially tend to *conform* to the norms of popular peers in order to gain peer approval and popularity (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010). This notion can be supported with several theories. Social learning theory suggests that engagement in new behaviors is promoted by observing and imitating the behaviors of valued

referents (Bandura, 1977). Popular peers may serve as valued referents in classrooms, presumably because adolescents believe these behaviors will earn them higher levels of peer status. Likewise, the prototype willingness model (Gibbons & Gerrard, 1995; Gibbons, Gerrard, Blanton, & Russell, 1998), postulates that individuals are motivated to engage in behaviors that approach their estimates of a favorable prototype's behavior (such as a popular peer) in order to maintain a favorable self-image. This may occur through social comparison processes (Festinger, 1954): adolescents construct a sense of identity by comparing their own behaviors to those of others (Felson, 1985; Harter, Stocker, & Robinson, 1996). Favorable comparisons (i.e., adolescents' perceived similarity between themselves and popular peers) promote positive self-regard, which is intrinsically rewarding. Unfavorable comparisons create cognitive dissonance (e.g., Brown & Lohr, 1987) that can be resolved either by altering perceptions of others, or by changing one's own behaviors. In sum, these theories suggest that adolescents may become increasingly similar to each other in behaviors that are rewarded with popularity.

There is some evidence that supports how adolescents' perceptions of popular peers' behaviors may play a role in shaping their own behavior. One study demonstrated that levels of bullying were higher in classes where bullying was more strongly associated with popularity (Dijkstra et al., 2008). In addition, a longitudinal study demonstrated that students who associated aggressive behavior with high social status increased their own aggressive behavior over time (Juvonen & Ho, 2008). Lastly, it was found that higher perceptions of popular peers' substance use related to an increase in adolescents' own substance use (Helms et al., 2014). These studies demonstrate that adolescents may tend to conform to popularity norms, increasing homogeneity in normative behaviors among peers.

This dissertation sets out several steps to further enhance our understanding of the role of popularity norms in peer- and behavior dynamics in adolescent classrooms. A first new step is to examine which mechanisms explain peers' homogeneity in normative behaviors (i.e., descriptive norms and in particular popularity norms). A second step is to examine the role of these norms

in peer dynamics across multiple behavioral domains. A third step is to examine the antecedents of popularity norms.

### **1.2.1 Selection, maintenance, and influence**

A first new step is to get more insights into the mechanisms underlying similarity among peers in normative behaviors. Most of the aforementioned theories assume similarity among peers in normative behaviors to be the result of only *socialization* (e.g., influence) processes. Homophily Theory, however, distinguishes three core mechanisms that provide alternative explanations for peer similarity (Brechwald & Prinstein, 2011; Heilbron & Prinstein, 2008; Kandel, 1978). First, similarities may occur because adolescents tend to engage in similar behaviors as their peers due to *influence* processes, such as reinforcement, persuasion (Dishion, Andrews, & Crosby, 1995), or observation (Bandura, 1977). Second, similarities can be elucidated by adolescents' preference to start or keep affiliating with peers who already engage in similar behaviors, which refer to *selection* or *maintenance* processes, respectively. The idea that humans select or maintain their friends on the basis of similarity can be traced back to at least Greek antiquity (McPherson, Smith-Lovin, & Cook, 2001). Byrne (1971) referred to this process as "similarity attraction": People tend to select and maintain similar others (or de-select dissimilar others) as friends, because similarity enables individuals to communicate with less effort and with shared feelings of understanding and belongingness, making relationships more rewarding and stable (Byrne, 1971; Veenstra & Dijkstra, 2011). These three mechanisms – selection, maintenance, and influence – result in the same phenomenon: similarity among peers (friends). Theories that expand the mechanisms of friendship similarity beyond influence processes require methods that capture maintenance and selection effects at the same time as influence effects. To address this methodological challenge, the RSIENA (Simulation Investigation for Empirical Network Analyses) program has been developed. This program disentangles peer selection, maintenance, and influence processes in a statistically sound way, yielding reliable indications of the strength and direction of these friendship dynamics (Snijders et al., 2007), while controlling for structural network effects

and the overall development of a behavior in the network (i.e., the classroom in this dissertation).

To date, several previous studies used RSIENA to examine peer selection, maintenance and influence processes with respect to aggression (Dijkstra, Berger, & Lindenberg, 2011; Logis et al., 2013), prosocial behavior (Logis et al., 2013; Molano et al., 2013) and academic behaviors (Flashman, 2012; Shin & Ryan, 2014a). Importantly, their findings on the magnitude and direction of selection, maintenance and influence processes related to these attributes varied considerably across and within studies. So far, studies have only reported these variations across settings, but have not provided an explanation of why the strength or direction of these friendship processes might vary. A reason could be that different settings (such as classrooms) are characterized by distinct *popularity norms*. Indeed, the reputational salience hypothesis (Hartup, 1996) postulates that friendship selection, maintenance, and influence may mainly occur for “reputationally salient” behaviors: behaviors that are an important tool to increase one’s social peer status such as popularity. As such, classroom popularity norms may have consequences for adolescents’ friendship- and behavior dynamics.

At the start of this dissertation, only one prior study had integrated the role of popularity and descriptive norms with selection and influence processes in a social network framework (Rambaran, Dijkstra, & Stark, 2013). It showed that students only adopted positive attitudes toward antisocial behaviors over the course of the school year in classrooms where these attitudes were rewarded with popularity. This finding indicates the spread of positive attitudes toward antisocial behaviors via status-based influence processes. Descriptive norms did not play a role in these friendship processes. This study presented a breakthrough in the peer norm literature by indicating that similarity among peers varied across classrooms as a function of popularity norms. In other words, adolescents were most likely to be influenced by their friends in attributes that were conform the popularity norm. Yet, it is still unknown how prosocial, aggressive, and academic popularity and descriptive norms would affect friendship selection, maintenance and influence in adolescent classrooms.

### 1.2.2 Friendship processes across social and academic domains

A second new step in the literature is to compare the role of popularity norms across multiple behavioral domains (social and academic behaviors). This may provide more information on whether popular peers can be a stronger role model for one type of behavior than for the other, and whether they may be seen a risk- or protective factor in adolescent classrooms.

**Social domains.** With regard to *social behaviors*, the few prior studies on the role of popularity norms in adolescent peer relationships and behavioral development mainly highlighted popular peers as a *risk factor* for adolescent social development (for aggression, Dijkstra et al., 2008; antisocial attitudes, Rambaran et al., 2013). Unfortunately, this important work has not been accompanied by an equivalent exploration of popular peers' role in more positive (prosocial) domains that may protect against these risks. In order to grasp the role of prosocial and aggressive popularity norms in friendship processes, it is important to consider that prosocial and aggressive behavior can be defined as two distinct but also partly overlapping dimensions that can both *co-occur* and *interplay* within individuals, relationships and contexts (Card et al., 2008; Pellegrini, 2008). Following resource control theory (Hawley, 2003), some adolescents gain access to resources (such as popularity) using either prosocial strategies (prosocial controllers) or aggression (coercive controllers), whereas others do this by means of *both* prosocial and aggressive strategies (bi-strategic controllers). Likewise, some classrooms may be characterized exclusively by either prosocial *or* aggressive popularity norms, whereas others may be characterized by *both* aggressive and prosocial popularity norms. This illustrates the need to examine constellations (combinations) of prosocial and aggressive popularity norms in classrooms.

Another question that may arise is how such popularity norm combinations affect prosocial and aggressive friendship processes. For instance, it is likely that prosocial friendship processes (e.g., the selection or maintenance of prosocial peers as friends, or prosocial friendship influence) are strongest in classrooms with high prosocial and low aggressive popularity norms. At the same time, aggressive friendship processes may be strongest in classrooms where aggression rather than

prosocial behavior is rewarded with popularity. Moreover, in such classrooms, there may be an *interplay* of aggression and prosocial behaviors through *cross-behavior norm processes* and *cross-behavior friendship processes*. For instance, when prosocial rather than aggressive behaviors relate to popularity, these prosocial popularity norms may discourage aggressive friendship processes (cross-behavior norm processes). Popularity norms may also affect the interplay of prosocial and aggressive behavior at the friendship-level. For instance, aggressive friends may diminish adolescents' prosocial behavior over time (cross-behavior friendship influence) in classrooms where aggression rather than prosocial behavior is rewarded with popularity.

It is unknown what would happen in classrooms where both aggressive and prosocial behaviors relate to popularity and hence are not mutually exclusive at the popularity norm-level. There are reasons to assume, however, that in such classrooms, aggressive popularity norms would be more powerful regulators of individuals' peer relations and behavioral decisions than prosocial popularity norms. Two social-psychological reviews (Baumeister et al., 2001; Rozin & Royzman, 2001) indicated that people seem to give greater weight to negative events (negative relationships, negative feedback from peers) than to positive ones, possibly due to innate predispositions and prior experiences (Rozin & Royzman, 2001). Consequently, adolescents may give greater weight to aggressive than to prosocial popularity norms. Indeed, a recent experimental study found visual attention toward popular peers to be stronger after a negative prime than after a positive prime, which may indicate that popular peers' aggressive behaviors attract more attention than their prosocial behaviors (Lansu & Troop-Gordon, 2017). Given that attention is a prerequisite for influence, aggressive popularity norms could more strongly affect friendship processes than prosocial popularity norms. Consequently, an interesting question is whether prosocial and aggressive popularity norms form constellations within classrooms, and how these constellations contribute to the co-existence and interplay of prosocial and aggressive friendship processes.

**Academic domains.** Whereas prosocial and aggressive behaviors are typically described as key strategies to achieve popularity (Hawley, 2003),

*academic behaviors* such as achievement are generally assumed to be less important for popularity (Schwartz, Gorman, Nakamoto & McKay, 2006). Academic achievement may also inherently differ from social behaviors as it is not *directed to others*, but rather an individual behavior that serves individual goals and aspirations (Ryan & Deci, 2000). Therefore, academic achievement may be a less visible or salient characteristic, and a less strong strategy to gain high popularity in the peer group, when compared to prosocial or – in particular – aggressive behaviors. Nevertheless, popularity norms regarding academic achievement may differ between classrooms. In certain classrooms, low academic achievement might be considered “cool”, for instance because students in these classrooms react against adult-approved behaviors to achieve well in school (Moffitt, 1993), whereas in other classrooms, high achievement could relate to popularity, because students are more occupied with their future education and careers (Rodkin & Ryan, 2012). Moreover, it could be interesting to examine whether other types of peers (also) set the norm for achievement-based friendship processes, such as well-liked, rejected, and unpopular peers (Rodkin & Ryan, 2012). This examination would provide more insights in the relative importance of reputation-based constructs (popularity, unpopularity) and preference-based constructs, as well as the power of social sanctions or social rewards (Brechwald & Prinstein, 2011) in relation to peer norms and academic friendship dynamics.

In addition to academic achievement, the motivational processes or achievement goals *underlying* students' academic achievement have been shown to matter for adolescent peer relationships and for how adolescents behave toward their peers (Linnenbrink-Garcia & Patall, 2016; Poortvliet & Darnon, 2010; Wigfield, Eccles, Fredricks, Simpkins, Roeser, & Schiefele, 2016). In achievement settings, two contrasting goals are often evident: mastery and performance goals (Ames, 1992; Dweck, 1986; Elliot et al., 2011). When mastery goals are salient in the classroom, there is a focus on *developing* academic competence or task mastery, whereas when performance goals are salient, there is a focus on *demonstrating* academic competence relative to other students, through superior performance or looking smart (Pintrich, 2000). Many researchers have shown that the salience of these achievement goals (due to manipulation in experiments or

natural variation in classrooms) affects the quality of social interactions with peers as well as adolescent achievement (Darnon, Dompnier, & Poortvliet, 2012; Levy-Tossman, Kaplan, & Assor, 2007; Poortvliet & Darnon, 2010). Yet, given the increased importance of popular peers in adolescence, it is likely that popular peers may also make certain goals salient in the classroom. In turn, these achievement goal popularity norms may affect achievement-based friendship processes. For instance, if performance goals are the norm, this may create a competitive setting where adolescents can only achieve their goal of outperforming others when others do *not*. Consequently, adolescents may be less likely to cooperate with each other or help each other on academic tasks, which may diminish peer influence on academic achievement (Roseth et al., 2008). Instead, when mastery goals are the popularity norm, adolescents may view their fellow students as helpers toward their goal of developing academic competence. This may stimulate useful information exchange patterns and cooperation, which may stimulate friendship influence. Therefore, the extent to which these mastery- or performance goals are made salient by popular peers could affect the coevolution of adolescents' peer relationships and academic achievement (Shin & Ryan, 2014a).

### **1.3 Antecedents of Popularity norms in Adolescent Classrooms**

Aggressive and prosocial popularity norms may play an important role in adolescent friendship processes, but how do these popularity norms emerge in the first place? Although recent work illuminated that classrooms differ in the strength of aggressive and prosocial popularity norms (Gest & Rodkin, 2011; Dijkstra & Gest, 2015), little is known about the origins or antecedents of these popularity norms. Consequently, a third new step in the literature would be to investigate the antecedents of classroom popularity norms.

**Popularity hierarchy.** Firstly, a classroom characteristic that may predict popularity norms is the degree to which popularity is unequally distributed in the classroom: the within-classroom popularity hierarchy (Koski, Xie, & Olson, 2015). From a *functionalist perspective* (Pellegrini & Long, 2002), hierarchies may serve an important *function*: they promote harmony and social order, and contribute to

a better organization of activities through everyone's awareness of their position in relation to others (Halevy, Chou, & Galinsky, 2011). A popularity hierarchy would therefore result in a clearly-organized classroom network, where all students know and accept their position. In such an orderly and harmonious environment, prosocial behavior may be highly valued and rewarded with popularity whereas aggression is not. In contrast, the *balance of power* perspective (Garandau, Lee, & Salmivalli, 2014) argues that a strong popularity hierarchy evokes a *power imbalance* which facilitates abuse of power through aggression while inhibiting prosocial behavior among popular peers. Also, inequalities in status may enhance competition for popularity, as resources associated with having a popular position are unequally divided among classmates. In such a competitive context, aggression may be a valuable tool rewarded with popularity, resulting in high aggressive and low prosocial popularity norms.

In sum, these two theoretical perspectives suggest that popularity hierarchy plays a role in the emergence of popularity norms; but they make opposite predictions regarding the direction (positive or negative) of these associations. To this end, it is important to examine whether and how the classroom popularity hierarchy predicts prosocial and aggressive popularity norms over time.

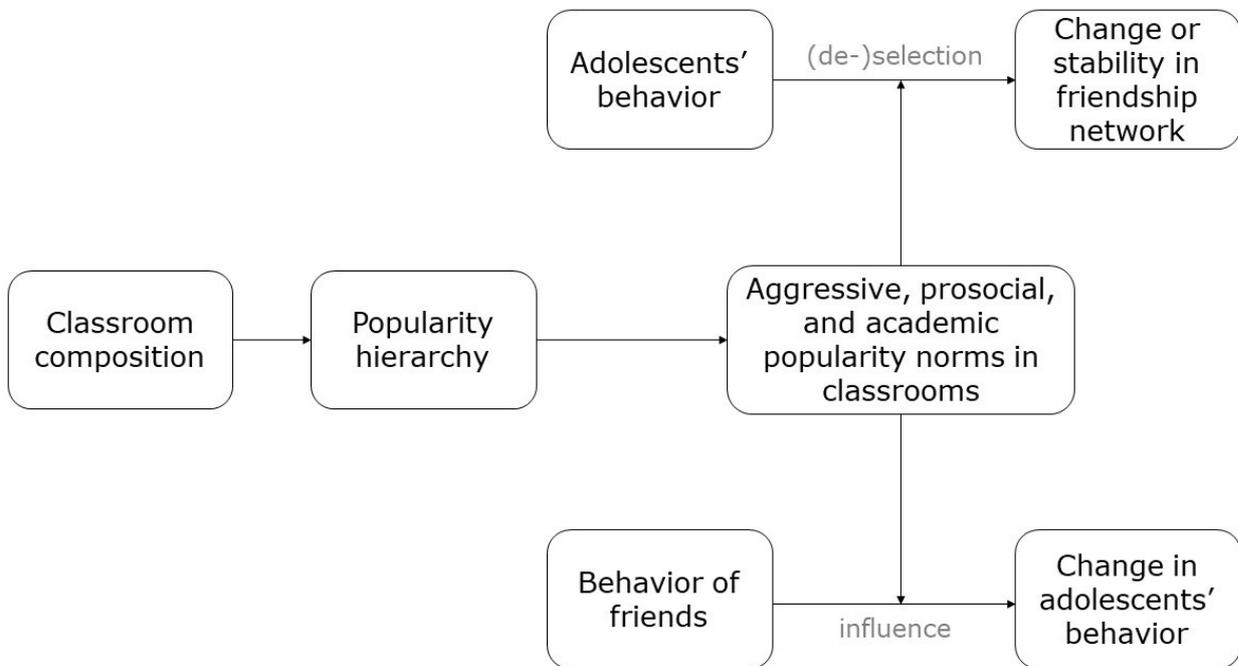
**Classroom composition.** Secondly, the emergence of popularity norms may depend on the classroom composition of students. Different types of students can be identified based on the extent to which they endorse aggressive or prosocial behavior, or a combination of both (bi-strategics; Hawley, 1999). Social impact theory (Latané, 1981) argues that the formation of norms may depend on 1) the *number of students* endorsing certain behaviors; 2) the *social dominance* (strength) of those enacting these behaviors; and 3) the closeness or immediacy of people (Latané & Wolf, 1981). Moreover, some students may contribute to the popularity norm by enhancing the popularity hierarchy, for instance socially dominant aggressive students, as they use their aggression in a manipulative, instrumental way, at the expense of others (Garandau et al., 2011). Consequently, it may be valuable to examine whether the emergence of popularity

norms is a function of the number and strength (i.e., social dominance) of prosocial, aggressive and bi-strategic adolescents within a classroom, and whether certain students contribute to the popularity norm by enhancing the classroom popularity hierarchy.

### **1.4 Project Overview**

This dissertation focuses on the consequences and antecedents of aggressive, prosocial, and academic popularity norms in adolescent classrooms. The seven empirical studies aim to address various gaps in the literature. Chapter 2 presents a study focused on the role of aggressive popularity and descriptive norms in friendship selection, maintenance, and influence processes related to aggression across the first year of secondary education. More specifically, it describes whether popularity norms rather than descriptive norms predict adolescents' friendship preferences in a relatively new peer context, as well as adolescents' tendency to adopt aggression of their friends. As a next step, Chapter 3 examines to which extent aggressive and prosocial popularity norms and descriptive norms may co-occur within classrooms, and how constellations of aggressive and prosocial popularity norms develop across a school year. In addition, the study examined how popularity norm constellations relate to individuals' behavioral development. Chapter 4 complements Chapter 2 and Chapter 3 by studying the role of aggressive and prosocial popularity norm combinations in the co-existence and interplay of prosocial and aggressive friendship processes. In Chapter 5, I compared the role of academic popularity norms with other types of academic status norms (acceptance, rejection, and unpopularity norms) in friendship processes related to academic achievement. Chapter 6 extended upon Chapter 5 by examining whether popular peers' achievement goals play a role in achievement-based friendship processes. In Chapter 7, I examined whether and how classrooms' popularity hierarchy predicts prosocial and aggressive popularity norms over time. In Chapter 8, I tested whether the classroom constellation of prosocial, aggressive, and bi-strategic students related to the formation of a strong popularity hierarchy, and in turn, to aggressive popularity norms. In Chapter 9, the main findings of all studies will be

discussed, together with scientific and practical implications, as well as directions for future research. Figure 1.1 provides a graphical representation of this dissertation.



*Figure 1.1.* Graphical representation of this dissertation.

### 1.4.1 Study samples

In this dissertation, six studies were conducted on data of the SNARE (Social Network Analysis of Risk behaviors in Early adolescence) project, a longitudinal project on adolescents' social networks and the development of adolescent behavior. We approached all first- and second-year students at two secondary schools in the Netherlands (comparable to Grade 7 – 8 in the U.S.) to participate in the SNARE project at the start of the 2011-2012 school year (Cohort 1). For the next school year, 2012-2013, a second cohort of first-year students entering these secondary schools was asked to participate in the project (Cohort 2). A third cohort

consisting of first-, second-, and third-year students was approached at another school in the 2016-2017 school year (SNARE GENETICS sample). In total, information was retrieved from about 2800 students in 120 classrooms. Data were collected at three points during one school year: in the autumn, winter, and spring. At each measurement occasion, participants were asked about several aspects of their daily lives, for example, their relationship with parents, their social-emotional functioning, and how they spent their time. In addition, peer nominations were used to assess, amongst others, friendships, aggressive and prosocial behaviors, and peer-valued characteristics such as popularity. Schools provided us with the GPA's of students as an objective measure for academic functioning. I collected nine waves of data for SNARE from 2013 to 2017 at two out of the three schools.

One study was conducted on the CUTRAN data (U.S) from three Midwestern school districts located in small to moderate size urban areas. This project aimed at examining adolescent academic development (achievement, academic engagement, achievement goals) and social development (peer networks, friendships), and the role of teachers in these outcomes. Peer-nominated and self-reported data were collected in 46 classrooms ( $N = 901$  students) at two time-points.

### **1.4.2 The Dutch school system**

Most of our data was collected in the Netherlands. In the Netherlands, children attend primary school for eight years (from four to about 12 years of age). Secondary school starts at the age of 12 (comparable to seventh grade in the USA). The first year of secondary education is a transitional year where students are organized by a tracked system, based on their academic performance observed at their primary school. Most students enter pre-vocational education, which lasts four years, covering four sectors: technology, personal care and health, economics, and agriculture (VMBO). General secondary education (HAVO) is a five-year program that prepares students for universities of applied science. Finally, pre-university education has six-year duration (VWO). Due to this tracked system, students are organized in classrooms where they do not know most of their peers, resulting in a largely new peer landscape. Adolescents spend most of

their time in these new classrooms, as they are educated together for all school subjects during the entire school year. Therefore, these classrooms present an important developmental context to adolescents.



**Chapter****2**

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The Norms of Popular Peers Moderate Friendship  
Dynamics of Adolescent Aggression

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**This chapter is based on:**

Laninga-Wijnen, L., Harakeh, Z., Steglich, C. E. G., Dijkstra, J. K., Veenstra, R., & Vollebergh, W. A. M. (2017). The norms of popular peers moderate friendship dynamics of adolescent aggression. *Child Development, 88*, 1265–1283.

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**Author Contributions:**

L.L.-W. conceived of this study, participated in its design and data-collection, conducted and interpreted statistical analyses and drafted the manuscript; Z.H. helped to interpret statistical analyses and draft the manuscript. C.S. assisted in conducting and interpreting the analyses; J.K.D., W.V. and R.V. designed the SNARE project where this study is part of, and helped to draft the manuscript.

This study examined whether peer norms for aggression within the classroom impact friendship selection, maintenance, and socialization processes related to aggression across the 1st year of secondary school ( $N = 1,134$  students from 51 classes,  $M_{age} = 12.66$ ). As hypothesized, longitudinal social network analyses indicated that friendship selection and influence processes related to aggression depended on the popularity norm within the classroom (i.e., the class-level association between popularity and aggression) rather than the descriptive norm (aggregated average of aggressive behavior). Hence, only in classes where the valence of aggression is high (because it is positively associated with popularity), adolescents tend to select their friends based on similarity in aggression and adopt the aggressive behavior of their friends.

### **2.1 Introduction**

Peer relations provide an important developmental context for adolescent aggressive behavior (Dishion, Piehler, & Myers, 2008). Aggressive behavior may shape peer relationships through processes in which peers select and maintain similar others as friends; relationships, in turn, may shape individual aggressive behavior through peer socialization (i.e., influence) processes. Due to these processes, similarity in aggression occurs among friends. However, friendship selection, maintenance, and influence dynamics do not operate in isolation, but are encapsulated in broader social peer contexts, such as classes and schools (Veenstra & Dijkstra, 2011). One way of characterizing the broader social context in the classroom is by using the concept of peer norms (Dijkstra & Gest, 2015). As peer norms reflect the expected and accepted behavior of a social group (Shaw, 1981), they may be considered a basis for friendship selection, maintenance, and influence processes. Therefore, in the current study, we examined the moderating role of peer norms for aggression on friendship dynamics (i.e., selection, maintenance, and influence) related to adolescents' aggressive behavior.

### **2.1.1 Peer selection, maintenance, and socialization processes**

According to the similarity attraction hypothesis (Byrne, 1971), adolescents tend to select and maintain similar peers as friends, for instance, peers who exhibit similar levels of aggression. Similarity enables individuals to communicate with less effort and with shared feelings of understanding and belongingness, making these relationships more rewarding and stable (Byrne, 1971; Veenstra & Dijkstra, 2011). Friends may be similar in aggression not only due to selection or maintenance processes but also because of a tendency to adopt their friends' behavior. These influence processes may be due to social pressures, such as reinforcement and persuasion (Dishion, Andrews, & Crosby, 1995), or to observational, social, and vicarious learning mechanisms (Bandura, 1977). Innovative methodological advances like social network analysis allow for the disentangling of peer selection, maintenance, and influence processes in a statistically sound way, yielding reliable indications of the strength and direction of these friendship dynamics (Steglich, Snijders, & Pearson, 2010). However, empirical studies that used these innovative social network analyses to examine friendship dynamics related to adolescent aggression did not examine maintenance processes and vary considerably in their findings on the presence of selection and influence processes. Significant selection effects were found in only one study (Rulison, Gest, & Loken, 2013), whereas these effects were marginal (Sijtsema, Ojanen, Veenstra, Lindenberg, S., Hawley, & Little, 2010b) or not present in other studies (Dijkstra, Berger, & Lindenberg, 2011; Logis, Rodkin, Gest, & Ahn, 2013; Molano, Jones, Brown, & Aber, 2013). Evidence was found for the presence of influence processes in some studies (Logis et al., 2013; Molano et al., 2013; Rulison et al., 2013; Sijtsema et al., 2010b), but not in others (Dijkstra et al., 2011; Sijtsema et al., 2010b).

Two major factors may explain why findings regarding friendship processes related to aggression were inconsistent in earlier studies. First, the non-significance of selection processes may result from the fact that, to our knowledge, all studies took place when the adolescents had known each other for several years. It is likely that friendship formation had already taken place and, therefore, the adolescents were less active in selecting new friends. In order to take

friendship formation into account, it is worthwhile to follow students who are entering a new peer context: for instance, in the 1st year of secondary education. Second, and more important, the inconsistent findings of previous studies may be due to the fact that none of these studies took into account the social contexts in which friendship selection, maintenance, and influence processes develop. For instance, specific characteristics of the classroom, like peer norms, can be considered an important basis and a crucial standard for the magnitude and direction of friendship processes related to aggression. To our knowledge, in only one study so far has the role of classroom peer norms in friendship dynamics been examined, showing that these peer norms indeed moderated influence processes in the realm of risk attitudes (Rambaran, Dijkstra, & Stark, 2013). More specifically, risk attitudes proliferated more via friendship influence processes in classes with more positive correlations between popularity and risk attitudes (i.e., high popularity norms for risk attitudes) than in classes with negative correlations between popularity and risk attitudes (i.e., low popularity norms for risk attitudes). In this study, we extended upon the study of Rambaran and colleagues (2013) by examining the impact of peer norms for aggression on friendship dynamics related to aggressive behavior (i.e., not attitudes) and by additionally examining both selection and maintenance processes in a new peer context.

### **2.1.2 Peer norms and friendship processes related to aggression**

Two distinct types of peer norms can be distinguished: descriptive norms and popularity norms. Descriptive norms refer to the perceived average behavior of all peers in a given setting, for instance, a classroom (Wright, Giammarino, & Parad, 1986). Popularity norms indicate to what extent a certain behavior in a classroom is associated with popularity. In the literature, "popularity" may refer to two different concepts: sociometric popularity (i.e., the extent to which someone is liked) and perceived popularity (i.e., the extent to which someone is seen as popular by his or her peers; LaFontana & Cillessen, 2002). Sociometric popularity and perceived popularity start to become different from one another by the middle of elementary school, but their distinction peaks in early adolescence (Cillessen & Rose, 2005). Moreover, during early adolescence, aggression is

negatively associated with sociometric popularity, but it becomes increasingly associated with perceived popularity (Cillessen & Mayeux, 2004; Cillessen & Borch, 2006). In this study, consistent with previous studies on popularity norms (Dijkstra & Gest, 2015; Rambaran et al., 2013), we use the term popularity (norms) to refer to perceived popularity.

Both descriptive and popularity norms for aggression can be a way of defining the broader social context in which the coevolution of the friendship network and adolescents' aggressive behavior takes place (Chang, 2004; Rambaran et al., 2013). Regarding friendship selection and maintenance processes, the social misfit theory, which can be applied to both popularity norms and descriptive norms (Wright et al., 1986), states that when adolescents conform to the norm, they have a greater chance of being accepted or liked and not rejected by their peers, because they fit in with the expectations of the peer group. Hence, although the findings of previous studies have indicated that aggression is related to lower levels of being liked (or sociometric popularity) by other peers (Cillessen & Mayeux, 2004), this appears to depend on the peer norm for aggression within the classroom (Chang, 2004; Dijkstra & Gest, 2015). Indeed, the findings of two studies indicated that in classrooms where antisocial behavior was the descriptive norm, antisocial adolescents were less likely to be rejected or were even liked by their peers (Dijkstra & Gest, 2015; Dijkstra, Lindenberg, & Veenstra, 2008). Similar (and even stronger) results were found in studies of the moderating impact of antisocial popularity norms (i.e., the class-level association between antisocial behavior and perceived popularity) on the association between individual antisocial behavior and being liked (Dijkstra & Gest, 2015; Dijkstra et al., 2008). When adolescents are liked in a particular setting, they may be seen as attractive friendship partners and, hence, have a greater chance of being selected and maintained as a friend by their peers. Therefore, conforming to the peer norm for aggression in the classroom may foster friendship selection and maintenance processes related to aggression (Veenstra & Dijkstra, 2011, p. 137). In addition, the reputational salience hypothesis (Hartup, 1996) emphasizes in particular the role of popularity norms in selection and maintenance processes. When aggressive behavior is positively associated with perceived popularity in a

given context, this aggressive behavior becomes reputationally salient. This implies that this aggressive behavior has high valence in such a context and that this behavior is an important tool for improving an adolescent's reputation (i.e., popularity in the current study). Aggression may then become an important characteristic based on which adolescents select and maintain each other as friends. Hence, in this study, we expected that the extent to which aggression is associated with popularity within a classroom (i.e., the popularity norm for aggression) would play a more pronounced role in friendship selection and maintenance processes than descriptive norms for aggression.

Regarding influence processes, according to the social impact theory (Latané, 1981), the extent to which adolescents tend to adopt behaviors from their peers depends on the extent to which they experience social forces or pressures in their environment. The strength of these social forces is determined by the power of the source (for instance, the "status of the source," that is, the popularity of peers in the current study), the immediacy of the source (the closeness of peers), and the number of sources present (the higher the number of peers, the greater the impact). Descriptive norms can be used to test this latter aspect of the social impact theory, because they represent the average behavior of *all* peers within a setting. Therefore, we expected that descriptive norms for aggression would play a moderating role in the extent to which adolescents tend to become similar in aggression to their friends.

The social impact theory (Latané, 1981) also suggests that the status of the source acting on the individual can be important. Popularity norms can be used to test this, as they represent the behaviors that are associated with the "status of the source," that is, in the current study, the popularity of aggressive peers in the classroom. Indeed, prior research has indicated that popular peers are powerful and influential and may have a disproportionate impact on what is considered attractive and valuable in a particular context (Cillessen & Rose, 2005). As becoming popular within the peer group is an increasingly important goal during early adolescence (Cillessen & Mayeux, 2004; LaFontana & Cillessen, 2010), behaviors that are associated with popularity have a highly positive valence within the classroom according to the reputational salience hypothesis (Hartup, 1996).

Therefore, adolescents may tend to adopt from their friends particularly those behaviors that are associated with popularity (i.e., reputationally salient behaviors) in a particular context (Hartup, 1996). On the basis of this literature, we expected that friendship influence processes would depend more strongly on the popularity norm for aggression than on the descriptive norm for aggression within the classroom.

## **2.2 Present Study**

The aim of the current study was to examine to what extent the peer norms (i.e., popularity norms and descriptive norms) for aggression play a role in friendship selection, maintenance, and socialization processes related to aggression among early adolescents within the classroom. On the basis of the social misfit theory and the similarity attraction hypothesis (Byrne, 1971; Dijkstra & Gest, 2015; Wright et al., 1986), we expected that adolescents would be more likely to select and maintain similar others as friends when they exhibited behaviors that were in line with the peer norms for aggression in the classroom. Regarding influence, we expected that adolescents would have a higher tendency to conform to the aggressive behavior of their friends when this behavior was in line with the peer norms for aggression based on the social impact theory and the hypothesis of reputational salience (Hartup, 1996; Latané, 1981). During early adolescence, especially popularity norms for aggression (rather than descriptive norms) may define an important social context for friendship selection, maintenance, and influence processes. First, popularity is often more highly desired and more actively pursued by adolescents than by children (LaFontana & Cillessen, 2010). Second, during early adolescence, there is an increase in aggression (Moffitt, 1993), and aggression is increasingly linked with popularity (Cillessen & Mayeux, 2004; Cillessen & Borch, 2006). Hence, during early adolescence, behaving like or affiliating with aggressive peers may be an important tool to “bask in reflected glory” and to gain popularity within the peer group (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010). As friendship networks at school are known to be highly gender segregated (especially during early

adolescence; Maccoby, 1998) and aggression is more common among men, we used gender as a predictor for friendship nominations and aggression.

### **2.3 Methods**

#### **2.3.1 Procedure and participants**

The Social Network Analysis of Risk behavior in Early adolescence (SNARE) project is a longitudinal study of adolescent social and behavioral development (ethical review passed at one of the participating universities; see also Dijkstra et al., 2015; Franken et al., 2015). All 1st-year students in two secondary schools (one in the north and one in the middle of the Netherlands) were approached to take part in the SNARE project (Cohort 1) at the beginning of the academic year 2011–2012. A second cohort of students entering 1st year in these secondary schools was also approached the following academic year, 2012–2013 (Cohort 2).

In the Netherlands, when adolescents enter secondary education, they enter a new school and are organized in classrooms based on their academic capacities. This implies that most adolescents know hardly anybody in their new classroom at the start of the academic year (on average, based on available information it was estimated that fewer than two students per classroom came from the same primary school). Moreover, students were in the same class with the same students all day, every day (hence, they did not change between classes). Therefore, this sample of 1st-year students provides an excellent opportunity to examine friendship formation in a new peer context.

For all 1st-year students of Cohort 1 and Cohort 2, data were collected three times in one academic year, that is, one month after the students transferred to secondary education (Wave 1 [T1]; in October 2011 for Cohort 1 and October 2012 for Cohort 2), followed by a second wave in December 2011 and 2012 (T2), and a third wave in April 2012 and 2013 (T3). The students received an information letter for themselves and their parents. Parents who did not wish their children to participate in the study were asked to indicate this (passive consent), and students were made aware that they could opt out anytime. The survey was completed in the classroom by computer (under the supervision of a researcher).

Of the 1,144 first-year students that were approached, 0.9% declined to participate for various reasons (i.e., the adolescent was dyslectic, or the research was perceived to be too time-consuming). This yielded a sample of 1,134 first-year students (99.1% of the full sample) from 51 classes, 568 (50.1%) boys and 566 (49.9%) girls, with a mean age of  $M = 12.66$  ( $SD = 0.48$ ). Each class had 12–30 students ( $M = 22.24$  students per class). Of the participants, 46.5% were enrolled in lower level education (including preparatory secondary school for technical and vocational training), and 53.5% were attending higher level education (including preparatory secondary school for higher professional education and for university). The majority of the sample was native Dutch (83.4%).

### 2.3.2 Measures

All variables were based on peer nominations measured during each of the three waves (T1, T2, and T3). Peer-nominated variables were assessed by asking participants questions about their classmates. Participants could select an unlimited number of same-gender and opposite-gender classmates. There was also the option of selecting “nobody”, which allowed us to differentiate between missing responses and valid empty responses in the name generators. Names were presented in random order to avoid answer tendencies. To take differences in the number of respondents per class into account, the number of times an individual was nominated by classmates was tallied and divided by the number of classmates who made nominations minus one (as the respondent was not able to select him or herself). Moreover, in constructing the peer-nominated variables, students who were absent or refused to participate during a particular wave were subtracted from the total number of students in the class, as they did not nominate any classmates. This yielded scores ranging from 0 (received no nominations) to 1 (received nominations from everyone in the classroom).

**Friendships.** The participants received a list of all consenting students in their class. They were asked to indicate who their “best friends” within the class were. Based on these nominations, we constructed an adjacency matrix containing all friendship nominations of the whole class across the three waves.

**Aggressive behavior (individual level).** This refers to aggression in the school context, that is, aggression in different forms, visible to all students in the classroom (see also Hamre & Pianta, 2006; Logis et al., 2013; Molano et al., 2013). Individual-level aggressive behavior was assessed using peer nominations on five items relating to aggression: “Who bullies you?”, “Who quarrels and/or initiates fights with you?”, “Who is rude and defies teachers?”, “Who sometimes spreads rumors or gossips about you?”, and “Who makes fun of others?” (cf. Lease, Kennedy, & Axelrod, 2002). Exploratory factor analyses for the three waves showed that these five items represented one factor, explaining 59.7%–63.8% of the variance. These five items were averaged for each wave, to create a scale for aggressive behavior. This scale represented the average percentage of peers that nominated a particular adolescent as aggressive using the five items. Cronbach’s alphas were  $\alpha_{T1} = .76$ ,  $\alpha_{T2} = .77$ , and  $\alpha_{T3} = .78$  respectively, indicating good internal consistency. Because RSIENA analyses (Simulation Investigation for Empirical Network Analyses) require ordinal categorical-dependent behavior variables, the peer-nominated aggressive behavior was recoded into five roughly equally populated categories, ranging from < 0.1% of peers nominating a student as aggressive to more than 8.0% of peers nominating a student as aggressive.

**Popularity norms (classroom level).** Popularity norms (also referred to in the literature as “status norms” by Laninga-Wijnen, Harakeh, Dijkstra, Veenstra, & Vollebergh, 2018; or “norm salience” by Henry et al., 2000) for aggression at T1 were calculated for each class separately as the correlation between peer-nominated aggressive behavior and peer-nominated popularity (Dijkstra & Gest, 2015; Dijkstra et al., 2008). Peer-nominated popularity was assessed by asking participants, “Who is the most popular?” and “Who is least popular?”. The score for least popular was subtracted from the score for most popular to obtain a single continuum of popularity (e.g., Cillessen & Rose, 2005; Lease et al., 2002). We distinguished between the three types of classes based on the average within-classroom correlation between peer-nominated popularity and peer-nominated aggression ( $M = 0.31$ ) and standard deviations ( $SD = 0.32$ ). The classes with low popularity norms for aggression were those which scored 1  $SD$  lower than the average within-classroom correlation between popularity and

aggressive behavior ( $r < 0.01$ ; type low;  $n = 10$  classes). Classes with average popularity norms for aggression had average within-classroom correlations between popularity and aggressive behavior ( $0.00 \leq r \leq 0.62$ , type average;  $n = 33$  classes). Classes with high popularity norms for aggression scored 1 *SD* higher than the average within-classroom correlation between popularity and aggressive behavior ( $r > 0.63$ , type high;  $n = 8$  classes).

**Descriptive norms (classroom level).** Descriptive norms for aggression were measured at T1 as the aggregated average proportion score for peer-nominated aggressive behavior across all students in the class (Dijkstra & Gest, 2015; Rambaran et al., 2013). Hence, the descriptive norms represent the average proportion of peer-nominated aggression within the classroom. We distinguished between three types of classes based on the aggregated average peer-nominated aggressive behavior ( $M = 0.04$ ) and standard deviations ( $SD = 0.02$ ). The classes with low descriptive norms were those which scored 1 *SD* lower than the average proportion of aggressive behavior (type low;  $n = 9$  classes). Classes with average descriptive norms had average proportions of aggressive behavior (type moderate;  $n = 31$  classes). Classes with high descriptive norms scored 1 *SD* higher than the average proportions of aggressive behavior (type high;  $n = 11$  classes).

Popularity norms and descriptive norms were unrelated ( $r_{\text{spearman}} = .003$ ,  $p = .981$ ). This indicates that those two class-level variables do not overlap. Popularity norms were moderately to highly correlated across waves ( $r_{T1-T2} = .73$ ;  $r_{T2-T3} = .42$ ), as well as descriptive norms ( $r_{T1-T2} = .49$ ;  $r_{T2-T3} = .75$ ).

## 2.4 Analytic Strategy

### 2.4.1 Attrition analyses

Of the 1,134 respondents, 2.9% showed missing values in T1 and 3.4% and 3.3% in T2 and T3, respectively. The average percentage of missing values per variable was 0.01%. Attrition analyses showed no significant differences in the research variables of interest between partially missing cases and complete cases. Missing data in the network were imputed with the "last observation carry forward"

method (LOCF, cf. Ripley, Snijders, Boda, Vorös, & Preciado, 2014). This means that for each missing tie variable the last previous nonmissing value was imputed; if there was no previous nonmissing value, the value 0 (referring to no friendship tie) was imputed. Also, for the missing data in the behavioral attribute (i.e., aggression), LOCF was applied, and the missing values were imputed by the mode per observation when no previous nonmissing value existed.

### **2.4.2 RSIENA analyses**

Analyses were conducted using longitudinal social network analysis (also called “stochastic actor-based models”; Snijders, 2005) implemented using the RSIENA software program (RSIENA version 1.1-289 in R 3.2.2). The RSIENA program estimates to what extent similarity among friends (for instance, in aggression) is due to friendship selection, maintenance, and influence processes (Snijders, Steglich, & Schweinberger, 2007), while controlling for structural network effects and the overall development of a certain behavior in the network (explained below). For a detailed, more technical explanation of longitudinal social network analyses, we refer to Snijders and colleagues (2007, 2010) and Veenstra, Dijkstra, Steglich, and Van Zalk (2013). See Appendix (2A) for how the terminology used in this study corresponds to the terminology used in prior RSIENA studies.

**Structural network effects.** In this study, we examined four structural network effects as control variables that represent the general tendencies that are present in a friendship network. The “tendency to make friends” parameter functions as an intercept in the friendship model and captures the overall tendency to create friendship ties. In data sets like ours, which are not random samples of students but groups of students sharing a quite intensely experienced classroom context, it is important to take into account our knowledge about the interdependencies that characterize such data and that manifest themselves in the form of friendship networks. The strong point of the chosen analysis method is that it allows for exactly this. Friendships are characterized by a strong tendency to reciprocate relationships, establishing nonindependence among incoming and outgoing relations within a dyad. These are controlled for by including the

“reciprocated friendships” effect. Friendships are also characterized by group formation tendencies (“friends of my friends are my friends”), establishing nonindependence between dyads. This departure from independence is controlled for in this network analysis method by including the “transitive group formation” and “cyclical group formation” effects. In transitive groups, there is a clear hierarchy that some peers receive more friendship nominations than others. Cyclical groups are egalitarian in nature; a positive three-cycle effect can be interpreted as a tendency to have no pronounced differences in the number of friendship nominations that members receive, whereas a negative estimate of the parameter can be interpreted as a tendency to have hierarchical ordering with relatively few three cycles. Examining these four structural network effects helps us to take into account the dependency in friendship networks, but also avoids overestimation of selection, maintenance, and influence effects (Ripley, Snijders, Boda, Vorös, & Preciado, 2014). For instance, two adolescents may become friends based on similarity in aggression, but they may also become friends because they share a common friend (“friends of my friends are my friends,” represented in group formation tendencies).

**Friendship selection based on aggression.** In addition to these structural network characteristics, selection effects based on aggression were estimated. The “*effect of aggression on friendship nominations received*” refers to the extent to which aggression affects being nominated as a best friend. Conversely, the “*effect of aggression on friendship nominations given*” indicates the extent to which aggression affects the number of best friend nominations given to peers. Hence, these effects control for the possibility that everybody (regardless of their own level of aggression) might have a tendency to select aggressive peers (for instance, because they are seen as “cool”). Because these two effects were included as control variables, the parameter similarity-based selection effect (using creation effects) gave a reliable estimate for testing our hypothesis about the extent to which adolescents form new friendships with others based on similarity in aggression. We also examined similarity-based selection for gender, as same-gender friendships were common.

**Friendship maintenance based on aggression.** We examined to what extent being similar in aggression predicted that a friendship present at one measurement would still be present at the next measurement (using endowment effects). A positive parameter for similarity-based maintenance of friends indicates that aggression similarity predicts friendship maintenance, whereas aggressive behavior dissimilarity predicts friendship dissolution (deselection). Friendship termination (deselection) is the reverse of friendship maintenance. Hence, the effect of peer norms on friendship termination can be retrieved by placing a “-” in front of the results for maintenance.

**Friendship influence on aggression.** Friendship influence processes refer to the tendency of adolescents to become similar to their friends in aggression. A positive influence effect represents the tendency of adolescents to adopt friends’ aggressive behavior over time; this can work in an upward or in a downward direction (or remain similar), depending on how aggressive an adolescent’s friends are. Friendship influence processes were estimated while controlling for the linear shape parameter, quadratic shape parameter, and the main effect of gender on aggressive behavior: It is important to control for the overall development of aggression within a particular context to provide more reliable estimates of the extent to which the adolescent’s aggressive behavior is subject to peer influence processes. The linear and quadratic shape parameters model the rate of change, and whether behavior change conforms to linear or quadratic trends. A positive quadratic shape parameter means that the higher an adolescent scores on aggressive behavior, the stronger the adolescent’s tendency become even more aggressive (escalation); a negative quadratic shape parameter means that the higher an adolescent scores on aggression, the lower the adolescent’s tendency to become more aggressive (self-corrective). In statistical terms, a positive quadratic shape parameter stands for an overdispersed (skewed or U-shaped) distribution of the aggression variable, whereas a negative quadratic shape parameter stands for an underdispersed (unimodal, bell-shaped) distribution of the aggression variable: hence, the name “shape parameter.”

**The moderating role of peer norms in friendship processes related to aggression.** The aforementioned effects were first analyzed for each class

separately in RSIENA, yielding 51 parameters for each effect. To examine the moderating role of peer norms, we conducted three steps of analyses. In a first step, we ran a meta-analysis using Viechtbauer's (2010) meta-analysis method implemented in the R-package "metafor" to aggregate these results for the total sample of 51 classes. As such, the meta-analysis in this first step displays a statistical model (which we will refer to as Model 1) regarding the extent to which, in general, friendship processes related to aggression took place within all classes. In the second step, we analyzed the role of popularity norms and descriptive norms at T1 in friendship processes related to aggressive behavior. To this end, we conducted six separate meta-analyses for classes with high, moderate, and low descriptive norms and high, moderate, and low popularity norms, resulting in six different statistical models (Models 2–7). In the third step, to test the moderating effect of peer norms, we tested for differences between parameter estimates among classes with high, moderate, and low peer norms for aggression using the following formula:

$$\frac{\hat{\beta}a + \hat{\beta}b}{\sqrt{(s.e.a)^2 + (s.e.b)^2}}$$

with estimates  $\hat{\beta}a$  and  $\hat{\beta}b$  and standard errors  $s.e_a$  and  $s.e_b$ , respectively, resulting in a z-score which under the null hypothesis of equal parameters had an approximately standard normal distribution (see Steglich, Sinclair, Holliday, & Moore, 2012, p. 367). We used the significance criterion of  $p < .05$  ( $z = 1.96$ ). In order to facilitate the interpretation of the findings, we calculated odds ratios by taking the exponential function of the parameter estimates (Ripley et al., 2014).

For the friendship influence, we first divided the estimates by the number of answer categories minus one to reflect the effect of a one-unit increase or decrease on the scale. Odds ratios were not calculated for the quadratic shape terms because these were not linear.

## **2.5 Results**

### **2.5.1 Descriptive statistics**

Tables 2.1 and 2.2 provide information on the sample, network characteristics, and measures for school classes with different popularity norms (Table 2.1) and descriptive norms (Table 2.2) for aggression. The proportion of stable friendship nominations relative to all new, lost, and stable friendships was around 50% across the whole academic year, which made our data sufficiently stable for social network analysis (Veenstra & Steglich, 2012). Using one-way analysis of variance with the Bonferroni post hoc test, for every wave, the average levels of aggression of non-, moderately, and highly popular adolescents were compared and indicated with different superscripts. Average levels of aggression for boys and girls were also compared and indicated with different superscripts. The results of the SIENA meta-analyses on the total model (with all 51 classes; Model 1) and separate analyses for classes with different types of norms (Models 2–7) are presented in Tables 2.3 and 2.4. The goodness of fit of our models were adequate and good.

### **2.5.2 Friendship selection based on aggression**

The similarity-based selection effect for peer-nominated aggression was nonsignificant in the meta-analyses performed on all classes (Model 1, Table 2.3). However, when the analyses were separated across classrooms with different peer norms (Models 2–7), this selection effect was significant in classes with high popularity norms for aggression. The difference in selection processes between classes with low and moderate popularity norms for aggression was not significant ( $z = 0.75, p = .454$ ), whereas it was significant between classes with moderate and high popularity norms for aggression ( $z = 2.57, p = .011$ ) and classes with low and high popularity norms for aggression ( $z = 2.24, p = .025$ ). These results show that adolescents in classes with strong associations between popularity and aggression tend to select peers as friends based on similar levels of aggressive behavior, whereas adolescents in classes with weak or moderate associations between popularity and aggression tend not to select peers as friends based on

similar levels of aggressive behavior. For descriptive norms, the similarity-based selection effects for aggression were nonsignificant (Table 2.4) and did not differ significantly across classes with different descriptive norms (i.e., low vs. moderate descriptive norms [ $z = 0.25, p = .803$ ], moderate vs. high descriptive norms [ $z = 0.10, p = .920$ ], and low vs. high descriptive norms [ $z = 0.51, p = .608$ ]). This indicates that, contrary to our hypothesis, descriptive norms for aggression did not play a moderating role in the extent to which adolescents tend to select similarly aggressive friends within classes.

### **2.5.3 Friendship maintenance based on aggression**

The analyses showed that the similarity-based maintenance effect was positive and significant in the model with all 51 classes (Model 1). When the analyses were separated across classrooms with different popularity norms (Models 2–4), maintenance effects were positive in all types of classes and significant in classes with moderate aggressive popularity norms. Estimates did not differ significantly from each other across classes with different popularity norms (low vs. moderate popularity norms [ $z = 1.21, p = .226$ ], moderate vs. high popularity norms [ $z = 0.39, p = .697$ ], and low vs. high popularity norms [ $z = 0.95, p = .342$ ]), indicating that, contrary to our hypothesis, popularity norms for aggression did not play a moderating role in the extent to which friendships between adolescents similar in aggressive behavior were maintained.

For descriptive norms for aggression (Models 5–7), maintenance effects were positive in all types of classes, and significant in classes with moderate descriptive norms. Estimates did not differ significantly from each other across classes (for low vs. moderate descriptive norms [ $z = 0.06, p = .952$ ], moderate vs. high descriptive norms [ $z = 0.02, p = .984$ ], and low vs. high descriptive norms [ $z = 0.11, p = .912$ ]), indicating that, contrary to our hypothesis, the maintenance of friendships between adolescents similar in aggression did not differ across classes with different descriptive norms.

Table 2.1

*Description of the Sample, Network Characteristics, and Measures for School Classes with a Low, Moderate and High Correlations Between Perceived Popularity and Aggression (i.e., Popularity Norms)*

<i>Friendship</i>	All classes			Low popularity norms for aggression			Moderate popularity norms for aggression			High popularity norms for aggression		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Average number of friends	5.05 (1.27)	5.50 (1.22)	5.40 (1.27)	4.68 (1.57)	5.20 (1.67)	5.20 (1.58)	5.18 (1.23)	5.74 (1.03)	5.50 (1.25)	4.95 (1.04)	4.93 (1.20)	5.27 (1.06)
Average number of friends boys	5.10 (1.79)	5.63 (1.69)	5.71 (1.86)	4.07 (1.76)	4.84 (1.84)	5.45 (1.78)	5.50 (1.87)	6.07 (1.62)	5.96 (1.97)	4.77 (0.78)	4.81 (1.25)	5.04 (1.44)
Average number of friends girls	4.93 (1.66)	5.23 (1.73)	4.93 (1.79)	5.08 (1.66)	5.55 (1.74)	5.02 (2.13)	4.87 (1.60)	5.25 (1.56)	4.93 (1.56)	4.96 (2.11)	4.74 (2.45)	4.83 (2.44)
Cohesion in friendship network	0.25 (0.08)	0.28 (0.07)	0.28 (0.08)	0.30 (0.12)	0.32 (0.08)	0.32 (0.09)	0.24 (0.06)	0.27 (0.07)	0.26 (0.07)	0.26 (0.06)	0.27 (0.04)	0.29 (0.10)
Proportion reciprocal friendships	0.62 (0.08)	0.63 (0.09)	0.64 (0.10)	0.58 (0.09)	0.61 (0.10)	0.64 (0.10)	0.63 (0.08)	0.67 (0.09)	0.63 (0.10)	0.63 (0.06)	0.63 (0.06)	0.66 (0.08)
Proportion triadic friendships	0.62 (0.09)	0.64 (0.08)	0.65 (0.07)	0.67 (0.08)	0.68 (0.07)	0.65 (0.07)	0.61 (0.08)	0.64 (0.07)	0.65 (0.08)	0.59 (0.10)	0.61 (0.10)	0.63 (0.06)
Same gender Friendships	0.85 (0.09)	0.85 (0.10)	0.85 (0.09)	0.80 (0.11)	0.79 (0.10)	0.82 (0.09)	0.86 (0.09)	0.86 (0.10)	0.86 (0.09)	0.85 (0.09)	0.89 (0.08)	0.88 (0.08)
<i>Aggressive Behavior</i>												
Average boys	0.05 (0.07) <sup>a</sup>	0.07 (0.08) <sup>a</sup>	0.08 (0.09) <sup>a</sup>	0.04 (0.07) <sup>a</sup>	0.07 (0.08) <sup>a</sup>	0.07 (0.09) <sup>a</sup>	0.05 (0.07) <sup>ab</sup>	0.07 (0.08) <sup>a</sup>	0.08 (0.09) <sup>a</sup>	0.05 (0.08) <sup>a</sup>	0.06 (0.08) <sup>a</sup>	0.07 (0.08) <sup>a</sup>
Average girls	0.03 (0.05) <sup>b</sup>	0.04 (0.07) <sup>b</sup>	0.07 (0.08) <sup>b</sup>	0.04 (0.05) <sup>a</sup>	0.06 (0.08) <sup>a</sup>	0.06 (0.08) <sup>a</sup>	0.03 (0.04) <sup>b</sup>	0.03 (0.06) <sup>b</sup>	0.04 (0.07) <sup>b</sup>	0.04 (0.08) <sup>a</sup>	0.04 (0.09) <sup>a</sup>	0.05 (0.08) <sup>a</sup>
Average highly popular students	0.09 (0.09) <sup>a</sup>	0.12 (0.11) <sup>a</sup>	0.13 (0.11) <sup>a</sup>	0.05 (0.04) <sup>ab</sup>	0.07 (0.07) <sup>ab</sup>	0.13 (0.10) <sup>a</sup>	0.09 (0.08) <sup>a</sup>	0.12 (0.12) <sup>a</sup>	0.13 (0.11) <sup>a</sup>	0.13 (0.11) <sup>a</sup>	0.17 (0.13) <sup>a</sup>	0.16 (0.10) <sup>a</sup>
Average moderately popular students	0.03 (0.05) <sup>b</sup>	0.04 (0.06) <sup>b</sup>	0.05 (0.08) <sup>b</sup>	0.03 (0.06) <sup>a</sup>	0.05 (0.06) <sup>a</sup>	0.05 (0.06) <sup>b</sup>	0.04 (0.05) <sup>b</sup>	0.04 (0.06) <sup>b</sup>	0.06 (0.08) <sup>b</sup>	0.02 (0.04) <sup>b</sup>	0.03 (0.05) <sup>b</sup>	0.04 (0.06) <sup>b</sup>
Average non-popular students	0.03 (0.05) <sup>b</sup>	0.03 (0.07) <sup>b</sup>	0.03 (0.05) <sup>c</sup>	0.06 (0.07) <sup>b</sup>	0.09 (0.12) <sup>b</sup>	0.06 (0.08) <sup>b</sup>	0.03 (0.05) <sup>b</sup>	0.02 (0.03) <sup>c</sup>	0.03 (0.03) <sup>c</sup>	0.00 (0.04) <sup>b</sup>	0.01 (0.02) <sup>b</sup>	0.02 (0.03) <sup>b</sup>

<i>Respondents</i>												
% Boys	50.4	50.6	51.1	44.1	45.8	47.3	51.0	50.8	50.7	56.1	55.9	57.3
Probability similarity between friends in aggression	0.06 (0.13)	0.07 (0.16)	0.14 (0.16)	-0.01 (0.09)	0.00 (0.16)	0.07 (0.13)	0.06 (0.12)	0.07 (0.13)	0.16 (0.15)	0.17 (0.14)	0.17 (0.24)	0.17 (0.20)
<i>Friendship Change</i>	T1 > T2 T2 > T3		T1 > T2 T2 > T3		T1 > T2 T2 > T3		T1 > T2 T2 > T3		T1 > T2 T2 > T3			
Average number of friendship changes	78.1	73.8			65.8	51.5			83.6	81.6	71.1	70.3
Proportion of stable friendships	0.52 (0.08)	0.54 (0.08)			0.50 (0.08)	0.60 (0.84)			0.53 (0.08)	0.54 (0.08)	0.50 (0.07)	0.51 (0.07)

*Note.* T1-T3 = Wave 1 – Wave 3. Standard deviations are given within parentheses; For information on the calculation of the different network indices, see Veenstra and Steglich (2012). Students scoring > 1 *SD* above the mean of perceived popularity were assigned as 'highly popular students', whereas students scoring >1 *SD* below the mean were defined as non-popular students. Remaining students were defined as moderately popular students. Using one-way analysis of variance with the Bonferroni post-hoc test, for every wave, average aggression of non-, moderately, and highly popular youth were compared and indicated with different superscripts. Average aggression for boys and girls were compared and indicated with different superscripts as well.

Table 2.2  
*Description of the Sample, Network Characteristics, and Measures for School Classes with Low, Moderate and High Average Levels of Aggressive Behaviors (i.e., Descriptive Norms)*

<i>Friendship</i>	Low descriptive norms for aggression			Moderate descriptive norms for aggression			High descriptive norms for aggression		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Average number of friends	4.10 (0.74)	5.35 (1.14)	4.69 (1.11)	5.42 (1.30)	5.54 (1.21)	5.76 (1.26)	4.77 (1.08)	5.53 (1.40)	4.98 (1.13)
Average number of Friends boys	4.31 (1.04)	5.42 (1.47)	4.89 (1.24)	5.44 (1.96)	5.64 (1.68)	6.22 (1.98)	4.78 (1.61)	5.78 (2.02)	4.96 (1.51)
Average number of friends girls	3.79 (1.10)	5.02 (1.65)	4.43 (1.61)	5.46 (1.61)	5.54 (1.56)	5.36 (1.61)	4.34 (1.63)	4.52 (2.15)	4.13 (2.16)
Cohesion in friendship network	0.20 (0.04)	0.26 (0.05)	0.24 (0.05)	0.26 (0.07)	0.27 (0.06)	0.28 (0.08)	0.27 (0.09)	0.32 (0.09)	0.30 (0.10)
Proportion reciprocal friendships	0.62 (0.11)	0.65 (0.08)	0.65 (0.09)	0.62 (0.07)	0.61 (0.09)	0.64 (0.10)	0.63 (0.07)	0.63 (0.09)	0.63 (0.09)
Proportion triadic friendships	0.59 (0.07)	0.64 (0.07)	0.58 (0.06)	0.62 (0.08)	0.64 (0.08)	0.66 (0.07)	0.62 (0.11)	0.66 (0.08)	0.65 (0.07)
Same gender friendships	0.89 (0.09)	0.87 (0.10)	0.87 (0.10)	0.84 (0.08)	0.85 (0.09)	0.84 (0.00)	0.83 (0.13)	0.82 (0.13)	0.88 (0.09)
<i>Aggressive Behavior</i>									
Average boys	0.02 (0.04) <sup>a</sup>	0.03 (0.05) <sup>a</sup>	0.05 (0.05) <sup>a</sup>	0.05 (0.07) <sup>a</sup>	0.07 (0.08) <sup>a</sup>	0.08 (0.09) <sup>a</sup>	0.08 (0.09) <sup>a</sup>	0.08 (0.10) <sup>a</sup>	0.10 (0.10) <sup>a</sup>
Average girls	0.01 (0.03) <sup>a</sup>	0.02 (0.05) <sup>a</sup>	0.04 (0.07) <sup>a</sup>	0.03 (0.05) <sup>b</sup>	0.04 (0.06) <sup>b</sup>	0.05 (0.07) <sup>b</sup>	0.05 (0.06) <sup>b</sup>	0.04 (0.08) <sup>b</sup>	0.05 (0.08) <sup>b</sup>
Average highly Popular students	0.04 (0.05) <sup>a</sup>	0.06 (0.07) <sup>a</sup>	0.11 (0.10) <sup>a</sup>	0.11 (0.08) <sup>a</sup>	0.12 (0.11) <sup>a</sup>	0.14 (0.11) <sup>a</sup>	0.14 (0.12) <sup>a</sup>	0.16 (0.14) <sup>a</sup>	0.12 (0.12) <sup>a</sup>
Average moderately popular students	0.01 (0.03) <sup>b</sup>	0.02 (0.04) <sup>b</sup>	0.04 (0.05) <sup>b</sup>	0.03 (0.05) <sup>b</sup>	0.05 (0.06) <sup>b</sup>	0.05 (0.07) <sup>b</sup>	0.06 (0.07) <sup>b</sup>	0.05 (0.07) <sup>b</sup>	0.08 (0.09) <sup>ab</sup>
Average non-popular students	0.02 (0.07) <sup>ab</sup>	0.03 (0.08) <sup>ab</sup>	0.02 (0.05) <sup>b</sup>	0.02 (0.04) <sup>b</sup>	0.03 (0.05) <sup>b</sup>	0.03 (0.09) <sup>b</sup>	0.05 (0.07) <sup>b</sup>	0.03 (0.09) <sup>b</sup>	0.04 (0.06) <sup>b</sup>

Probability similarity between friends in aggression	0.04 (0.07)	0.04 (0.12)	0.08 (0.13)	0.06 (0.15)	0.08 (0.18)	0.15 (0.18)	0.09 (0.12)	0.08 (0.14)	0.15 (0.12)
<i>Friendship Change</i>		T1 > T2	T2 > T3		T1 > T2	T2 > T3		T1 > T2	T2 > T3
Average number of friendship changes		74.8	54.8		81.9	83.1		70.2	63.7
Proportion of stable friendships		0.51 (0.11)	0.59 (0.07)		0.52 (0.09)	0.53 (0.08)		0.51 (0.06)	0.56 (0.09)

*Note.* T1-T3 = Wave 1– Wave 3. Standard deviations are given within parentheses; For information on the calculation of the different network indices, see Veenstra and Steglich (2012). Students scoring > 1 *SD* above the mean of perceived popularity were assigned as 'highly popular students', whereas students scoring >1 *SD* below the mean were defined as non-popular students. Remaining students were defined as moderately popular students. Using one-way analysis of variance with the Bonferroni post-hoc test, for every wave, average aggression of non-, moderately, and highly popular youth were compared and indicated with different superscripts. Average aggression for boys and girls were compared and indicated with different superscripts as well.

Table 2.3  
*RSIENA Meta-Analyses of Network and Influence Dynamics for Aggressive Behaviors in All Classes, and Classes with Low, Moderate and High Associations Between Perceived Popularity and Aggressive Behaviors (i.e., Popularity Norms)*

	All classes			Low popularity norms for aggression			Moderate popularity norms for aggression			High popularity norms for aggression		
	Model 1			Model 2			Model 3			Model 4		
	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>
<i>Structural Network effects</i>												
Tendency to make friends	-2.23***	0.05	0.11	-2.09***	0.13	0.12	-2.25***	0.06	0.11	-2.30***	0.12	0.10
Reciprocated friendships	1.34***	0.06	3.82	1.04***	0.19	2.83	1.39***	0.07	4.01	1.29***	0.12	3.63
Transitive group formation	0.32***	0.01	1.38	0.34***	0.04	1.40	0.32***	0.01	1.38	0.29***	0.03	1.35
Cyclical group formation	-0.36***	0.02	0.70	-0.32***	0.06	0.73	-0.36***	0.02	0.70	-0.39***	0.08	0.68
<i>Selection Processes</i>												
Same gender (selection; 1=boy)	0.85***	0.06	2.34	0.95***	0.12	2.59	0.81***	0.07	2.25	1.01***	0.20	2.75
Effect of aggression on friendship nominations received	-0.03	0.02	0.97	-0.06	0.07	0.94	-0.06**	0.02	0.94	0.05	0.05	1.05
Effect of aggression of friendship nominations given	-0.01	0.02	0.99	0.01	0.08	1.01	-0.02	0.02	0.97	-0.03	0.06	0.97
Similarity-based selection of friends	0.05	0.25	1.05	-0.92	0.90	0.38	-0.21	0.29	0.81	1.49*	0.59	4.44
<i>Maintenance Processes</i>												
Similarity-based maintenance of friends	1.10***	0.26	3.00	1.54	1.05	4.66	1.10***	0.36	3.02	0.43	0.52	1.54
<i>Influence Processes</i>												
Aggression Linear Shape	0.09	0.04	1.08	0.24	0.11	1.23	0.09	0.05	1.08	0.02	0.10	1.02
Aggression Quadratic Shape	0.19***	0.02		0.18***	0.07		0.16***	0.03		0.26***	0.05	
Aggression: Gender (1=boy)	0.10	0.05	1.12	0.21	0.14	1.23	0.11	0.07	1.12	-0.08	0.16	0.92
Influence on aggression	2.83***	0.40	2.03	1.09	1.11	1.31	2.84***	0.47	2.04	4.27***	1.10	2.91
<i>n</i> of classes		51			10			33			8	
<i>n</i> of students		1134			186			780			168	

*Note.* All models represent separate meta-analyses. Due to some convergence issues, we had to fix the rate effect for numerical stability at 4.0 in all analyses. For almost all parameters, all classes converged. In some cases, it was not possible to identify the selection, maintenance, or influence parameter for one class due to too high standard errors; this class was therefore excluded from the calculation of this parameter. This did not affect the interpretability of the results. *B* = the unstandardized multinomial logit coefficient; *OR* = odds ratio; RSIENA = Simulation Investigation for Empirical Network Analyses.

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

Table 2.4

*RSIENA Meta-analysis of Network and Influence Dynamics for Aggressive Behavior in All Classes, and Classes with Low, Moderate and High Average Levels of Aggressive Behaviors*

	Low descriptive norms for aggression Model 5			Moderate descriptive norms for aggression Model 6			High descriptive norms for aggression Model 7		
	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>
<i>Structural Network effects</i>									
Tendency to make friends	-2.23***	0.09	0.11	-2.26***	0.07	0.10	-2.20***	0.24	0.11
Reciprocated friendship	1.58***	0.11	4.85	1.28***	0.07	3.60	1.24***	0.20	3.46
Transitive group formation	0.37***	0.02	1.45	0.31***	0.02	1.36	0.31***	0.03	1.36
Cyclical group formation	-0.41***	0.04	0.66	-0.35***	0.02	0.70	-0.36***	0.04	0.70
<i>Selection Processes</i>									
Same gender (selection; 1=boy)	0.84***	0.13	2.31	0.86***	0.06	2.36	0.91***	0.24	2.48
Effect of aggression on friendship nominations received	-0.05	0.06	0.95	-0.01	0.03	0.99	-0.10*	0.05	0.91
Effect of aggression on friendship nominations given	0.04	0.05	1.04	-0.01	0.03	0.99	-0.09	0.09	0.93
Similarity-based selection of friends	0.21	0.64	1.23	0.03	0.32	1.03	0.10	0.61	1.11
<i>Maintenance Processes</i>									
Similarity-based maintenance of friends	1.15	0.80	3.16	1.10**	0.34	3.00	1.04	0.60	2.83
<i>Influence Processes</i>									
Aggression Linear Shape	0.02	0.07	1.02	0.12*	0.06	1.13	0.06	0.13	1.06
Aggression Quadratic Shape	0.28***	0.05		0.16***	0.03		0.20***	0.06	
Aggression: Gender (1=boy)	0.06	0.14	1.06	0.09	0.07	1.09	0.18	0.14	1.19
Influence on aggression	4.01***	0.84	2.73	2.50***	0.49	1.87	2.47*	1.06	1.85
<i>n</i> of classes		9			31			10	
<i>n</i> of students		206			706			222	

*Note.* All models represent separate meta-analyses. Due to some convergence issues, we had to fix the rate effect for numerical stability at 4.0 in all analyses. For almost all parameters, all classes converged. In some cases, it was not possible to identify the selection, maintenance, or influence parameter for one class due to too high standard errors; this class was therefore excluded from the calculation of this parameter. This did not affect the interpretability of the results. *B* = the unstandardized multinomial logit coefficient; *OR* = odds ratio; RSIENA = Simulation Investigation for Empirical Network Analyses.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

### 2.5.4 Friendship influence on aggression

Friendship influence on peer-nominated aggression was highly significant in the model with all classes ( $p < .001$ ). However, when the analyses were separated across classrooms with low, moderate, and high popularity norms for aggression, the influence of friends on aggression was found to be nonsignificant in classes with low popularity norms for aggression (Model 2), indicating that friendship influence processes on aggressive behavior did not take place in classes with a weak association between popularity and aggressive behavior. Friendship influence processes occurred in classes with moderate popularity norms for aggression (Model 3), and particularly in classes with high popularity norms for aggression (Model 4), indicating an increase in strength of friendship influence processes as the association of popularity with aggressive behavior increased. Influence processes did not differ significantly between classes with low and moderate popularity norms ( $z = 1.46, p = .144$ ) and moderate and high popularity norms ( $z = 1.20, p = .230$ ), but differences were significant between classes with low and high popularity norms ( $z = 2.04, p = .041$ ). These results were consistent with our hypothesis that adolescents' aggressive behavior would proliferate more via peer influence processes in classes where there was a strong association between popularity and aggressive behavior than in classes with weak associations between popularity and aggressive behavior at T1.

All influence effects were significant in classes with low, moderate, and high descriptive norms for aggression, and the friendship influence effects on aggression did not differ significantly from each other between classes with low, moderate, and high descriptive norms for aggression (i.e., for low vs. moderate descriptive norms [ $z = 1.55, p = .121$ ], moderate vs. high descriptive norms [ $z = 0.03, p = .976$ ], and low vs. high descriptive norms [ $z = 1.14, p = .254$ ]), implying that, in contrast to our hypothesis, descriptive norms for aggression did not play a moderating role in friendship influence processes related to aggression.

## 2.6 Discussion

In this study, we examined to what extent peer norms within the classroom play a role in friendship selection, maintenance, and socialization processes related to aggressive behavior. Our results show that the magnitude and direction of peer selection and influence processes differed across classes with different popularity norms for aggression but not across classes with different descriptive

norms for aggression. Similarity-based selection and socialization processes related to aggression mainly took place in classes with highly popular aggressive adolescents (i.e., classes with high popularity norms for aggression) and not in classes in with nonpopular aggressive adolescents (i.e., classes with low popularity norms for aggression). Thus, aggression is not a valued characteristic for peer processes as such among early adolescents, but only has valence for peer processes in a context in which it is related to popularity.

### **2.6.1 Peer norms and friendship selection based on aggression**

Consistent with our expectations, we found that popularity norms rather than descriptive norms for aggression played a crucial moderating role in regulating friendship selection processes related to aggression. Adolescents with similar levels of aggressive behavior tended to select each other as friends but only in classes in which aggressive behavior was strongly associated with popularity (i.e., high popularity norm for aggression) and not in classes with low or moderate popularity norms for aggression. Apparently, aggressive behavior is used as a selection criterion for adolescent friendships only in a context in which the salience and valence of aggressive behavior is high (because it is related to popularity; Hartup, 1993, 1996). Hence, in classes with a high popularity norm for aggression, aggressive adolescents are more popular (Hartup, 1993) and may be more accepted by other peers (Dijkstra & Gest, 2015). Therefore, they may be perceived as attractive friendship partners to increase and maintain one's own popularity (Dijkstra et al., 2010), resulting in similarity-based selection processes based on preferential attraction (McPherson, Smith-Lovin, & Cook, 2001).

For descriptive norms, selection effects did not reach conventional levels of significance and did not differ significantly across classes. Apparently, average class-level aggression does not play a role in who is perceived as an attractive friendship partner (Dijkstra & Gest, 2015; Dijkstra et al., 2008) and, hence, selected as a friend. Thus, the formation of friendships can be seen as an active and strategic process, with adolescents as active agents (Latané, 1981) pursuing their goals of achieving popularity by selecting friends who exhibit behaviors that are related to popularity within a certain context (Logis et al., 2013).

### **2.6.2 Peer norms and friendship maintenance based on aggression**

Contrary to our hypotheses, the tendency of adolescents to maintain similarly aggressive friends did not differ across classes; peer norms did not play a moderating role in these effects. Hence, friendship maintenance appears to constitute an important additional process that may result in similarity in aggression among friends, regardless of the peer norms in the class (Veenstra et al., 2013). Being similar in aggression may give adolescents a feeling of understanding each other, which makes mutual communication easier, resulting in more rewarding and stable friendships (Byrne, 1971). The finding that peer norms did not significantly affect maintenance processes across classes can be explained in several ways. First, we investigated best friend relationships. Best friendships can be perceived as high-quality friendships that include high levels of intimacy, self-disclosure, and support (Berndt, 2002). Due to these positive features, adolescents may have a higher tendency to be loyal to their best friends and to maintain the friendship, regardless of whether the behavior that they both exhibit conforms to the norm or not. Second, it might be the case that the norm does play a role in the maintenance of friendships for certain groups of adolescents within the classroom, but why it does may diverge across classes with different norm types. For instance, in classes with high popularity norms for aggression, highly popular adolescents may remain friends with similarly aggressive peers in order to maintain their high popularity (i.e., preferential attraction; Byrne, 1971), whereas in classes with low popularity norms for aggression, highly aggressive friends may be at the periphery of the peer group, and they may choose to stay with their similarly aggressive friends in order to have some affection and support (i.e., default selection; Dishion et al., 1995; Sijtsema, Lindenberg, & Veenstra, 2010a). Future researchers might examine whether the maintenance processes are due to preferential attraction or default selection processes, for instance, by investigating bilateral versus unilateral friendships (Sijtsema et al., 2010a).

### **2.6.3 Peer norms and friendship influence based on aggression**

Consistent with our expectations, peer influence processes related to aggression only took place in classes with moderate and high popularity norms for aggression. In these classes, adolescents seemed to be more susceptible to friendship influence related to aggressive behavior, resulting in a proliferation of aggressive behavior through popularity-based influence processes. More

specifically, adolescents whose friends are perceived to be more aggressive on average are highly likely to become more aggressive themselves in classes with high popularity norms for aggression compared to in classes with lower popularity norms for aggression. These findings may be explained by a norm salience effect (Henry et al., 2000), which implies that popular students who exhibit aggressive behavior set the norm in the class and function as role models (Bandura, 1977). The valence of aggressive behavior is high in these classes, as this behavior is a means of becoming more popular (i.e., they are reputationally salient; Hartup, 1996). Therefore, less popular students might conform to the aggressive behavior of their highly popular peers in order to become more popular themselves.

Descriptive norms did not moderate the friendship influence processes related to aggression. This finding can be explained as follows: The social impact theory suggests that the strength of social forces is a function of the popularity of peers, closeness of peers, and number of peers present (Latané, 1981). Descriptive norms only represent the last, quite subtle aspect of this function and hence may not be strong enough to determine social impact.

#### **2.6.4 Strengths, limitations, and future research**

Some limitations of the present study need to be acknowledged. First, the data used in this study stem from peer nominations only, which might lead to problems with shared method variance (Vaillancourt & Hymel, 2006). However, measures stemming from peer nominations were aggregated across multiple nominators, enhancing the validity and reliability of our data (Bukowski, Gauze, Hoza, & Newcomb, 1993; Bukowski & Hoza, 1989). Moreover, respondents were allowed to nominate an unlimited number of peers, by which means we avoided a ceiling effect in which respondents tend to nominate a certain maximum number of peers. Second, in this study, we focused on peer processes within classrooms, as students in the Netherlands spend most of their time in the same class and, therefore, may be expected to have most interactions with peers in this class. However, peer processes may also occur at the grade level or at the school level, and even among out-of-school friends (e.g., Kerr, Stattin, & Kiesner, 2007). Analyses at the class level may, therefore, provide a somewhat incomplete picture of the friendship networks of students, as they also have friends outside their own classroom (Veenstra & Dijkstra, 2011). We encourage future researchers to

consider friends from various contexts (class, grade, school, out of school) and compare the relative impacts of norms at several levels of friendship processes.

Despite the above limitations, the present study has several strengths. First, our sample consisted of 1st-year secondary school students, the majority of whom did not know each other initially. This provided us with an excellent opportunity to examine selection effects in a situation in which friendships were not already formed. Second, and more important, our research significantly adds to the current literature by addressing the “context gap”: We have demonstrated that the broader social context matters regarding the direction and magnitude of friendship dynamics. The broader social context in terms of popularity norms may be decisive in determining whether peer effects are for the better (i.e., suppressing aggressive behavior) or the worse (i.e., enhancing aggressive behavior). Future researchers are encouraged to consider the broader social context when examining the coevolution of networks and behavior, and to investigate the role of peer norms in other behaviors (for instance, prosocial and academic behaviors; Dijkstra & Gest, 2015). Third, in the current study, we considered maintenance effects in addition to selection and influence effects, hereby capturing a friendship dynamic that appears to be equally important in all types of classes, regardless of the peer norm within these classes. Hence, even though it has been largely disregarded in previous studies, the maintenance of friendship is an important characteristic that, in general, may enhance similarity in aggressive behavior. Fourth, the measurement waves were grouped fairly closely together in the current study (i.e., three times in one academic school year). This allowed close monitoring of changes in the peer network over fairly short periods. At the same time, it is possible that the reason network stability was quite high over these short time intervals for some classes was because breaking ties can take longer than 3 months (indeed, the stability of the network in the current study was quite high compared with that in other studies, in which intervals of [half] a year were used; see, for instance, Molano et al., 2013; Rulison et al., 2013). We encourage future researchers to examine whether the timing of the measurement waves could impact on friendship processes and peer norms. Fifth, the finding that aggression is more strongly associated with popularity in some classes than in others is interesting in and of itself. Future researchers are encouraged to learn more about predictors of the extent to which popularity is associated with aggression within the classroom. Predictors could be at the

individual level (socioeconomic background of students, gender, personality, maturity, or attractive features; see, for instance, Lindenberg, 2001, 2006), at the teacher level (teacher support, structure, monitoring), or at the structural group level (extent of cohesion, hierarchy, gender ratio, and educational level (see for instance Ahn, Garandeau, & Rodkin, 2010)). Sixth, we not only included gender as a control variable in the analyses for the current study, but we also performed additional analyses where we specifically addressed gender differences in selection, maintenance, and influence processes. Results of these analyses were nonsignificant and are available upon request. Two reasons may explain the nonsignificance of results. First, it may be the case that our unique measure of “aggression in the school context” taps a type of aggression that does not typically differ for boys and girls. Second, the nonsignificant findings could be due to power limitations, as our models were already quite complex and the number of classes with high and low peer norms for aggression was small. Therefore, future researchers may profit from testing gender differences in friendship dynamics of adolescent aggression.

### **2.6.5 Implications**

The implications of our findings are twofold. First, our findings lend important nuance to former findings on peer influence and selection effects, by demonstrating how the broader social context of popularity norms plays a role in the magnitude and direction of these effects. Future researchers might make use of this knowledge by examining the role of popularity norms in the coevolution of friendship networks and behavior during adolescence. It might also be useful to examine the impact of other components in the broader social context (i.e., the norms of socially accepted adolescents, teacher attitudes or behaviors, the atmosphere in the classroom or school, the goals of classmates; Gest & Rodkin, 2011) on the network–behavior dynamics.

Second, our study reveals the important role of popularity norms in the proliferation of aggressive behavior through friends. This knowledge is a crucial prerequisite to proposing solid research-based intervention strategies designed to change classrooms and create environments that appropriately foster adolescents’ adjustment. As most adolescents tend to adopt aggressive behavior from their friends (Hartup, 1996), based on the results of our study, it could be reasoned that changing the popularity norm in classrooms may have important

consequences for reducing aggressive behavior. Up until now, to our knowledge, there have not been many studies on whether and how popularity norms for aggression can be changed and whether this affects aggressive behavior within the classroom. One recent intervention study (The Roots Intervention; Paluck, Shepherd, & Aronow, 2016) indicated that peer norms for aggression can be changed into more favorable norms, resulting in a decline of aggressive behavior within the school (for more information, see Paluck et al., 2016). In this intervention, certain kinds of students (called “social referents”) are encouraged to take a public stance against conflict (such as verbal and physical aggression) at school. These “social referents” have many connections within the peer network: for instance (but not necessarily), due to their high popularity. Our study provides theoretical and empirical support for the (potential) effectiveness of such an intervention. At the same time, our findings also provide suggestions for extending on The Roots Intervention or developing new interventions. First, selecting particularly popular peers to take a public stance against aggression may be very fruitful. Second, the aggressive behavior of these popular peers themselves should be taken into account. In some classes, popular peers are very aggressive; in others, they are nonaggressive. It should be monitored whether the behavior of the popular peers themselves hinder them in taking a public stance against aggression. It is possible that when highly aggressive popular adolescents are encouraged to take a public stance against aggression, they change their own aggressive behavior as well. However, this could also work counterproductively. Therefore, learning more about the classes in which aggression is negatively associated with popularity could provide important information about how to intervene in peer groups in which aggression is positively linked with high popularity.

The current findings have important implications for both theory and practice. We found that popularity is a powerful construct during adolescence: Popular students set a norm for friendship processes related to aggressive behavior and their norms are an excellent and crucial target to change undesirable environments into more desirable ones, for the good of all peers.

## Appendix (2A)

Term for effect in current study	SIENA term	Conceptual meaning	Graphics
Descriptives			
Average number of friends	Average out-degree	Average number of friends	
Cohesion in friendship network	Density	Total number of ties divided by the total number of possible ties	
Proportion reciprocated friendships	Reciprocity	Proportion of reciprocated relationships within the network	
Proportion triadic friendships	Transitivity	Proportion of transitive relationships within the network	
Probability similarity between friends in aggression	Moran's I	Network autocorrelation: Extent to which relational partners are (not) more similar than one would expect under random pairing	
Average number of friendship changes	Hamming distance	Average number of tie changes from one time point to the next	
Proportion of stable friendships	Jaccard index	The proportion of stable relations out of the total number of created, resolved, and stable relations	
Structural network effects Tendency to make friends	Out-degree	Tendency to have ties at all	
Reciprocated friendships	Reciprocity	Tendency to form/maintain reciprocated relationships	
Transitive group formation	Transitive triplets effect	Tendency toward network closure (friends of my friends are my friends). Transitive triplets are hierarchical in nature	
Cyclical group formation	Three-cycle effect	This effect models the tendency toward forming three cycles, which is the simplest form of generalized exchange and is opposed to hierarchy	
Selection effects Effect of aggression on friendship nominations received	Alter effect	Tendency of peers to select adolescents as friends based on the adolescent's mean level of aggression	

## Aggressive Peer Norms and Aggressive Friendship Processes

Effect of aggression on friendship nominations given	Ego effect	Tendency for adolescents to select peers as friends based on the adolescent's mean level of aggression	
Similarity-based selection of friends	Creation effect	Tendency for adolescents and friends to select each other based on similarity between the adolescents and friends in the independent variable	
Maintenance effects Similarity-based maintenance of friends	Endowment effect	Tendency for adolescents and friends to maintain each other's friendship based on similarity between the adolescents and friends in the independent variable	
Influence effects Friendship influence on aggression	Average similarity effect	Tendency of friends to become more similar in behavior over time: The friends' aggressive behavior predicts changes in the adolescent's aggressive behavior	

SIENA = Simulation Investigation for Empirical Network Analyses.

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Aggressive and Prosocial Peer Norms: Change, Stability,  
and Associations with Adolescent Aggressive and Prosocial  
Behavior Development

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**This chapter is based on:**

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**Author Contributions:**

L.L.-W. conceived of this study, participated in its design and data-collection, conducted and interpreted statistical analyses and drafted the manuscript; Z.H., J.K.D., W.V. and R.V. designed the SNARE project where this study is part of, and helped to draft the manuscript.

This longitudinal study examined the extent to which the development of prosocial and aggressive peer norms was related to individual prosocial and aggressive behavior development across the first year of secondary education (three waves,  $n = 1,134$  adolescents from 51 classes,  $M_{age} = 12.66$ ). A distinction was made between descriptive norms (the aggregated average peer-perceived behavior within the classroom) and status norms (the within-classroom correlation between peer-perceived popularity and behavior). Results indicated that descriptive norms represented a stable, static peer ecology, whereas status norms were somewhat more dynamic and changed across the school year. The development of descriptive and status norms was associated with initial levels of individual prosocial and aggressive behavior, whereas the development of status norms was also associated with the development of prosocial behavior.

### 3.1 Introduction

During adolescence, aggressive (i.e., harming someone physically, socially, or psychologically) and prosocial (i.e., voluntary behavior intended to benefit another) behavior increase in comparison with childhood (Eisenberg & Morris, 2004; Moffitt, 1993). Reducing adolescent aggressive behavior and, instead, fostering adolescent prosocial behavior are concerning issues for schools; not only to maintain order and safety, but also because both behaviors have important consequences for adolescent academic achievement, well-being, and long-term social-emotional adjustment (Jones, Brown, Hogg, & Aber, 2010; Wentzel, Filisetti, & Looney, 2007). The actual display of aggressive and prosocial behavior may be dependent on the extent to which the peer context motivates adolescents to do so (Wentzel et al., 2007). Especially during early adolescence, peers are assumed to play a crucial role in the development of adolescent aggressive and prosocial behavior, by constituting a powerful socialization context in which they influence each other's behaviors (Veenstra & Dijkstra, 2011). One way of characterizing this socialization context is with the concept of peer norms (Dijkstra & Gest, 2015), which reflect the expected and accepted behavior of a social group (Shaw, 1981). To date, peer norms have been treated as rather static constructs: They have been identified at a certain moment in time and have been used to predict individual-level behavior at a later time-point. Although this approach has yielded valuable insights into how peer norms form a context that affects

adolescent behavior, it overlooks the idea that peer norms themselves may be dynamic constructs that change over time. The aim of the current study is therefore to examine to what extent the development of prosocial and aggressive peer norms is associated with the development of individual-level prosocial and aggressive behavior.

### **3.1.1 Theoretical background**

Two types of peer norms can be distinguished: descriptive norms and status norms. Descriptive norms refer to the peer-perceived average behaviors in a given setting (Wright, Giammarino, & Parad, 1986), such as a classroom. Status norms indicate the extent to which certain behaviors in a classroom are associated with popularity (i.e., norm salience; Henry, Guerra, Huesmann, Tolan, VanAcker, & Eron, 2000). Both types of peer norms within classrooms are assumed to relate to individual behavior development (Bukowski & Sippola, 2001). Some peer norms may provide opportunities for certain behaviors to flourish, whereas other peer norms do not (Dijkstra & Gest, 2015). Several theories provide explanation for the relation between peer norms and individual-level behaviors with the notion that adolescents tend to *conform* to peer norms (e.g., Asch, 1987). Conformity to descriptive norms can be explained by the social identity theory (Abrams & Hogg, 1990; Festinger, 1954). This theory states that individuals adopt behaviors that conform to peer norms, yielding a shared identity that provides social and emotional support, behavioral confirmation, peer status, and a "sense of self". Moreover, according to the social misfit model (Wright et al., 1986), adolescents may conform to norms in order to fit in with the expectations of the group (Miller & Prentice, 1994; Prinstein & Dodge, 2008), to gain peer acceptance, and to avoid peer rejection (Dijkstra & Gest, 2015; Dijkstra, Lindenberg, & Veenstra, 2008). In line with these theories, there is some evidence with regard to descriptive norms that aggressive behavior at the class level is predictive of aggressive behavior at the individual level (Thomas, Bierman, & Powers, 2011; Werner & Hill, 2010). To date, the effect of descriptive norms on the adoption of individual prosocial behavior has been under-investigated, but based on the aforementioned theories (i.e., social identity theory, social misfit theory), it seems likely that adolescents also try to conform to prosocial descriptive norms in order to establish and maintain a shared identity (Abrams & Hogg, 1990; Festinger, 1954), and to gain

peer acceptance (Chang, 2004; Dijkstra & Gest, 2015) by fitting in with the expectations of the group (Prinstein & Dodge, 2008).

Whereas the descriptive norm approach places equal weight on the behavior of all peers in a given setting, the status norm approach holds that popular adolescents especially seem to influence which behaviors are seen as valuable and attractive (Kruglanski, Shah, Fishback, Friedman, Chun & Sleeth-Keppler, 2002). According to the reputational salience hypothesis (Hartup, 1996), behaviors that are positively associated with popularity in a given context become "reputationally salient." This implies that these behaviors have high valence in a context and that these behaviors are an important tool for improving an adolescent's reputation (i.e., popularity in the current study). As adolescents generally strive for status, they may be inclined to adopt behaviors that are associated with status, in order to enhance their own status either directly or via affiliation with popular peers (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010). Moreover, according to the resource control theory, adolescents may adopt the behaviors of popular peers as this provides them with access to valuable material and social resources (Hawley, 2003). A few empirical studies have underlined the importance of status norms for the adoption of aggressive behavior. For instance, Dijkstra and colleagues (2008) demonstrated that levels of bullying were higher in classes where bullying was associated with popularity than in classes where bullying was associated with non-popularity. In addition, one longitudinal study demonstrated that middle school students ( $M_{\text{age}} = 11$  years) who associated aggressive behavior with high social status in the first semester increased their own aggressive behavior in the second year at that school (Juvonen & Ho, 2008). No studies have yet examined adolescent conformity to prosocial status norms, but based on aforementioned theories (i.e., reputational salience hypothesis; resource control theory), it is likely that adolescents tend to conform to prosocial status norms to enhance their own status (Dijkstra et al., 2010) and to get access to valuable resources (Hawley, 2003).

Although these existing studies provide valuable insights in the extent to which peer norms can be predictive for individual-level aggressive behavior, there are two aspects that are frequently overlooked in the literature. First, a setting, for instance, a classroom, may be characterized by peer norms for different kinds of behaviors (i.e., prosocial and aggressive behaviors in our study). Peer norms for prosocial and aggressive behavior do not occur in isolation but might form

combinations: distinct classroom peer norm profiles, which can be predictive of individual-level outcomes (Dijkstra & Gest, 2015). Second, in previous studies, peer norms have been treated as static constructs, that is, peer norms were measured at one time-point and used to predict individual-level behaviors at a later time-point. However, this overlooks the idea that peer norms (or more specifically, peer norm profiles) themselves may develop over time as well, and that this development may also relate to individual-level behavior development.

First, the hypothesis that the *combination* of prosocial and aggressive norms is predictive of individual-level outcomes is supported by a recent study by Dijkstra and Gest (2015). They addressed the proposition that prosocial and aggressive peer norms do not occur in isolation but, instead, are combined within classrooms. More specifically, this cross-sectional study of second-year secondary education students ( $M_{\text{age}} = 13.60$  years) took a profile-centered approach and identified distinct peer norm profiles for status norms. School classes were assigned to two meaningfully distinct peer norm profiles, based on different combinations of aggressive, prosocial, and academic achievement norms. One part of these school classes was characterized by a peer norm profile with lower levels of prosocial and academic achievement norms and higher levels of aggressive norms. The other part was characterized by a peer norm profile with higher levels of prosocial and academic achievement status norms and lower levels of aggressive status norms. These peer norm profiles were indicative of broader patterns of student classroom experiences and adjustment: Youth in classes with higher prosocial and academic achievement status norms and lower aggression status norms reported lower levels of peer rejection, lower levels of peer victimization, higher levels of practical support from peers, and more positive feelings about school (Dijkstra & Gest, 2015). In the current study, we examined whether peer norm profiles based on prosocial and aggressive peer norms (both descriptive and status norms, respectively) within classrooms are predictive for individual-level prosocial and aggressive behavior development.

Second, regarding the hypothesis that peer norms could change over time, it is important to investigate how peer norms emerge and unfold in a new peer context: for instance, in the first year of secondary education. Theoretical robust equilibrium models define the development of peer norms in a new peer context as a dynamic, self-organizing process toward “equilibrium”. This “equilibrium” refers to a stable, norm-based peer ecology, or, in other words, a stable classroom

peer norm profile (Arrow, Poole, Henry, Wheelan, & Moreland, 2004). During the developmental process towards this stable norm profile, internal or external forces may initially bring some change in peer norm profiles (Arrow, 1997; Arrow et al., 2004). Internal forces refer to the natural developmental processes that take place with regard to peer norms, whereas external forces could refer to external events like interventions or teacher interference.

A change in peer norm profiles most likely reflects the more aggressive peer norms associated with the increase in aggressive behavior during adolescence (Cillessen & Mayeux, 2004; Moffitt, 1993). The fact that aggression increases can be explained by the “maturity gap”, which is experienced by adolescents who feel biologically mature but do not yet receive adult-like rights and privileges from society. Engaging in aggressive behavior is a way for these adolescents to obtain an adult-like status among their peers (Moffitt, 1993). Soon after the possible initial change toward more aggressive norm profiles, it is expected that a homeostasis (stability in norms) will emerge (Arrow, 1997). In this homeostasis, the combination of prosocial and aggressive peer norms is stable, and both peer norms form building blocks of a predictable norm-based peer ecology (or classroom peer norm profile) in which adolescents know what behaviors are expected of them (Arrow, 1997; Arrow et al., 2004; Gest & Rodkin, 2011). The way in which peer norms emerge and unfold across the school year may therefore be associated with prosocial and aggressive behavior development of adolescents.

### **3.2 Present Study**

The present longitudinal study aimed to examine the development of peer norm profiles of aggressive and prosocial descriptive norms and status norms respectively in classrooms in relation to individual aggressive and prosocial behavior development, across the first year of secondary education. To examine the development of peer norm profiles, we conducted two steps. First, we explored without a strong a priori hypothesis how many “latent classes” (in our case, peer norm profiles) were present in the data (Finch & Bronk, 2011). Second, we examined to what extent classes made transitions between peer norm profiles, and what kind of developmental trajectory these classes made throughout the whole school year. We expected that, initially, some classes would make a transition toward more aggressive peer norm profiles (Cillessen & Mayeux, 2004; Moffitt, 1993), but that after some potential initial change, classes would remain

stable within a certain peer norm profile across the school year (Arrow et al., 2004). We used data from early adolescents in their first year of secondary education, who are to a large extent unfamiliar to each other, allowing us to assess the establishment and development of classroom peer norm profiles in a new peer context.

Next, we examined to what extent norm development was associated with individual aggressive and prosocial behavior development. As individuals are assumed to have a tendency to conform to the norm (Abrams & Hogg, 1990; Miller & Prentice, 1994; Prinstein & Dodge, 2008; Wright et al., 1986), we expected that individual-level aggressive behavior will flourish in classes that are stable in, or make a transition toward, a more aggressive norm profile, whereas individual-level prosocial behavior will flourish (higher initial levels and greater increase) in classes that are stable in, or make a transition toward, a more prosocial profile. When classes would make transitions over time across different profiles, we expected that individual-level aggressive and prosocial behavior would adapt to the changing norms. Moreover, as popular adolescents particularly seem to influence which behaviors are seen as valuable and attractive (Hartup, 1996), we expected these effects to be more evident for status norm class profiles than for descriptive norm class profiles.

### **3.3 Methods**

#### **3.3.1 Procedure and participants**

The SNARE (Social Network Analysis of Risk behavior in Early adolescence) project is a longitudinal study on adolescent social and behavioral development. The study was approved by the Institutional Review Board (IRB) of one of the participating universities (for more information, see also Dijkstra et al., 2015; Franken et al., 2016). From two secondary schools in the Netherlands, all first-year students were approached to take part in the SNARE project (Cohort 1) at the beginning of the academic year (2011-2012). The next academic year (2012-2013), a second cohort of students entered the first year of the secondary schools and was also approached (Cohort 2). In the Netherlands, when adolescents transition to secondary education, they enter a new school and are organized in classrooms based on their academic capacities. This implies that most adolescents (hardly) know anybody in their new classroom at the start of the academic year.

## Aggressive and Prosocial Peer Norms and Individual Behavior

We estimated that approximately less than two students per classroom came from the same primary school. This provides an excellent situation to examine peer norm development in a new peer context.

Students received an information letter for themselves and their parents. Parents who did not wish their children to participate in the project were asked to indicate so (passive consent), and students were told that they could opt out anytime. Data were collected 1 month after students transferred to secondary education (T1) in October 2011 for Cohort 1 and October 2012 for Cohort 2, followed by a second wave (T2) in December and a third wave in April (T3). The survey was completed by computer within the classroom (under supervision of a researcher or researcher-assistant) using the Bright Answer socio-software (SNARE software, 2011). Of the 1,144 approached first-year respondents, 0.9% declined to participate. Hence, participants included 1,134 first-year students (50.1% boys) from 51 classes, with a mean age of 12.66 ( $SD = 0.48$ ). Each class consisted of 12 to 30 students ( $M = 22.24$  students per class). Of the participants, 46.5% were enrolled in lower level education (including preparatory secondary school for technical and vocational training), whereas 53.5% were attending higher level education (including preparatory secondary school for higher professional education and preparatory secondary school for university). The majority of the sample was native Dutch (83.4%).

### 3.3.2 Measurements

All variables were based on peer nominations measured in three measurement waves (T1, T2, and T3). The number of times an individual was nominated by classmates was tallied and divided by the number of classmates minus one (as the individual was not allowed to nominate himself or herself), in order to take differences in the number of respondents per class into account. This yielded scores ranging from 0 (no nominations) to 1 (nominated by everybody) per item.

**Aggressive behavior (individual level).** This referred to aggression in the school context, that is, aggression in different forms, visible to all students in the classroom (see also Hamre & Pianta, 2006; Logis, Rodkin, Gest, & Ahn, 2013; Molano, Jones, Brown, & Aber, 2013). Individual-level aggressive behavior was assessed using peer nominations on five items: "Who quarrels and/or initiates fights with you?", "Who sometimes spreads rumors or gossips about you?", "Who

bullies you?", "Who is rude and defies teachers?", and "Who makes fun of others?" (based on Lease, Kennedy, & Axelrod, 2002). For each wave, the average of these five items was used as a scale for aggressive behavior (for a similar procedure, see Gest & Rodkin, 2011). Hence, a score of 0 on this scale implied that an adolescent was not nominated by his or her peers on the five aggression items. A score of 1 implied that the adolescent was nominated by all of his or her peers on all five aggression items. Cronbach's alphas were  $\alpha_{T1} = .76$ ,  $\alpha_{T2} = .77$ , and  $\alpha_{T3} = .78$ , respectively.

**Prosocial behavior (individual level).** Peer-perceived prosocial behavior was assessed using peer nominations on four items: "Who gives others the feeling that they belong to the group?" "Who helps others by giving good advice?", "Who cooperates in a friendly way with you?", and "Who keeps his or her promises?" (these questions were developed based on Hawley, 2003). For each wave, the average of these four items was used as a scale for prosocial behavior. The interpretation of this score is the same as the score for peer-perceived aggressive behavior. Cronbach's alphas of the resultant scale were  $\alpha_{T1} = .68$ ,  $\alpha_{T2} = .82$ , and  $\alpha_{T3} = .86$ , respectively, indicating sufficient and good internal consistency.

**Status norms (classroom level).** Aggressive and prosocial status norms were calculated for each class separately as the correlation between aggressive behavior and popularity, and prosocial behavior and popularity (see Dijkstra & Gest, 2015; Dijkstra et al., 2008). Popularity was assessed by asking participants "Who is the most popular?" and "Who is least popular?" The score for least popular was subtracted from the score for most popular to obtain a single continuum of popularity (e.g., Cillessen & Rose, 2005; Lease et al., 2002).

**Descriptive norms (classroom level).** Descriptive norms were measured as the aggregated average proportion score for aggressive behavior and prosocial behavior, respectively, across all students in the class. Hence, the descriptive norms represented the average proportions of peer-nominated aggression and prosocial behavior within the classroom.

### 3.4 Analytic Strategy

#### 3.4.1 Attrition analyses

Of the 1,134 respondents, 2.9% showed missing values in T1, and 3.4% and 3.3%, respectively, showed missing values in T2 and T3. The average

percentage of missing values was 0.01% per variable. Attrition analyses showed no significant or substantial differences in research variables of interest between partially missing cases and complete cases. Missing data were handled using full information maximum likelihood in Mplus 7.31.

### **3.4.2 Latent class analyses**

To examine the development of peer norm profiles across the school year, we conducted two steps. First, we used cross-sectional and longitudinal latent class analyses (LCA) to explore the number of latent classes (i.e., peer norm profiles) within our data based on aggressive and prosocial norms for both status and descriptive norms. LCA is a person-centered analytical strategy that groups classes into class profiles based on empirically distinct patterns of scores on the variables (i.e., prosocial and aggressive peer norms). Thus, a class profile is a configuration of class-level characteristics, in this case, the prosocial and aggressive peer norms within a class. We used cross-sectional and longitudinal LCA in order to examine whether the classes that we found cross-sectionally were also the same longitudinally. To find the appropriate number of class profiles, we inspected the class-solutions based on five frequently used criteria (Meeus, van de Schoot, Keijsers, Schwartz, & Branje, 2010; Meeus et al., 2011). First, the sample size-adjusted Bayesian Information Criteria of the final class-solution should be lower than for other class-solutions. Second, a significant Lo–Mendell–Rubin Test should indicate that the fit of the final class-solution is significantly better than the fit of other class-solutions. Third, entropy values should be  $>.70$  to indicate good classification accuracy (Reinecke, 2006). Fourth, when evaluating the content of the classes, the addition of a new class should provide unique information. Fifth, the percentage of additional classes is not allowed to be lower than 5.0% (Speece, 1994).

### **3.4.3 Latent transition analyses**

As a second step to examine the development of peer norms, we performed latent transition analyses (LTA) in Mplus. LTA comprises a longitudinal extension of LCA (for an overview, see Kaplan, 2008), offering two types of structural parameters: (a) varying numbers of classes within a particular class type across waves, indicating an increase or decrease in prevalence over time; and (b) transitions of classes between class types that carry these changes in prevalence.

Based on the potential transitions that classes could make across norm profiles throughout the whole school year, we identified different norm trajectories, and assigned all classes to a certain norm trajectory. In this way, we were able to test our hypothesis that initially, some classes would make a transition toward more aggressive peer norm profiles (Cillessen & Mayeux, 2004; Moffitt, 1993), but that after some potential initial change, peer norms would stabilize during the school year (Arrow et al., 2004).

#### **3.4.4 Latent growth curve models**

Next, to examine the association of peer norm development and individual behavior development, we used Multilevel Multigroup Latent Growth Curve Models, in which we controlled for the multi-level structure of the data. In this way, we examined whether individual-level development of aggressive and prosocial behavior varied between classes with different norm trajectories (Preacher, Wichman, MacCallum, & Briggs, 2008). Model fits were evaluated and considered as adequate if their comparative fit index (CFI) was greater than .90 (Kaplan, 2000) and their root mean square error of approximation (RMSEA) was less than .08 (Kline, 2005). As the normal distribution of individual-level aggressive behavior was positively skewed, we used Restricted Maximum Likelihood Estimation (Banks, Mao, & Walter, 1985).

#### **3.4.5 Supplemental analyses**

The results were computed in two ways for descriptive norms, in order to account for endogenous feedback that might take place (i.e., the individual adds to the norm and may also be impacted by the norm). First, we used the whole sample to calculate descriptive norms, disregarding the fact that endogenous feedback might be present. Second, we split the sample into two parts. The first part (33.3%) was used to estimate the development of descriptive norm profiles, and we performed analyses to predict individual-level aggressive and prosocial behavior development on the second part of the sample (66.7%). Both methods of analyzing the data produced the same results, so we decided to present the results of the analyses of the whole sample in this article. The results of the other method (split method) are available upon request.

### **3.5 Results**

### 3.5.1 Descriptive statistics

Descriptive results are presented in Table 3.1. Correlations between individual aggressive and prosocial behavior were significantly negatively related across waves ( $r_{T1} = -.06$ ,  $r_{T2} = -.14$ , and  $r_{T3} = -.11$ ). Correlations between status norms and descriptive norms varied between  $r = -.03$  and  $r = .34$  and were nonsignificant, except for the correlation between prosocial status norms and prosocial descriptive norms at T2 ( $r_{T2} = .34$ ), which was significant.

### 3.5.2 Development of aggressive and prosocial peer norm profiles

Based on our cross-sectional and longitudinal LCA, we found a two-class solution to be superior for descriptive norms (Figure 3.1) and a three-class solution to be superior for status norms (Figure 3.2). For descriptive norms, a prosocial peer norm profile (with high levels of prosocial peer norms and low levels of aggressive peer norms) and a mixed class profile (with fairly similar levels of prosocial and aggressive peer norms) were visible. For status norms, in addition to a similar prosocial and mixed peer norm profile, there was an aggressive peer norm profile (higher levels of aggressive norms than prosocial norms). In the longitudinal LCA, the peer norm profiles were assumed to be the same for each wave by restricting the profiles and variances to make them equivalent across waves (see Nylund, Asparouhov, & Muthén, 2007), with an excellent model fit: entropy values of .81 for descriptive norms and .80 for status norms.

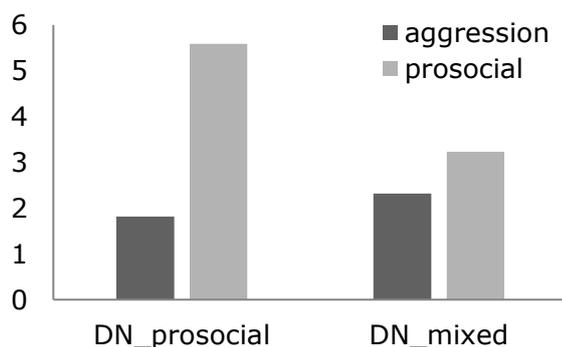


Figure 3.1. Two-class solution for descriptive (DN) based on standardized average proportional scores.

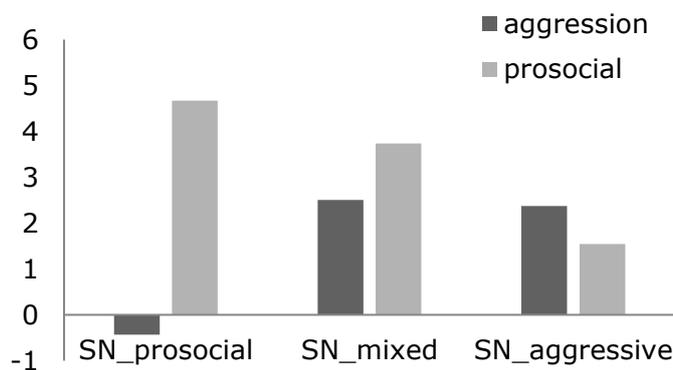


Figure 3.2. Three-class solution for status norms (SN) norms based on standardized correlation scores.

We performed two LTA analyses to examine the development of peer norm profiles for descriptive norms and status norms, respectively. The prevalence of the prosocial and mixed descriptive norm class profiles remained stable over time. Over the whole period, the majority of classes ( $n = 40$ ) were in the mixed profile, while the minority of classes were in the prosocial profile ( $n = 11$ ). In terms of transition probabilities between descriptive norm profiles, the probability of moving to another profile was zero for each descriptive norm profile. For status norm profiles, the prevalence of classes within the prosocial status norm profile decreased over time from  $n_{T1} = 14$  classes to  $n_{T2} = 12$  and  $n_{T3} = 5$  classes, whereas the prevalence of classes within the mixed status norm profile first stayed stable and then increased over time from  $n_{T1} = 20$  classes to  $n_{T2} = 20$  and  $n_{T3} = 33$  classes. The prevalence of classes within the aggressive profile initially increased, followed by a decline from  $n_{T1} = 17$  classes to  $n_{T2} = 19$  and  $n_{T3} = 13$  classes. In terms of transition probabilities, the probability of making a transition to a mixed class profile increased across the two time intervals, whereas the probability of making a transition to an aggressive or prosocial profile declined. The prosocial profile was least stable across waves (Table 3.2).

We distinguished between different trajectories that the classes could make over time based on the transitions that they made across class norm profiles throughout the whole school year (i.e., different norm trajectories). For descriptive norms, two stable norm trajectories could be distinguished. The first trajectory consisted of classes that remained continually in the mixed profile (mixed norm trajectory) and the second trajectory consisted of classes that remained continually in the prosocial profile across waves (prosocial norm trajectory). For status norms, four norm trajectories could be distinguished based on the stability and the endpoint (i.e., transitions) of norm development. Across the whole school year, 14 (27.5%) classes remained stable within the mixed profile (mixed norm trajectory: stable mixed). Only one class remained stable within the prosocial type, whereas four classes made a transition from the mixed or aggressive profile to the prosocial profile from T1 to T2; hence, the latter four classes were stable in prosocial norms from T2 to T3. We collapsed these five classes into a longitudinal prosocial class profile (prosocial norm trajectory: stable prosocial or prosocial endpoint; 9.8%). Furthermore, 13 classes remained stable in the aggressive profile and one class made a transition from a mixed profile to the aggressive profile from T1 to T2; hence, this class was stable in the aggressive profile from

T2 to T3. We collapsed these 14 (27.5%) classes in an aggressive trajectory (aggressive norm trajectory: stable aggressive, or transition to aggressive profile).

Table 3.1  
*Means and Standard Deviations for Status Norms, Descriptive Norms, Individual Prosocial and Aggressive Behavior*

	Time 1	Time 2	Time 3
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
<i>Class-Level</i>			
Prosocial status norms	0.523 (0.243) <sup>a</sup>	0.495 (0.250) <sup>a</sup>	0.470 (0.225) <sup>a</sup>
Aggressive status norms	0.309 (0.317) <sup>a</sup>	0.358 (0.317) <sup>a</sup>	0.421 (0.242) <sup>a</sup>
Prosocial descriptive norms	0.120 (0.042) <sup>a</sup>	0.136 (0.048) <sup>b</sup>	0.131 (0.053) <sup>b</sup>
Aggressive descriptive norms	0.043 (0.022) <sup>a</sup>	0.053 (0.021) <sup>b</sup>	0.064 (0.026) <sup>c</sup>
<i>Individual-level</i>			
Prosocial behavior	0.119 (0.065) <sup>a</sup>	0.134 (0.078) <sup>b</sup>	0.129 (0.086) <sup>c</sup>
Aggressive behavior	0.041 (0.062) <sup>a</sup>	0.052 (0.075) <sup>b</sup>	0.062 (0.083) <sup>c</sup>

*Note.* Status norms indicate average correlations between behavior and status across classes. Descriptive norms indicate average aggregated proportional peer-nominated scores of behaviors. Means that do not share the same superscript across the row, differ at  $p < .05$ .

Table 3.2

*Classroom-level Transition Probabilities for Prosocial, Aggressive, and Mixed Status Norm Classrooms*

	Wave 2			Wave 3		
	Aggressive	Mixed	Prosocial	Aggressive	Mixed	Prosocial
<i>Wave k-1</i>						
Aggressive	.941	.000	.059	.684	.316	.000
Mixed	.100	.750	.150	.000	.950	.050
Prosocial	.071	.357	.571	.000	.333	.667

*Note.* Transition probabilities sum up to 1.00 across rows for each interval set.

Furthermore, 18 (35.3%) classes made a transition from an aggressive profile (three classes) or prosocial profile (15 classes) toward a mixed profile. Because this was the most often made transition, we decided to make a separate trajectory based on classes who had the mixed profile as an endpoint (transition mixed trajectory: mixed profile as endpoint). Hence, we found two norm trajectories for descriptive norms and four norm trajectories for status norms, and we were able to include all classes in one of these developmental trajectories.

In sum, it appeared that descriptive norms were very stable and that classes did not make transitions toward other descriptive norm peer profiles. The change in status norms was somewhat more dynamic and classes most often made a transition toward a status norm mixed profile.

### **3.5.3 Individual-level aggressive and prosocial behavior development in classes with different norm trajectories**

We used two multi-level multi-group Latent Growth Curve Models (LGCM) to investigate differences in individual-level aggressive and prosocial behavior development between classes with different norm trajectories, comparing two longitudinal descriptive norm trajectories and four longitudinal status norm trajectories. The model fit of the LGCM with the two descriptive norm trajectories,  $\chi^2(14) = 22.52$ ,  $p = .069$ ,  $RMSEA = .033$ ,  $CFI = .990$ , was good. The addition of a quadratic slope did not significantly improve the model fit for descriptive norms. For status norms, the BIC-adjusted of the model with a quadratic slope was 104.30

points lower than the model without a quadratic slope. The RMSEA was .027 points lower for the model with a quadratic slope, indicating a better model fit. The model fit with the quadratic slope was good,  $\chi^2(24) = 41.81$ ,  $p = .01$ , RMSEA = .051, CFI = .989.

We examined the 95% confidence intervals to test differences between the intercepts and slopes of individual-level development of aggressive and prosocial behavior in different class profiles. For descriptive norms, in line with our hypotheses, the intercept of individual-level prosocial behavior was significantly higher within classes with a prosocial norm trajectory than in classes with a mixed norm trajectory. For aggressive behavior, the intercept of individual-level aggressive behavior was significantly higher within the mixed norm trajectory than in the prosocial norm trajectory. Hence, initial levels of individual-level prosocial behavior were higher and initial levels of individual-level aggressive behavior were lower in classes with prosocial descriptive norms. There were no significant differences in slopes of individual prosocial and aggressive behavior (Table 3.3).

For status norms, in contrast to our hypothesis, individuals initially had significantly lower initial levels (i.e., intercepts) of prosocial behavior in classes with a prosocial norm trajectory compared with individuals in classes with other norm trajectories. In line with our hypothesis, the linear slope of individual prosocial behavior in classes with the prosocial norm trajectory was significantly higher than in classes with the aggressive and mixed norm trajectory, but not higher than the linear slope of individual prosocial behavior in classes with the transition mixed norm trajectory. The linear slope effects were somewhat weakened by the quadratic effects. This quadratic effect was significantly more negative for individuals of classes within the prosocial norm trajectory and the transition mixed norm trajectory. As expected, for individual-level aggressive behavior development, the intercept of classes with a mixed norm trajectory differed significantly from classes with an aggressive norm trajectory and a transition mixed norm trajectory (Table 3.3). In contrast to our hypothesis, aggressive behavior slopes did not differ significantly across classes with different norm trajectories.

Table 3.3

*Intercepts and Slopes for Individual Development of Prosocial and Antisocial Behavior for Different Class Norm Trajectories*

	Descriptive Norms		Status Norms			
	Prosocial Norm Trajectory N=11	Mixed Norm Trajectory N=40	Prosocial Norm Trajectory N=5	Mixed Norm Trajectory N=14	Aggressive Norm Trajectory N=14	Transition Mixed Norm Trajectory N=18
<i>Prosocial behavior</i>						
Intercept	.176 ( .160, .191) <sup>a</sup>	.106 ( .097, .114) <sup>b</sup>	.086 ( .073, .100) <sup>a</sup>	.124 ( .107, .142) <sup>b</sup>	.122 ( .101, .142) <sup>b</sup>	.120 ( .101, .140) <sup>b</sup>
Linear slope	.012 (-.008, .031)	.004 (-.004, .011)	.106 ( .053, .160) <sup>a</sup>	.000 (-.024, .023) <sup>b</sup>	-.011 (-.045, .023) <sup>b</sup>	.058 ( .029, .087) <sup>a</sup>
Quadratic slope	*	*	-.043 (-.069, -.016) <sup>a</sup>	.003 (-.011, .016) <sup>b</sup>	.006 (-.006, .018) <sup>b</sup>	-.027 (-.043, -.012) <sup>a</sup>
<i>Aggressive behavior</i>						
Intercept	.030 ( .022, .039) <sup>a</sup>	.044 ( .038, .050) <sup>b</sup>	.037 ( .021, .053) <sup>ab</sup>	.032 ( .024, .040) <sup>a</sup>	.048 ( .041, .056) <sup>b</sup>	.044 ( .034, .054) <sup>ab</sup>
Linear slope	.011 ( .002, .020)	.010 ( .007, .013)	.010 (-.003, .022)	.017 ( .003, .031)	.005 (-.005, .015)	.012 (-.010, .034)
Quadratic slope	*	*	.000 (-.006, .006)	-.002 (-.008, .004)	.001 (-.003, .005)	-.001 (-.010, .008)

*Note.* Prosocial Norm Trajectory/Mixed Norm Trajectory/Aggressive Norm Trajectory = classes that are stable and/or make transition to the profile. Transition Mixed Norm Trajectory: classes that have the mixed profile as endpoint. Parameters with different superscripts differ significantly from each other at the  $p < .05$  level. Numbers in parentheses represent 95% confidence intervals.

### **3.6 Discussion**

The present study investigated the profile-centered development of prosocial and aggressive descriptive and status norms in a new peer context across a school year in relation to individual behavior development. Our findings suggest that descriptive norms constitute a stable, static peer ecology, whereas status norms show some dynamic change across the school year toward more aggressive norm profiles. Descriptive and status norm development was correlated with initial levels of individual prosocial and aggressive behavior, whereas status norm development also related to the development of individual prosocial behavior.

#### **3.6.1 The development of peer norm profiles**

Descriptive norms in particular constituted a predictable and stable class environment for adolescents from the beginning of the school year onward, with the majority of classes remaining continually in a mixed norm profile (consisting of almost evenly high prosocial and aggressive norms) and the minority of classes being continually in a prosocial norm profile (consisting of high prosocial behavior and low aggressive norms). Status norms were fairly stable as well, as the probability of staying within the same class norm profile was higher compared with making a transition toward another class profile. However, status norms were also somewhat dynamical, as some classes made transitions across peer norm profiles. The aggressive class norm profile (higher aggressive than prosocial norms) was most stable across the first two waves whereas the mixed profile was most stable across the last two waves. If a transition was made, this was most often made from a prosocial profile toward a mixed profile (i.e., more aggressive profile).

These findings largely correspond with the theoretical robust equilibrium models of Arrow and colleagues (Arrow, 1997; Arrow et al., 2004) about norms being building blocks of a fairly predictable and stable environment (Gest & Rodkin, 2011). For descriptive norms, no initial change seemed to happen; the norm-based peer ecology was quickly established in this new peer context. For status norms, change was possible across the whole school year, which indicates that next to initial change, there may still be a chance that a class makes a transition in its norm development. The finding that classes increasingly make a transition toward a more aggressive peer norm profile can be explained by the fact that adolescents increasingly are confronted with the "maturity gap," which they attempt to bridge by displaying deviant behaviors (Moffitt, 1993). Also, it could be the case that

highly popular adolescents have to reject friendship invitations in order to maintain in their own, highly popular clique, which could be viewed as aggressive behavior to those who made such friendship invitations. The fact that the prosocial profile was the least stable across waves is a finding that needs some attention as well. Apparently, “internal forces” drive classes toward somewhat more aggressive norm profiles (for instance, the mixed profiles). For instance, these “internal forces” may reflect the general tendency of adolescents to become more deviant over time (Moffitt, 1993). However, schools may find it more desirable when there is a prosocial status norm in classes. It might be the case that external forces (teachers, interventions) are needed to make sure that more classes remain prosocial (Arrow et al., 2004). More studies are needed to examine why prosocial norms are less stable and how teachers and interventions may play a role in peer norm development.

### **3.6.2 The development of peer norms and individual-level behavior development**

The development of descriptive norms and status norms was associated with the extent to which individual-level behaviors flourished within the classroom. Regarding descriptive norms, there were higher levels of initial prosocial behavior (and individuals ended up higher on prosocial behavior as well, but not due to differences in slopes) in classes that had stable descriptive prosocial norms. This is in line with our hypothesis. For status norms, initial levels of prosocial behavior were lower in more prosocial norm trajectory classes, which seems counterintuitive and in contrast to our hypothesis. This may be explained by the fact that, for status norms, the classes with a prosocial norm trajectory consisted of only one class that was prosocial at the first time-point, as the other classes made a transition toward the prosocial profile from the first to the second time-point. Moreover, in line with our hypothesis, there is a greater increase in prosocial behavior in classes with a prosocial norm trajectory in that individuals end up relatively higher on prosocial behavior compared with their initial values. Regarding aggressive behavior, in line with our hypotheses, descriptive and status norm development were both associated with initial levels of individual aggressive behavior; initial aggressive behavior flourished in classes with more aggressive peer norm trajectories. In contrast to our hypotheses, the direction of aggressive behavior development (i.e.,

the slope) did not differ across classes with different descriptive and status norm trajectories.

Our findings are largely in line with theories that explain the association between peer norms and individual-level behavior with the notion that individuals conform to peer norms due to a desire to be accepted by peers (Chang, 2004; Dijkstra & Gest, 2015; Wright et al., 1986), or to increase their own popularity by adopting behaviors that are positively valued within the classroom (i.e., reputationally salient; Hartup, 1996). The fact that initial levels of individual-level prosocial behavior, and aggressive behavior in particular, seemed to be associated with the development of peer norms could indicate that individuals rapidly start to conform to the norm after entering a new peer context with unfamiliar peers. However, next to the possibility that individuals tend to conform to the norm, it should also be considered that individual-level behavior development may contribute to the development of peer norms as well. For instance, the structure and composition of peer relationships, together with the way in which peers within a context behave and interact, may inform the conceptualization of peer norms (McCormick & Cappella, 2015; Neal & Neal, 2013; Wellman, 1988).

The finding that descriptive and status peer norms were not associated with the direction (i.e., slope) of individual aggressive behavior development can be explained in three ways. First of all, the reported aggressive behavior was low within classes: only about 5.0% of adolescents within the class exhibited aggressive behaviors. The low levels of aggressive behavior may be a reason why class variables (in our case, peer norms) might not explain a lot of the variation in individual-level aggressive behavior and, therefore, the effects may be nonsignificant. Second, it might be the case that status norms are only associated with individual-level aggression at the very beginning of the school year, in order to establish dominance hierarchies. Once these dominance hierarchies are established, adolescents may not feel the urge to further increase their aggressive behavior. For instance, the study of Pellegrini and Long (2002) provides some evidence for this proposition. Third, it might be the case that characteristics of the individual play a role in the extent to which conformity to the norm takes place. For instance, only adolescents with certain personality characteristics or lower self-control may tend to conform to the norm. Also, it may well be that particular peers, for instance, best friends who are also popular, have more influence on adolescents' aggressive behavior compared with the popular peers within a class.

Several studies have indeed shown that friendship with aggressive (popular) peers is associated with increases in an individual's own level of aggression (Dijkstra et al., 2010; Espelage, Holt, & Henkel, 2003; Logis et al., 2013). Moreover, peer norms have been demonstrated to influence on friendship socialization (and selection) with respect to aggressive behavior (Laninga-Wijnen et al., 2017). Future studies are encouraged to take moderators into account in examining the association between norm development and aggressive behavior development.

### **3.6.3 Strengths, limitations, and future research**

Several limitations of the present study need to be acknowledged. First, our study is mainly concerned with descriptive findings on change and stability of classroom peer norms. We did not investigate why peer norms change or remain stable throughout the school year, or why one peer norm profile is more likely than the other. We believe that future research should examine which endogenous (e.g., individual social skills, pubertal status) or exogenous forces (e.g., teachers, school climate) influence the way in which norms emerge and develop (Dijkstra & Gest, 2015; Gest & Rodkin, 2011). Second, to what extent our findings are generalizable to developmental stages other than early adolescence remains a matter for future research. Just as shifts take place in the correlates of popularity throughout child and adolescent development (Cillessen & Mayeux, 2004), there may also be developmental differences in the way in which status and descriptive norms affect individual prosocial and aggressive behavior. Third, the data used in our study stem from peer nominations only, which might lead to problems in terms of shared method variance (Vaillancourt & Hymel, 2006). However, measures stemming from peer nominations were aggregated across multiple nominators, enhancing the validity and reliability of our data (Bukowski, Gauze, Hoza, & Newcomb, 1993). Moreover, respondents in our study were allowed to nominate an unlimited number of peers. Consequently, we avoided a ceiling effect in which respondents tend to nominate a certain maximum number of peers. Fourth, the periods between data collection waves were not identical, as the period between the second and the third time-point was somewhat longer than the period between first and second time-point. However, we do not believe that a wave with exactly the same time interval would have yielded different results, as norms are shown to be reasonably stable across the three time points. Moreover, between the second and third wave, there were more holidays than between the first and

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second wave, implying that the time individuals within classes spent together between second and third wave is roughly similar to the time from first to the second wave.

The present study also has several strengths. First of all, we examined peer norm development using a profile-centered approach by taking the prosocial and aggressive peer norms into account simultaneously. Hence, both aggressive and prosocial norms are important building blocks of an overall norm based peer ecology. Moreover, we showed that descriptive norms and status norms should be considered as psychometrically distinct and conceptually complementary approaches to measure norm development within a classroom (Dijkstra & Gest, 2015). Whereas descriptive norms are static and stable, status norms show both stability and change across the school year. Second, our data were longitudinal and consisted of first-year secondary school students, who in most cases initially did not know each other, due to the system in the Netherlands where adolescents enter secondary education in new schools. It is a strong point that we started one month after the transition to secondary education. This provided us with an excellent opportunity to examine the emergence and stability of descriptive and status norms in a new peer context, something that has not been done before. At the same time, it might have been the case that adolescents were relatively unfamiliar to each other during the first time-point, which might have hindered making an accurate assessment of each other's behaviors. However, we believe that adolescents were sufficiently familiar with one another to accurately assess each other's behavior. Students were in the same class, every day, all day. They not only observed each other in the classroom but also in other important school-related contexts such as in the lunchroom, the playground, and the hallways of the school. Moreover, our constructs of prosocial and aggressive behaviors within the school context tap into behaviors that are visible for all students within the classroom. Therefore, adolescents had extensive opportunities to observe and experience each other's aggressive and prosocial behavior. Third, a strong point of our study is that we are the first to examine the development of descriptive norms and status norms in relation to both individual prosocial and aggressive behavior development.

### 3.6.4 Implications

The implications of our findings are threefold. First, the knowledge that status norms within the classroom may be associated with the direction of individual-level prosocial behaviors is a crucial prerequisite to proposing solid research-based intervention strategies designed to change classrooms and, consequently, to creating environments that appropriately foster children's adjustment. Based on the results of our study, it could be reasoned that changing the status peer norm in the classroom may have important consequences for fostering prosocial behavior within the classroom.

Second, we found that both descriptive norms and status norms differed in their development over time. Both were associated with initial individual-level behavior, whereas status norms also were associated with changes in prosocial behavior across the school year. Thus, even though recent studies emphasize the important role of status norms in terms of influence processes (Sandstrom, 2011), our study indicates that descriptive norms should not be disregarded in examining the association between norms and individual behavior (Cialdini, 2007).

Third, our results indicate that it is important to study the development of peer norms in relation to adolescent prosocial and aggressive behavior development. First of all, although adolescents are thought to be able to display higher levels of prosocial behavior than children (Eisenberg & Morris, 2004), the actual display of these prosocial behaviors is assumed to be dependent on the extent to which the context motivates them to do so (Wentzel et al., 2007). Our results indicate that the context in terms of peer norms seems to be an important motivator to display prosocial behavior. Furthermore, even though the development of aggressive behavior was not directly related to the development of peer norms, it might be the case that peer norms form a context that has a moderating impact on processes that are associated with individual-level aggressive behavior. A recent study of Laninga-Wijnen and colleagues (2017) indicated that peer norms indeed affect friendship dynamics with regard to aggression. More specifically, in classes with high aggressive status norms, adolescents tended to adopt the aggressive behavior of their friends, whereas in classes with low aggressive status norms, adolescents did not adopt the aggressive behavior of their friends. Next to the fact that peer norms may play a moderating role in friendship dynamics on aggression, it could also be the case that peer norms are especially important for aggressive behavior at the beginning of the school

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year, as dominance hierarchies may be established during this particular period (Pellegrini & Long, 2002). Indeed, we found that the development of peer norms was associated with initial levels of aggressive behavior. Future studies are encouraged to examine possible moderators in the relation between peer norms and adolescent aggression development, and to pay particular attention to this relation in a situation in which peer norms emerge.

This article demonstrates that a profile-centered approach is an innovative way to examine the development of a norm-based peer ecology which is associated with the extent to which individual prosocial and aggressive behavior flourish within the classroom across the school year. We encourage future studies that examine to what extent peer norms predict certain outcomes to report estimates regarding the stability of these peer norms, as status norms seem to be especially susceptible to change over time. We also encourage future studies to take a holistic, profile-centered approach in examining peer norms, as we have indicated that “. . . the whole is more than the sum of its parts.”

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The Role of Prosocial and Aggressive Popularity Norm  
Combinations in Prosocial and Aggressive Friendship  
Processes

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**This chapter is based on:**

Laninga-Wijnen, L., Steglich, C. E. G., Harakeh, Z., Veenstra, R., Vollebergh, W. A. M., & Dijkstra, J. K. (2019). The role of prosocial and aggressive popularity norm combinations in prosocial and aggressive friendship processes. *Journal of Youth and Adolescence*, advanced online publication. <https://doi.org/10.1007/s10964-019-01088-x>

**Author Contributions:**

L.L.-W. conceived of this study, participated in its design and data-collection, conducted and interpreted statistical analyses and drafted the manuscript; C.S. helped conducting and interpreting analyses. Z.H., W.V. and R.V. designed the SNARE project where this study is part of, and helped to draft the manuscript. J.K.D. designed the SNARE project where this study is part of, helped interpreting analyses and drafting the manuscript.

Prior work has shown that popular peers can set a powerful norm for the valence and salience of aggression in adolescent classrooms, which enhances aggressive friendship processes (selection, maintenance, influence). It is unknown, however, whether popular peers also set a norm for prosocial behavior that can buffer against aggressive friendship processes and stimulate prosocial friendship processes. This study examined the role of prosocial and aggressive popularity norm combinations in prosocial and aggressive friendship processes. Three waves of peer-nominated data were collected in the first- and second year of secondary school ( $N = 1,816$  students; 81 classrooms;  $M_{age} = 13.06$ ; 50.5% girl). Longitudinal social network analyses indicate that prosocial popularity norms have most power to affect both prosocial and aggressive friendship processes when aggressive popularity norms are non-present. In prosocial classrooms (low aggressive and high prosocial popularity norms), friendship maintenance based on prosocial behavior is enhanced, whereas aggressive friendship processes are largely mitigated. Instead, when aggressive popularity norms are equally strong as prosocial norms (mixed classrooms) or even stronger than prosocial norms (aggressive classrooms), aggression is more important for friendship processes than prosocial behavior. These findings show that the prosocial behavior of popular peers may only buffer against aggressive friendship processes and stimulate prosocial friendship processes if these popular peers (or other popular peers in the classroom) abstain from aggression.

#### **4.1 Introduction**

Adolescents spend a large part of the day in their classroom, and the proliferation of prosocial and aggressive behavior in classrooms is vital to adolescents' social-emotional and academic adjustment (Jones et al., 2010). Aggressive and prosocial behavior may proliferate through a dynamic interplay of peer selection, maintenance, and influence processes (Dishion & Tipsord, 2011). Selection and maintenance refer to adolescents selecting and keeping friends; for instance, based on similarity; as similarity enhances predictability, mutual understanding, and trust (similarity attraction hypothesis; Byrne, 1971). In turn, adolescents may become similar to their friends via *influence* processes, due to social pressure or imitation (Dijkstra & Veenstra, 2012). Following reputational salience hypothesis (Hartup, 1996), these friendship processes would mainly occur

for behaviors that are an important tool to improve one's social reputation such as popularity. Indeed, adolescents increasingly strive for popularity (LaFontana & Cillessen, 2010) and behaviors associated with achieving this goal become of high valence to them. The concept of "popularity norms" captures the within-classroom association between behavior – such as prosocial and aggressive behavior – and popularity (Henry et al., 2000). To date, only two studies examined popularity norms' role in friendship processes. They showed that friendship selection and influence related to aggression (Laninga-Wijnen et al., 2017), and friendship influence on risk attitudes (Rambaran et al., 2013) were strongest in classrooms where these behaviors or attitudes were rewarded with popularity.

There are, however, two important gaps in our understanding on popularity norms' role in friendship processes. First, the valuable work on antisocial popularity norms has not been accompanied by an equivalent exploration on domains that protect against this risk or promote positive development. Evolutionary-psychological theories (Ellis et al., 2016) state that when adolescents can achieve their goals (e.g., popularity) through prosocial behavior, they will attach less value to aggression; which would enhance prosocial friendship processes and mitigate aggressive friendship processes; however, this assumption has been empirically unexplored. Second, prior work only examined popularity norms and friendship processes in *one* behavioral domain (same-behavior processes); but reality is often more complex: multiple norms and friendship processes may both co-exist and interplay. This is particularly true for prosocial and aggressive behavior, which used to be defined as two distinct but also partly overlapping dimensions that both *co-occur* and *interplay* within individuals, relationships and contexts (Card et al., 2008; Hawley & Bower, 2018; Pellegrini, 2008). The *interplay* of these behaviors may occur through two processes. First, strong norms for one behavior may discourage friendship processes for the other behavior (e.g., prosocial norms diminish aggressive friendship processes); reflecting *cross-behavior norm processes*. Second, prosocial and aggressive behavior may interplay at the dyadic friendship level, through *cross-behavior friendship processes*. Adolescents displaying certain behaviors may select their friends based on the combination with another type of behavior, such as when highly prosocial adolescents select lowly aggressive peers as friends (*cross-behavior friendship selection*). Moreover, *cross-behavior friendship influence* occurs when certain behaviors of friends influence *other* behaviors in adolescents (Giletta et al., 2013), for instance when

prosocial friends diminish adolescents' aggression. Importantly, the extent to which these cross-behavior processes take place, is likely to depend on whether aggression and prosocial behavior can be considered as mutually exclusive; for instance, when one behavior is rewarded with popularity whereas the other is not. However, a previous study – on partly the same data as the current study – found that prosocial and aggressive popularity norms can also co-occur, indicating that in some classrooms prosocial and aggressive behaviors are not mutually exclusive as both behaviors have the function to gain popularity. This previous study distinguished three classroom types: mixed classrooms with high prosocial and high aggressive popularity norms, prosocial classrooms with high prosocial and very low aggressive popularity norms, and aggressive classrooms with high aggressive and relatively low prosocial norms (Laninga-Wijnen et al., 2018a). The current study extends upon this prior work by examining the role of these popularity norm combinations (aggressive, prosocial and mixed) in aggressive and prosocial friendship processes.

#### **4.1.1 Prosocial classrooms and friendship processes**

In classrooms with high prosocial popularity norms and non-present aggressive popularity norms, prosocial behavior is highly valued and reputationally salient, whereas aggression is not (Hartup, 1996). In such classrooms, prosocial and aggressive behaviors can be viewed as mutually exclusive as they do not co-exist at the norm level, which may elicit cross-behavior processes. The prosocial popularity norm may therefore not only enhance friendship selection, maintenance and influence related to prosocial behavior (same-behavior norm processes); but also discourage friendship selection, maintenance and influence related to aggression (cross-behavior *norm* processes). The prosocial popularity norm may also encourage cross-behavior *friendship* processes. Regarding cross-behavior *friendship selection*, highly prosocial youth may be attracted to lowly aggressive friends, as these peers may share similar values and principles (Brechwald & Prinstein, 2011). At the same time, highly aggressive youth may be attracted to highly prosocial peers as friends, as affiliation with these highly prosocial friends can be an effective way to achieve popularity (Dijkstra et al., 2010). These adolescents may consider the goal of becoming popular more important than sharing the same values or principles (LaFontana & Cillessen, 2010). Next, regarding cross-behavior *friendship influence*, highly prosocial youth may diminish

adolescents' aggression, whereas highly aggressive friends may not have the power to diminish adolescents' prosocial behavior, as prosocial behavior is highly valued and rewarding in this context (Hartup, 1996). So far, no study examined prosocial popularity norms' role in these friendship processes.

#### **4.1.2 Aggressive classrooms and friendship processes**

Aggressive classrooms are characterized by high aggressive popularity norms and relatively low prosocial popularity norms (Laninga-Wijnen et al., 2018a). In these classrooms, the aggressive popularity norm may strengthen friendship selection, maintenance, and influence related to aggression (same-behavior norm processes); and mitigate friendship selection, maintenance and influence based on prosocial behavior (cross-behavior norm processes). Regarding cross-behavior friendship selection, highly aggressive adolescents may select lowly prosocial peers as friends (Brechwald & Prinstein, 2011), whereas highly prosocial adolescents may be attracted to highly aggressive peers (LaFontana & Cillessen, 2010). Regarding cross-behavior friendship influence, aggressive friends are expected to mitigate adolescents' prosocial behavior, whereas prosocial friends may not diminish adolescents' aggression over time. Previous research found aggressive popularity norms to strengthen same-behavior friendship selection and influence (but not maintenance) regarding aggression (Laninga-Wijnen et al., 2017); However, that research considered neither the potential co-existence of prosocial popularity norms, nor cross-behavior processes.

#### **4.1.3 Mixed classrooms and friendship processes**

In mixed classrooms, both prosocial and aggressive behaviors are rewarded with popularity (Laninga-Wijnen et al., 2018a). To date, it has not been investigated what happens in such contexts regarding friendship processes, and two alternate hypotheses can be delineated. First, based on the reputational salience hypothesis, it could be argued that in mixed classrooms, both prosocial and aggressive behaviors are valuable and attractive tools to achieve popularity (Hartup, 1996). Therefore, in these classrooms prosocial and aggressive behaviors are not mutually exclusive, and cross-behavior (norm- and friendship) processes may *not* take place. As such, the prosocial popularity norm may only enhance prosocial friendship processes, and *not* diminish aggressive friendship processes; and the aggressive popularity norm may only enhance aggressive friendship

processes, and not diminish prosocial friendship processes (e.g., *no* cross-behavior *norm* processes). With regard to cross-behavior friendship selection, highly aggressive adolescents may select highly prosocial peers as friends, and vice versa. In line with this reasoning, a previous study found that aggressive adolescents selected prosocial peers as friends when they were both high in popularity (Logis et al., 2013). Cross-behavior friendship influence may not occur either: both behaviors can flourish next to each other, as adolescents may not feel the need to – for example – diminish their aggression based on the prosocial behavior of their friends, given that both behaviors are valuable strategies to gain popularity (Hawley & Bower, 2018). In sum, a first hypothesis would be that if prosocial and aggressive behaviors are both of high valence to adolescents, they may independently co-exist and *not* interplay through cross-behavior processes. Consequently, prosocial friendship processes may be equally strong in mixed classrooms and prosocial classrooms (both classroom types have equivalent prosocial norms), and aggressive friendship processes may be equally strong in aggressive classrooms as in mixed classrooms (equivalent aggressive norms), and cross-behavior friendship processes may be non-existent.

Second, an alternate hypothesis can be proposed. There are reasons to assume that aggressive popularity norms may dominate prosocial popularity norms in affecting friendship processes, even when these norms are equally present. Various reviews in the psychological literature on the role of negative events in relation to positive events (Baumeister et al., 2001; Rozin & Royzman, 2001) suggest that negative events or entities have a greater power over positive ones, and underpin this statement with prior research on – among others – life events, close relationship outcomes, social network patterns, interpersonal interactions, and learning processes. Possibly due to innate predispositions and experiences, human beings may give greater weight to negative entities (bad emotions, bad parents, and bad feedback from peers) than to positive ones (Rozin & Royzman, 2001). Specific to the current study, a recent experimental study found visual attention towards popular peers to be stronger after a negative prime than after a positive prime, indicating that popular adolescents' negative behaviors drive the greater attention they receive from their peers (Lansu & Troop-Gordon, 2017). When adolescents attend more to popular peers' aggression than to popular peers' prosocial behavior, aggressive popularity norms could more strongly affect friendship processes than prosocial popularity norms, even when both norms are

equally present. Combining reputational salience hypothesis with this literature on “the power of negative events”, makes it most likely to find support for the second hypothesis that aggressive norms would dominate prosocial norms, and hence, that mixed classrooms are relatively similar to aggressive classrooms in terms of friendship processes.

## **4.2 Present Study**

This study sought to understand the role of classroom combinations of prosocial and aggressive popularity norms in friendship processes related to prosocial and aggressive behavior. It is expected that friendship selection, maintenance and influence related to prosocial behavior would be stronger in prosocial classrooms than in aggressive classrooms, whereas friendship selection, maintenance and influence related to aggression would be stronger in aggressive than in prosocial classrooms. In prosocial classrooms, highly aggressive youth would be attracted toward highly prosocial friends, but not vice versa; and prosocial friends would diminish adolescents’ aggression, and not vice versa. In aggressive classrooms, it is expected that these cross-behavior selection and influence processes would be exactly the other way around. With regard to mixed classrooms, it is expected that aggressive norms would affect friendship processes more strongly than prosocial norms – therefore, mixed classrooms would be more similar to aggressive than to prosocial classrooms. For same-behavior processes, this study examined selection, maintenance and influence processes; whereas for cross-behavior processes this study only focused on selection and influence. This was done to prevent convergence issues, which were more likely to emerge in these highly complex models if cross-behavior maintenance (and other associated) effects would be included.

## **4.3 Methods**

### **4.3.1 Participants and procedure**

Data originated from the SNARE-project (Social Networks and Risk Behavior in Early Adolescence). All first-year and second-year students in two secondary schools in the Netherlands were approached to take part in the project (Cohort 1) at the beginning of the academic year 2011-2012. A second cohort of students entering first year in these secondary schools was asked to take part in the project

the following academic year 2012-2013 (Cohort 2). Data were collected three times in one academic year, in the fall, winter and spring of 2011–2012 (Cohort 1) and 2012–2013 (Cohort 2). Before data-collection started, students received an information letter describing the goal of the study and offering the possibility to refrain from participation. Parents who did not wish their children to participate in the study were asked to indicate this and students were made aware that they could cease their participation at any time. The survey was completed in the classroom by computer, supervised by a researcher, using Bright Answer socio-software (SNARE software, 2011). The privacy and anonymity of the students were warranted, and the study was approved by the Internal Review Board (IRB) of Utrecht University (see also Franken et al., 2016; the project name is “Social Network Processes and Social Development of Children and Adolescents”).

Of the 1,854 approached first- and second-year students, 2.0% declined to participate. The final sample comprised 1,816 first- and second-year students from 81 classrooms (63% first-year students), with 917 (50.5 %) girls, aged between 11 and 15 years ( $M = 13.05$ ,  $SD = 0.71$ ). Each class consisted of 12 to 30 students ( $M = 22.42$  participating students per class). Of the participants, 48.1% were attending lower-level education (i.e., preparatory secondary school for technical and vocational training), whereas 51.9% were enrolled in higher-level education (including preparatory secondary school for higher professional education and for university). Most respondents were native Dutch (80.9%).

Participants' socioeconomic status was assessed based on the zip codes, using “status scores” of the Social Cultural Planning Office, The Netherlands (see Benson et al., 2015). These status scores were based on the percentage of habitants with lower incomes, the percentage of lowly educated habitants, average income of habitants within an area, and the percentage of unemployed habitants. It was not possible to define the socioeconomic status of 9.7% of the sample, because these participants had not filled in their zip code or because the zip code was not in the system of the Social Cultural Planning Office. About a third of the participants (32.3%) came from areas with lower socioeconomic status, whereas 50.8% came from areas with an average socioeconomic status. The smallest percentage of participants (7.2%) came from areas with a higher socioeconomic status.

### 4.3.2 Measures

All research variables were based on peer nominations, measured at each of the three waves (T1, T2, and T3). Peer-nominated variables were assessed by asking participants questions about their classmates. Adolescents were told that they could nominate an unlimited number of same-gender and opposite-gender classmates. There was also the option of selecting “nobody”, so that it was possible to differentiate between missing responses and valid empty responses in the name generators. Names were presented in random order to avoid (alphabetical) answer tendencies.

**Friendship (dyadic measure).** Participants received a list of all consenting students in their class. They were asked to nominate their best friends within the classroom. Based on these nominations, an adjacency matrix was constructed, containing all within-classroom friendship nominations of all classrooms across the three waves.

**Aggressive behavior (individual-level attribute).** Peer-perceived aggressive behavior was assessed using within-classroom peer nominations on four items about aggressive behavior: “Who bullies you?”; “Who quarrels and/or initiates fights with you?”; “Who sometimes spreads rumors or gossips about you?”; and “Who makes fun of others?” (see also Hamre & Pianta, 2006; Lease et al., 2002; Logis et al., 2013; Molano et al., 2013; Laninga-Wijnen et al., 2017). For each item, the number of received nominations was divided by the number of nominators, so that scores represented the proportion of classmates that had nominated an adolescent for that item. Principal component factor analyses for the three waves showed that these four items represented one factor, explaining 62.2% to 67.9% of the variance (factor loadings varying from .73 to .86). Therefore, these items were averaged for each wave to create a scale for aggressive behavior, which represented the average percentage of peers who nominated a particular adolescent as aggressive using the four items. Scores on this scale varied from 0 (nominated by nobody on the four items) to 1 (nominated by everyone on all four items). Cronbach’s alphas were  $\alpha_{T1} = .73$ ,  $\alpha_{T2} = .79$  and  $\alpha_{T3} = .76$  respectively, indicating good internal consistency. Because RSIENA analyses (Simulation Investigation for Empirical Network Analyses) require ordinal categorical dependent behavior variables, the peer-nominated aggressive behavior was recoded into four roughly equally populated categories based on quartiles of

the variable's distribution pooled over all classes and time points (in line with previous studies, Laninga-Wijnen et al., 2017).

**Prosocial behavior (individual-level attribute).** Peer-perceived prosocial behavior was assessed using peer nominations on three items: "Who gives others the feeling that they belong to the group?"; "Who helps others by giving good advice?"; and "Who help you with problems (e.g., with homework, repairing a flat tire, or when you feel down)?", (see also Laninga-Wijnen et al., 2018a). For each item, the number of received nominations was divided by the number of nominators, so that scores represented the proportion of classmates that had nominated an adolescent for that item. Principal component factor analyses for the three waves showed that these three items represented one factor, explaining 64.3% to 72.7% of the variance (factor loadings ranging from .77 to .88). For each wave, the average of these three items was used as a scale for prosocial behavior. Cronbach's alphas of the resultant scale were  $\alpha_{T1} = .72$ ,  $\alpha_{T2} = .75$ , and  $\alpha_{T3} = .81$ , respectively, indicating sufficient and good internal consistency. In order to use this scale for RSIENA analyses, peer-nominated prosocial behavior was recoded into four roughly equally populated categories based on quartiles of the variable's distribution pooled over all classes and time points.

**Popularity norms (classroom-level variable).** Popularity norms for aggression and prosocial behavior at T1 were calculated for each classroom as the correlation between peer-nominated aggressive or prosocial behavior and popularity, respectively (Dijkstra & Gest, 2015; Dijkstra et al., 2008). Peer-nominated popularity was assessed by asking participants "Who is the most popular?" and "Who is least popular?" (correlation between these items is  $r = -.45$ ). For each item, the number of received nominations was divided by the number of nominators, so that scores represented the proportion of classmates that had nominated an adolescent for that item. The score for least popular was subtracted from the score for most popular to obtain a single continuum of popularity (e.g., Lease et al., 2002; Cillessen & Rose, 2005).

## **4.4 Analytic Strategy**

### **4.4.1 Attrition analyses**

Percentages of participants with missing values were 1.6% at wave 1, and 1.4% at both wave 2 and wave 3. Missing data analysis showed no significant or substantial differences between partially missing cases and complete cases across time points. Missing data due to nonresponse were handled using the SIENA missing data method (Huisman & Steglich, 2008) with the “last observation carry forward” method proposed by Huisman and Snijders (LOCF; 2003).

### **4.4.2 Classroom popularity norm combinations**

In order to identify different classroom combinations (or “profiles”) based on aggressive and prosocial popularity norms, iterative *k*-cluster analysis was conducted in SPSS (version 25). Cluster analysis allows to identify relatively homogenous groups using information across multiple variables because its algorithm maximizes within-group homogeneity and does not require an arbitrary and complex set of a priori cut-scores. Based on a previous study on partly the same data as the current study (Laninga-Wijnen et al., 2018a), a three-cluster solution was expected, but it was compared to a two-, four-, and five-cluster solution to test whether a three-cluster solution was indeed preferable based on the content of the profiles and minimal number of classrooms in a profile. In line with previous studies using *k*-cluster analysis (Dijkstra & Gest, 2015) the following criteria were used to decide upon the cluster-solution: clusters should provide distinct new profiles and should contain at least 5% of the total sample of classrooms. Also, the distance table should indicate that both norms contribute to the cluster-solution.

### **4.4.3 Social network analyses**

This study used longitudinal social network analyses (Snijders, 2005) implemented using the Simulation Investigation for Empirical Network Analyses (RSIENATest) software package in R (RSIENATest version 1.1-352) to analyze friendship processes related to prosocial and aggressive behavior. The RSIENA program estimates the extent to which similarity among friends (in aggression and prosocial behavior) is due to same-behavior and cross-behavior friendship selection, maintenance, and influence processes (Steglich et al., 2010), while

controlling for structural network effects and the overall development of aggressive and prosocial behavior in the network. In Appendix (4A) the model specification of these control parameters is discussed.

In order to achieve high statistical power while sufficiently accounting for potential heterogeneity between classrooms with the same popularity norm combination, a random effects model with Bayesian estimation methods was used (see Section 12.3; Ripley et al., 2017). In short, Bayesian inference assigns a prior probability distribution to the parameter – which is, in the light of new data, updated to a posterior probability. The posterior probability density is proportional to the product of the prior density and the likelihood of the data. Computations are made using Markov Chain Monte Carlo algorithms (Koskinen & Snijders, 2007; Ripley et al., 2017). All control variables were allowed to randomly vary between classrooms within the same popularity norm profile, whereas parameters corresponding to hypotheses were assumed to be constant in these classrooms in order to gain power (the null hypothesis is that they are 0, and therefore constant; see Ripley et al., 2017). Posterior means and standard deviations for the fixed parameters  $\eta$  and the random parameters  $\mu$  will be reported, as well as variation between classrooms for the random parameters, indicated by  $\tau^2$  and  $sd(\tau^2)$ .

**Model specification friendship same-behavior selection processes.**

In order to examine the extent to which friendship selection related to aggression and prosocial behavior took place, several effects were estimated, both for prosocial and aggressive behavior. The “*effect of behavior on friendship nominations received*” indicates whether adolescents with high levels of aggressive or prosocial behavior are more often nominated as friends. Conversely, the “*effect of behavior on friendship nominations given*” indicates whether adolescents with high levels of aggressive or prosocial behavior have a higher tendency to *give* more friend nominations to peers. Moreover, the estimated squared functions of these estimates were included in the models (EgoSqX and AltSqX; Snijders & Lomi, 2019). By including these effects, the parameter “*similarity-based selection*” (Ego\*Alter creation<sup>1</sup>), for both prosocial and aggressive behavior, provides reliable estimates for testing hypothesis about the extent to which adolescents form new friendships with peers based on similarity in aggressive and prosocial behavior.

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<sup>1</sup> This effect measures a positive correlation between the behaviors of ego (adolescent) and alter (friend); hence it does not necessarily imply that ego and alter are behaving in exact similar ways.

**Model specification friendship same-behavior maintenance processes.** It was examined to what extent being similar in aggressive or prosocial behavior would predict that a friendship present at one measurement is still present at the next measurement (using Ego\*Alter endowment effects). A positive parameter for similarity-based maintenance of friends indicates that similarity in aggressive and prosocial behavior predicts friendship *maintenance*.

**Model specification friendship same-behavior influence processes.** The behavioral dynamics of the model consisted of several control effects, see Appendix (4A). Same-behavior friendship influence was measured with the average alter parameter. This represents the tendency of adolescents to develop their behavior toward the values of their friends' behavior; which can work in an upward or in a downward direction (or remain similar) – depending on how aggressive or prosocial adolescents' friends are.

**Model specification cross-behavior friendship processes.** The interacting cross-behavior friendship selection effects between prosocial and aggressive behavior, such as the *prosocial ego \* aggression alter* effect were included. A negative parameter for cross-behavior selection implies that adolescents with high (low) scores one type of behavior, tend to select friends who score low (high) on the other type of behavior; for instance, that highly prosocial adolescents select lowly aggressive friends. Moreover, the cross-behavior friendship influence (avXAlt) parameter indicated whether a friends' behavior in one domain, influenced adolescents' behavior in another domain. A negative parameter for cross-behavior influence indicates that friends that are high (low) in one type of behavior influence adolescents toward lower (higher) levels of the other type of behavior; for instance, that highly prosocial friends diminish adolescents' aggression over time. Both endowment (decrease) and evaluation (increase) effects were estimated, to more specifically examine the direction of cross-behavior influence effects.

**The moderating role of popularity norm combinations.** In order to test whether popularity norm combinations moderate friendship same-behavior and cross-behavior processes, analyses were first performed for *all* classrooms and next, for aggressive, mixed, and prosocial classrooms separately. Classrooms were compared with each other based on *p*-values and based on credibility intervals of estimates. The *p*-values indicate the posterior probability that the parameter is

greater than 0. Moreover, the chance that the parameter is smaller than 0 can be retrieved by  $1 - p$ .  $P$ -values of  $\geq .95$  and  $\leq .05$  reflect a high posterior chance that the alternate hypothesis is true ( $\geq 95\%$  in both scenarios). If certain estimates are highly likely in the one classroom type ( $p$ -values for estimates  $\geq .95$  or  $\leq .05$ ) but not in other classroom types ( $.05 < p < .95$ ), this indicates differences between classrooms. Moreover, credibility intervals represent the range of values for the parameter that has a posterior probability of .95; and these were used to compare estimates between classrooms. If credibility intervals for estimates of different classrooms did not overlap, these estimates were considered to differ from each other. If applicable, ego-alter tables were calculated to further examine between-classroom differences in the direction of selection, maintenance, and influence effects.

## 4.5 Results

### 4.5.1 Popularity norm combinations

The prosocial popularity norm varied from  $-.14$  to  $.93$  across classrooms ( $M = .48$ ;  $SD = .23$ ; 95% range =  $.06$  to  $.85$ ) and the aggressive popularity norm varied from  $-.52$  to  $.81$  ( $M = .33$ ;  $SD = .30$ ; 95% range =  $-.35$  to  $.70$ ). These correlations indicate that classrooms varied largely in both the prosocial popularity norm and the aggressive popularity norm. The correlation between prosocial and aggressive popularity norms was weakly negative ( $r = -0.22$ ,  $p = .051$ ).

Based on iterative  $K$ -cluster analyses, a three-class solution was found to be superior, as this class solution rendered three meaningfully distinct configurations of prosocial and aggressive popularity norms with sufficient classrooms within each profile (Figure 4.1). A four-class and a five-class solution did not provide distinct new profiles: extra profiles were variations based on a profile that was already present in the three-class solution, and the number of classrooms within additional profiles was rather low ( $< 5\%$  of the total sample of classrooms). The distance table of the  $k$  - cluster analysis indicated that both aggressive and prosocial popularity norm variations significantly contribute to the three-cluster solution (both  $p < .001$ ).

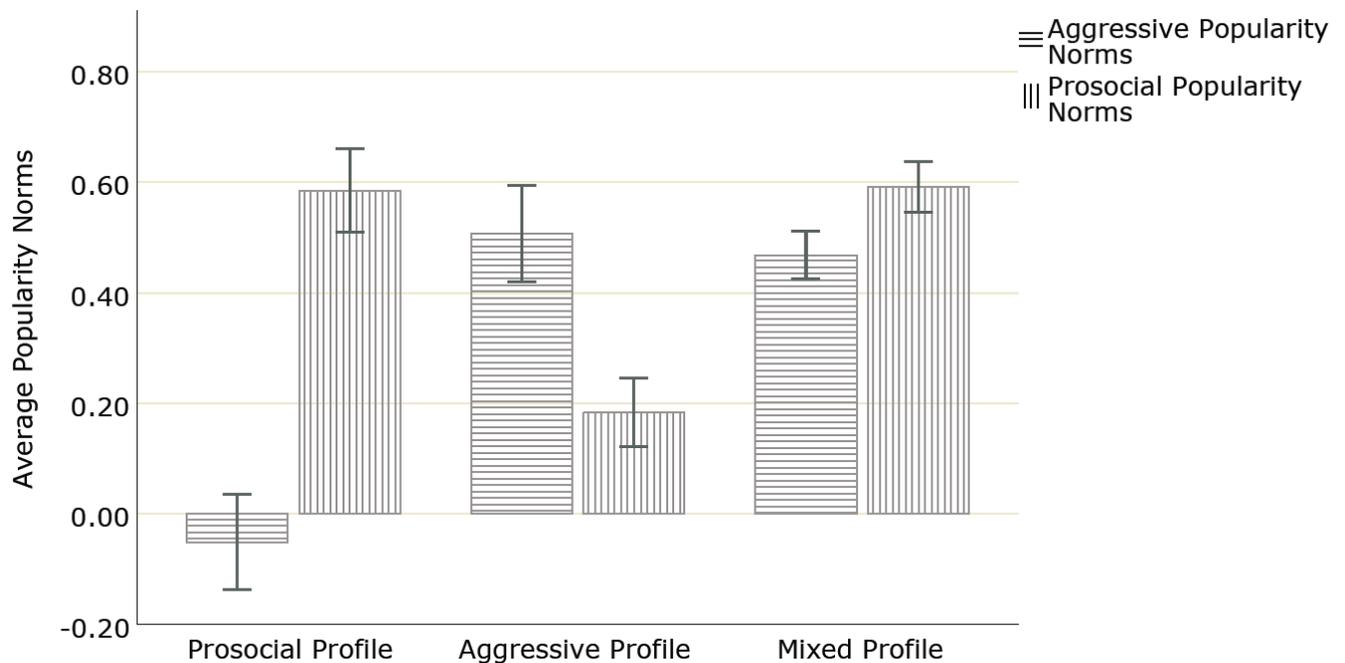


Figure 4.1.

Three-cluster solution of popularity norm combinations ( $N = 81$  classrooms) at wave 1.

Prosocial classrooms ( $N = 23$ ) were characterized by high prosocial popularity norms and significantly lower (even negative) aggressive popularity norms, as computed with a dependent samples  $t$ -test [ $t(22) = -12.64, p < .001$ ]. Aggressive classrooms ( $N = 22$ ) were characterized by high aggressive popularity norms and significantly lower prosocial popularity norms [ $t(21) = 6.93, p < .001$ ]. Mixed classrooms ( $N = 36$ ) were characterized by high aggressive popularity norms and significantly higher prosocial popularity norms [ $t(35) = -4.26, p < .001$ ]. Furthermore, comparing the three types of classrooms using ANOVA with Fisher's Least Significant Difference test (LSD), aggressive popularity norms were significantly lower in prosocial classrooms ( $p < .001$ ) than in mixed and aggressive classrooms; and were equally high in aggressive and mixed classrooms ( $p = .40$ ). Prosocial popularity norms were significantly lower in aggressive classrooms ( $p < .001$ ) than in mixed and prosocial classrooms, and were equally high in prosocial and mixed classrooms ( $p = .87$ ). It was tested whether certain classroom types were represented more in first-year classrooms compared to in second-year

classrooms, but this was not the case [ $\chi^2(2) = 1.90, p = .39; \Phi = .15$ ]. Also, educational level was equally represented in the different classroom types [ $\chi^2(2) = 1.45, p = .48; \Phi = .13$ ].

#### 4.5.2 Popularity norm combinations and aggressive and prosocial friendship processes

**Descriptive results.** Table 4.1 provides a description of friendships, prosocial behavior and aggressive behavior for the three classroom types. On average, youth nominated four to six classmates as their best friend. More than half of all friendships were reciprocated, and most friendships were between same-gender peers. Boys were perceived to display higher levels of aggressive behavior and girls higher levels of prosocial behavior. The Jaccard Index was about 45%, indicating sufficient stability for social network analyses (Veenstra et al., 2013). Network autocorrelation indices (Moran's  $I$ ) were relatively high for prosocial and aggressive behavior, indicating that it is useful to conduct social network analyses to examine which processes (selection, maintenance or influence) underlie this autocorrelation. Moreover, prosocial classrooms were characterized by significantly more friendships and higher levels of prosocial behavior when compared to aggressive and mixed classrooms, consistently across time points; whereas levels of prosocial behavior were equal in mixed and aggressive classrooms. Also, aggressive classrooms scored consistently higher on aggression; these differences were significant when compared to mixed classrooms (T1 and T2) and prosocial classrooms (T2). This indicates that patterns of behavior and friendship vary between different types of classrooms.

**Friendship processes in all classrooms.** Table 4.2 displays the results of social network analyses performed on *all* classrooms, without considering popularity norms' role, see Appendix (4B) for control effects. Regarding friendship same-behavior processes, adolescents selected and maintained friendships with peers who are similar in aggressive and prosocial behavior (all  $p > .99$ ; indicating that the posterior chance that these processes take place  $> 99\%$ ). Moreover, adolescents were influenced by their friends' aggressive and prosocial behavior (both  $p > .99$ ).

Regarding cross-behavior friendship processes, there was a positive cross-behavior friendship selection effect for prosocial ego \* aggressive alter. Together with the negative prosocial ego effect (-0.46) and negative aggressive alter effect

(-0.02), this can be interpreted as lowly prosocial adolescents selecting lowly aggressive peers as friends. There was no aggressive ego \* prosocial alter effect, indicating that aggressive adolescents were not more likely to select lowly (or highly) prosocial peers as friends. For cross-behavior friendship influence processes, it appeared that adolescents with relatively more aggressive friends were more likely to decrease in prosocial behavior, whereas adolescents with relatively fewer aggressive friends were more likely to increase in prosocial behavior (negative evaluation effect;  $\eta = -0.32$ ,  $p = .01$ ). Adolescents with relatively more prosocial friends were more likely to increase in aggression – or less likely to decrease in aggression – over time (positive evaluation effect,  $\eta = 0.32$ ).

Table 4.1

*Description of the Sample, Network Characteristics, and Behavioral Attributes for Classrooms with Aggressive, Prosocial and Mixed Popularity Norm Combinations*

	Prosocial popularity norm classrooms ( <i>N</i> = 23)			Mixed popularity norm classrooms ( <i>N</i> = 36)			Aggressive popularity norm classrooms ( <i>N</i> = 22)		
	T1 <i>M</i> ( <i>SD</i> )	T2 <i>M</i> ( <i>SD</i> )	T3 <i>M</i> ( <i>SD</i> )	T1 <i>M</i> ( <i>SD</i> )	T2 <i>M</i> ( <i>SD</i> )	T3 <i>M</i> ( <i>SD</i> )	T1 <i>M</i> ( <i>SD</i> )	T2 <i>M</i> ( <i>SD</i> )	T3 <i>M</i> ( <i>SD</i> )
<i>Network indicators</i>									
Average number of friends	5.86(3.06) <sup>a</sup>	6.13(3.13) <sup>a</sup>	5.88(2.86) <sup>a</sup>	5.06(2.58) <sup>b</sup>	5.52(2.69) <sup>b</sup>	5.25(2.56) <sup>b</sup>	4.92(2.43) <sup>b</sup>	5.52(2.69) <sup>b</sup>	5.31(2.82) <sup>b</sup>
Cohesion in friendship network	0.27(0.08)	0.29(0.08)	0.28(0.07)	0.23(0.06)	0.25(0.05)	0.24(0.06)	0.24(0.08)	0.26(0.06)	0.25(0.08)
Proportion reciprocated relationships	61.7% (10.7%)	60.9% (10.3%)	63.4% (9.2%)	63.8% (9.4%)	64.3% (9.8%)	65.5% (12.5%)	67.2% (10.5%)	64.1% (9.7%)	62.1% (11.9%)
Proportion triadic friendships	64.3% (9.1%)	64.6% (8.3%)	65.2% (7.1%)	62.7% (9.7%)	64.6% (9.4%)	63.4% (11.5%)	61.8% (10.1%)	62.6% (8.6%)	63.1% (11.1%)
Proportion same-gender friendships	82.9% (9.9%)	80.2% (9.5%)	83.5% (8.6%)	85.9% (8.8%)	87.3% (9.4%)	86.8% (8.8%)	88.8% (8.5%)	88.6% (8.8%)	87.4% (9.9%)
<i>Aggressive behavior</i>									
Total average	0.03(0.04) <sup>a</sup> <sub>b</sub>	0.04(0.04) <sup>a</sup>	0.04(0.05) <sup>a</sup>	0.03(0.04) <sup>b</sup>	0.03(0.04) <sup>a</sup>	0.04(0.06) <sup>a</sup>	0.04(0.06) <sup>a</sup>	0.04(0.06) <sup>b</sup>	0.04(0.06) <sup>a</sup>
Average boys	0.04(0.05) <sup>a</sup>	0.04(0.05) <sup>a</sup>	0.05(0.05) <sup>a</sup>	0.06(0.08) <sup>a</sup>	0.07(0.08) <sup>a</sup>	0.07(0.06) <sup>a</sup>	0.05(0.07) <sup>a</sup>	0.06(0.07) <sup>a</sup>	0.06(0.07) <sup>a</sup>
Average girls	0.03(0.03) <sup>b</sup>	0.03(0.04) <sup>b</sup>	0.03(0.04) <sup>b</sup>	0.03(0.05) <sup>a</sup>	0.03(0.06) <sup>b</sup>	0.03(0.06) <sup>b</sup>	0.02(0.04) <sup>b</sup>	0.03(0.05) <sup>b</sup>	0.02(0.04) <sup>b</sup>
Average highly popular students	0.05(0.04) <sup>b</sup>	0.06(0.06) <sup>b</sup>	0.06(0.06) <sup>b</sup>	0.06(0.05) <sup>a</sup>	0.07(0.06) <sup>a</sup>	0.06(0.09) <sup>a</sup>	0.07(0.06) <sup>a</sup>	0.11(0.09) <sup>a</sup>	0.10(0.08) <sup>a</sup>
Average moderately popular students	0.03(0.04) <sup>a</sup>	0.03(0.04) <sup>a</sup>	0.04(0.04) <sup>a</sup>	0.03(0.04) <sup>b</sup>	0.03(0.04) <sup>b</sup>	0.04(0.05) <sup>b</sup>	0.03(0.04) <sup>b</sup>	0.03(0.05) <sup>b</sup>	0.04(0.06) <sup>b</sup>
Average non-popular students	0.04(0.05) <sup>a</sup> <sub>b</sub>	0.03(0.05) <sup>a</sup>	0.03(0.04) <sup>a</sup>	0.01(0.02) <sup>c</sup>	0.02(0.04) <sup>c</sup>	0.04(0.02) <sup>b</sup>	0.03(0.04) <sup>b</sup>	0.03(0.06) <sup>b</sup>	0.02(0.03) <sup>b</sup>
<i>Prosocial behavior</i>									
Total average	0.13(0.07) <sup>a</sup>	0.13(0.07) <sup>a</sup>	0.12(0.08) <sup>a</sup>	0.11(0.06) <sup>b</sup>	0.11(0.06) <sup>b</sup>	0.11(0.07) <sup>b</sup>	0.11(0.07) <sup>b</sup>	0.11(0.08) <sup>b</sup>	0.10(0.07) <sup>b</sup>
Average boys	0.10(0.05) <sup>a</sup>	0.11(0.06) <sup>a</sup>	0.10(0.07) <sup>a</sup>	0.08(0.05) <sup>a</sup>	0.09(0.06) <sup>b</sup>	0.08(0.07) <sup>a</sup>	0.08(0.05) <sup>a</sup>	0.09(0.07) <sup>a</sup>	0.08(0.06) <sup>a</sup>
Average girls	0.15(0.08) <sup>b</sup>	0.15(0.07) <sup>b</sup>	0.14(0.09) <sup>b</sup>	0.11(0.06) <sup>a</sup>	0.15(0.08) <sup>a</sup>	0.13(0.07) <sup>b</sup>	0.13(0.06) <sup>b</sup>	0.14(0.08) <sup>b</sup>	0.12(0.08) <sup>b</sup>
Average highly popular students	0.17(0.07) <sup>c</sup>	0.19(0.08) <sup>c</sup>	0.18(0.10) <sup>a</sup>	0.16(0.06) <sup>a</sup>	0.14(0.07) <sup>a</sup>	0.15(0.08) <sup>a</sup>	0.15(0.08) <sup>a</sup>	0.13(0.08) <sup>a</sup>	0.13(0.09) <sup>a</sup>

Average moderately popular students	0.13(0.07) <sup>b</sup>	0.13(0.06) <sup>b</sup>	0.11(0.08) <sup>b</sup>	0.11(0.06) <sup>b</sup>	0.11(0.06) <sup>b</sup>	0.11(0.07) <sup>b</sup>	0.11(0.07) <sup>b</sup>	0.12(0.08) <sup>a</sup>	0.10(0.07) <sup>b</sup>
Average non-popular students	0.07(0.05) <sup>a</sup>	0.07(0.04) <sup>a</sup>	0.06(0.05) <sup>c</sup>	0.06(0.04) <sup>c</sup>	0.07(0.05) <sup>c</sup>	0.07(0.05) <sup>c</sup>	0.07(0.05) <sup>c</sup>	0.06(0.05) <sup>b</sup>	0.06(0.06) <sup>c</sup>
Correlation prosocial behavior and aggression	-.12*	-.13*	-.06	.00	-.09*	-.03	-.15***	-.11*	-.22***
<i>Respondents</i>									
% boys	49.8% <sup>a</sup>			50.2% <sup>a</sup>			51.6% <sup>b</sup>		
Probability similarity in friendship dyads in aggression (Moran's <i>I</i> )	.09	.15	.13	.09	.16	.18	.21	.16	.15
Probability similarity in friendship dyads in prosocial behavior (Moran's <i>I</i> )	.25	.22	.21	.19	.16	.20	.31	.23	.22
<i>Friendship change</i>		T1-T2	T2-T3		T1-T2	T2-T3		T1-T2	T2-T3
Average number of friendship changes		73.14	67.72		75.22	72.22		71.95	73.14
Proportion of stable friendships		.55(.11)	.53(.11)		.50(.14)	.51(.10)		.51(.10)	.53(.09)

*Note.* Differences between boys and girls and different types of popular peers (non-popular, moderately popular and highly popular, based on +/- 1SD relative to *M*) were calculated with ANOVA's; parameters with different superscripts differ significantly from each other. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

Table 4.2

*Longitudinal Bayesian Social Network Analyses on Friendship Selection, Maintenance and Influence related to Prosocial and Aggressive Behavior in All Classrooms (N = 81 classrooms)*

	Random			Fixed			Class-level variation	
	$\mu$	$sd(\mu)$	$p$	$\eta$	$sd(\eta)$	$p$	$\tau^2$	$sd(\tau^2)$
<i>Network dynamics</i>								
Friendship cohesion (density)	-0.91	0.17	< .01				1.84	0.39
Reciprocity in friendship	1.61	0.07	> .99				0.30	0.05
Transitive group formation (gwespFF)	1.64	0.06	> .99				0.32	0.05
Transitive group formation (gwespBB)	0.23	0.06	> .99				0.26	0.04
Indegree popularity (sqrt)	-0.55	0.06	< .01				0.22	0.04
Outdegree popularity (sqrt)	-0.63	0.05	< .01				0.21	0.03
Outdegree activity (sqrt)	0.00	0.04	.50				0.17	0.02
Effect of gender on nominations received*	0.07	0.05	.91				0.27	0.04
Effect of gender on nominations given*	-0.06	0.07	.20				0.32	0.05
Same gender friendships	0.55	0.05	> .99				0.31	0.05
Effect of prosocial behavior on nominations received				0.37	0.02	> .99		
Squared effect of prosocial behavior on nominations received				-0.11	0.02	< .01		
Effect of prosocial behavior on nominations given				-0.46	0.04	< .01		
Squared effect of prosocial behavior on nominations given				0.09	0.04	> .99		
Selection based on similarity in prosocial behavior				0.12	0.03	> .99		
Maintenance based on similarity in prosocial behavior				0.15	0.04	> .99		
Effect of aggression on friendship nominations received				-0.02	0.01	.09		
Squared effect of aggression on friendship nominations received				-0.03	0.02	.05		
Effect of aggression of friendship nominations given				-0.04	0.02	.02		
Squared effect of aggression of friendship nominations given				-0.02	0.02	.21		
Selection based on similarity aggression				0.06	0.02	> .99		

Maintenance based on similarity in aggression				0.27	0.03	> .99		
Prosocial ego * aggressive alter: Prosocial adolescents select aggressive friends				0.06	0.02	> .99		
Aggressive ego * prosocial alter: Aggressive adolescents select prosocial friends				0.02	0.02	.82		
<i>Behavior dynamics</i>								
Prosocial behavior: Linear shape	-2.39	0.17	< .01				1.27	0.19
Prosocial behavior: Quadratic shape	-0.48	0.05	< .01				0.26	0.04
Prosocial behavior: Indegree				0.35	0.02	> .99		
Prosocial behavior: Outdegree				0.08	0.01	> .99		
Prosocial behavior: Effect from gender	-0.94	0.11	< .01				0.68	0.13
Prosocial behavior: Effect from aggression				-0.08	0.04	.02		
Influence prosocial friends on prosocial behavior adolescent				0.26	0.08	> .99		
Influence aggressive friends on prosocial behavior adolescent (evaluation)				-0.32	0.17	.01		
Influence aggressive friends on prosocial behavior adolescent (endowment)				0.12	0.30	.63		
Aggressive behavior: Linear shape	-0.07	0.15	.31				0.68	0.12
Aggressive behavior: Quadratic shape	0.03	0.05	.72				0.35	0.04
Aggressive behavior: Indegree				0.00	0.02	.51		
Aggressive behavior: Outdegree				-0.01	0.01	.31		
Aggressive behavior: Effect from gender	0.33	0.10	> .99				0.52	0.10
Aggressive behavior: Effect from prosocial behavior				-0.04	0.06	.27		
Influence aggressive friends on adolescent aggression				0.47	0.07	> .99		
Influence prosocial friends on aggression adolescent (evaluation)				0.32	0.15	.99		
Influence prosocial friends on aggression adolescent (endowment)				-0.06	0.30	.42		

*Note.* Posterior means  $\eta$  and standard deviations  $sd(\eta)$  for fixed parameters. Posterior means  $\mu$  and  $sd(\mu)$  for random parameters. The  $p$  represents the percentile of zero in the posterior distribution. \* girls are reference category.

Table 4.3  
*The Role of Popularity Norm Combinations in the Strength of Friendship Selection, Maintenance and Socialization related to Prosocial and Aggressive behavior within the Classroom*

Parameters	Prosocial popularity norm classrooms				Mixed popularity norm classrooms				Aggressive popularity norm classrooms			
	$\eta$	$sd(\eta)$	CI	$p$	$\eta$	$sd(\eta)$	CI	$p$	$\eta$	$sd(\eta)$	CI	$p$
<i>Prosocial behavior</i>												
Effect of prosocial behavior on nominations received	0.38	0.08	0.26, 0.50	> .99	0.36	0.04	0.29, 0.43	> .99	0.41	0.04	0.34, 0.50	> .99
Squared effect of prosocial behavior on nominations received	-0.09 <sup>a</sup>	0.07	-0.20, 0.02	.14	-0.10 <sup>a</sup>	0.02	-0.15, -0.06	< .01	-0.17 <sup>b</sup>	0.04	-0.26,-0.09	< .01
Effect of prosocial behavior on nominations given	-0.65 <sup>a</sup>	0.05	-0.73, -0.55	< .01	-0.38 <sup>b</sup>	0.03	-0.44, -0.33	< .01	-0.36 <sup>b</sup>	0.04	-0.43,-0.26	< .01
Squared effect of prosocial behavior on nominations given	0.20 <sup>a</sup>	0.07	0.08, 0.36	> .99	0.14 <sup>a</sup>	0.04	0.08, 0.23	> .99	-0.04 <sup>b</sup>	0.05	-0.13, 0.05	.19
Selection based on similarity in prosocial behavior	0.15	0.09	0.02, 0.29	.98	0.06	0.06	-0.05, 0.16	.80	0.16	0.05	0.06, 0.27	> .99
Maintenance based on similarity in prosocial behavior	0.40 <sup>a</sup>	0.13	0.20, 0.63	> .99	0.14 <sup>ab</sup>	0.06	0.05, 0.25	> .99	0.10 <sup>b</sup>	0.05	0.00, 0.21	.97
Prosocial ego * aggressive alter (prosocial adolescents select aggressive friends)	0.13 <sup>a</sup>	0.03	0.07, 0.19	> .99	0.04 <sup>ab</sup>	0.03	0.00, 0.10	.98	-0.01 <sup>b</sup>	0.03	-0.06, 0.04	.41
Influence of friends' prosocial behavior on adolescents' prosocial behavior	0.07	0.15	-0.24, 0.36	.66	0.35	0.13	0.12, 0.61	.99	0.20	0.18	-0.13, 0.61	.88
Adolescent prosocial behavior: effect of aggression	-0.12	0.09	-0.29, 0.03	.09	-0.04	0.06	-0.16, 0.08	.25	-0.16	0.10	-0.32, 0.04	.06
Influence aggressive friends on adolescents' prosocial behavior (eval)	-0.22	0.35	-1.09, 0.28	.28	-0.38	0.34	-1.13, 0.23	.11	-0.66	0.32	-1.41,-0.16	< .01

Influence aggressive friends on adolescents' prosocial behavior (endow)	-0.25	0.61	-1.44, 1.10	.32	0.19	0.61	-0.96, 1.39	.63	0.96	0.58	-0.08, 2.12	.96
<i>Aggression</i>												
Effect of aggression on friendship nominations received	-0.04	0.04	-0.12, 0.03	.19	-0.02	0.02	-0.06, 0.03	.16	0.00	0.03	-0.06, 0.05	.48
Squared effect of aggression on friendship nominations received	0.00	0.03	-0.06, 0.06	.51	-0.02	0.02	-0.06, 0.03	.16	-0.03	0.03	-0.09, 0.03	.21
Effect of aggression on friendship nominations given	-0.03	0.04	-0.12, 0.04	.25	-0.04	0.03	-0.09, 0.01	.04	-0.07	0.03	-0.12, -0.01	< .01
Squared effect of aggression of friendship nominations given <sup>#</sup>	-0.20	-	-	-	-0.01	0.03	-0.06, 0.04	.35	0.11	0.04	0.04, 0.19	> .99
Selection based on similarity in aggression	0.03	0.04	-0.03, 0.11	.81	0.08	0.03	0.01, 0.15	.99	0.03	0.04	-0.03, 0.10	.71
Maintenance based on similarity in aggression	0.34	0.08	0.21, 0.53	> .99	0.30	0.04	0.22, 0.39	> .99	0.19	0.05	0.09, 0.28	> .99
Aggressive ego * prosocial alter: Aggressive adolescents select prosocial friends	0.02	0.03	-0.06, 0.07	.78	0.04	0.03	-0.02, 0.09	.92	0.01	0.03	-0.05, 0.07	.62
Influence of friends' aggression on adolescents' aggression	-0.01 <sup>a</sup>	0.13	-0.27, 0.25	.44	0.62 <sup>b</sup>	0.10	0.44, 0.85	> .99	0.66 <sup>b</sup>	0.12	0.43, 0.92	> .99
Adolescent aggressive behavior: effect of prosocial behavior	-0.15	0.12	-0.45, 0.04	.09	0.20	0.07	0.07, 0.32	> .99	-0.20	0.17	-0.56, 0.09	.09
Influence prosocial friends on aggression adolescent (eval)	0.53	0.29	0.05, 1.12	.99	0.15	0.24	-0.28, 0.63	.71	0.31	0.48	-0.49, 1.46	.73
Influence prosocial friends on aggression adolescent (endow)	-0.34	0.49	-1.38, 0.54	.25	0.00	0.46	-0.92, 0.81	.50	0.14	0.88	-1.76, 1.51	.63

Note. <sup>#</sup> This effect had to be fixed in prosocial classrooms to reach convergence criteria. Results with the fixed effect were similar to results with non-fixed effect. Parameters with different superscripts differ significantly from each other.

### 4.5.3 Friendship processes in classrooms with different popularity norm combinations.

In the next step, the same model was tested for the three types of classrooms (prosocial, aggressive, and mixed; Table 4.3). Estimates with different superscripts differed significantly from each other, as credibility intervals did not overlap.

**Prosocial classrooms.** In prosocial classrooms, prosocial behavior was important for friendship selection and maintenance, but not for friendship influence ( $\eta = .07, p = .66$ ). Regarding *cross-behavior norm processes* (e.g., the role of prosocial norms in aggressive friendship processes), aggression only played a marginal role in friendship selection via the maintenance effect ( $\eta = .34, p > .99$ ). Table 4.4 indicates that friendships were more likely to be maintained if friends were similarly *low* in aggression than when friends were similarly *high* in aggression [ $OR(\exp(.41 - .21)) = 1.22$ ]. Furthermore, aggressive friendship influence did not take place ( $\eta = -.01, p = .66$ ). As hypothesized, this indicates that the prosocial popularity norm mitigates aggressive friendship processes.

Next, the prosocial norm affected *cross-behavior friendship processes*: adolescents who were low in prosocial behavior tended to select lowly aggressive adolescents as friends, reflected by the negative prosocial ego \* negative aggressive alter effect ( $\eta = .13, p > .99$ ). Next, aggressive friends did not diminish adolescents' prosocial behavior. Instead, prosocial friends *did* affect adolescents' aggression ( $\eta = .53, p = .99$ ), but in a somewhat unexpected way. Adolescents were more likely to increase in aggression (or less likely to decrease in aggression) if they had highly prosocial friends, which was in contrast to our hypothesis. With this latter finding as exception, most findings in these prosocial classrooms indicate that prosocial norms enhance certain prosocial friendship processes and mitigate aggressive friendship processes.

**Aggressive classrooms.** In *aggressive classrooms*, aggression played a marginal role in friendship selection processes, with the maintenance effect as one exception (Table 4.3). The influence effect indicated that respondents adjust their behavior to their friends' aggression ( $\eta = .66, p > .99$ ). Table 4.5 (column on the left) indicates that when adolescents change their aggression levels, they most strongly prefer their friends' aggression levels when these are at the extreme ends of aggression (e.g., in *high* or in *low* aggression), which is indicated by having the largest differences between values within the upper row (1.63 to -2.03) and within

the lowest row (-1.25 and 1.10). Moreover, regarding *cross-behavior norm processes* (role of aggressive norm in prosocial friendship processes): although prosocial behavior was important for friendship selection and maintenance ( $\eta = .10$  and  $\eta = .16$ , respectively), it was less important when compared to prosocial classrooms, as indicated by non-overlapping credibility intervals. Moreover, prosocial friendship influence did not occur.

With regard to *cross-behavior friendship processes*, it appeared that aggressive friends diminished adolescents' prosocial behavior ( $\eta_{\text{evaluation}} = -.66$ ,  $p < .01$ ;  $\eta_{\text{endowment}} = .96$ ,  $p = .96$ ), but not vice versa. In sum, as expected, in these aggressive classrooms, aggressive friendship processes are strongly present, whereas prosocial friendship processes are diminished.

**Mixed classrooms.** In mixed classrooms, aggressive behaviors were important for friendship selection and maintenance processes. Friendship influence on aggression was significantly stronger when compared to prosocial classrooms, and equal to aggressive classrooms (Table 4.3). The ego-alter table indicates that friendship influence on aggression again was most likely towards the extreme values of aggression, in particular *high* aggression, as differences between values within the lowest row were highest (-1.59 to 1.70; Table 4.5, column on the right). Prosocial behavior was not important for similarity-based selection, and only modestly for friendship maintenance. Friendship influence on prosocial behavior was significant in mixed classrooms. The ego-alter table indicates that this influence is most likely towards lower levels of prosocial behavior irrespective of friends' prosocial behavior (indicated by the highest scores per row being in the first column; Table 4.6). These findings are largely in line with the hypothesis that aggressive popularity norms dominate prosocial popularity norms, as aggressive friendship processes are strongly present whereas prosocial friendship processes are mitigated (comparable to aggressive classrooms).

With regard to cross-behavior friendship processes, no cross-behavior selection or influence took place (except one small cross-behavior selection effect: lowly prosocial adolescents preferred lowly aggressive peers as friends). These findings are in line with the alternate hypothesis that both behaviors are considered as valuable due to their associations with popularity and therefore these behaviors are not mutually exclusive.

Table 4.4

*Ego-alter Friendship Maintenance based on Aggression in Prosocial, Mixed and Aggressive Classrooms*

Adolescent aggression	Friends' aggression											
	Prosocial classrooms				Mixed classrooms				Aggressive classrooms			
	1	2	3	4	1	2	3	4	1	2	3	4
1	0.41	-0.13	-0.67	-1.21	0.62	0.22	-0.23	-0.73	0.68	0.46	0.17	-0.17
2	0.27	0.07	-0.14	-0.34	0.17	0.07	-0.08	-0.27	0.12	0.09	0.00	-0.15
3	-0.27	-0.13	0.00	0.14	-0.30	-0.10	0.06	0.17	-0.22	-0.06	0.05	0.09
4	-0.12	-0.73	-0.26	0.21	-0.79	-0.28	0.18	0.59	-0.33	0.02	0.32	0.56

*Note.* Numbers in the table reflect the strength of attraction for students to become friends with certain peers, given their own and their peers' aggression levels (columns dependent on rows). The values in the cells in these tables can be transformed to odds by taking the exponential function ( $\exp.[\beta]$ ).

Table 4.5

*Ego-alter Influence Table related to Aggression in Mixed and Aggressive Classrooms*

	Aggressive classrooms				Mixed classrooms			
	Adolescent aggression				Adolescent aggression			
Friends' aggression	1	2	3	4	1	2	3	4
1	1.63	0.52	-0.70	-2.03	1.02	0.30	-0.46	-1.27
2	0.67	0.23	-0.32	-0.99	0.15	0.05	-0.09	-0.28
3	-0.30	-0.06	0.05	0.05	-0.72	-0.20	0.28	0.71
4	-1.25	-0.36	0.43	1.10	-1.59	-0.45	0.65	1.70

*Note.* Numbers in the table reflect the strength of peer influence on certain levels of aggression for the student resulting from the average levels of their best friends' aggression (columns dependent on rows).

Table 4.6

*Ego-alter Influence Table related to Prosocial behavior in Mixed Classrooms*

Friends' prosocial behavior	Mixed classrooms			
	Adolescent prosocial behavior			
	1	2	3	4
1	2.69	1.09	-1.66	-5.55
2	2.19	0.94	-1.47	-5.02
3	1.69	0.78	-1.28	-4.48
4	1.19	0.63	-1.09	-3.94

*Note.* Numbers in the table reflect the strength of peer influence on certain levels of prosocial behavior for the student resulting from the average levels of their best friends' prosocial behavior (columns dependent on rows).

#### 4.5.4 Sensitivity analysis

Several sensitivity analyses were run to check the robustness of findings. First, even though the three-cluster solution of the  $k$ -cluster analysis supports findings of a previous study (Lanina-Wijnen et al., 2018a) that used LCA to identify clusters, it was examined whether a similar cluster solution would emerge when using another statistical approach: A two-step cluster analysis. In this analysis, the number of clusters was not fixed, in order to examine what cluster-solution would be detected in the data. Based on AIC (Burnham & Anderson, 2002) and the log-likelihood criterium for determining distances between clusters, a three-factor solution again was detected. The cluster quality was indicated as good in the silhouette measure of cohesion and separation. The three-factor solution rendered by the two-step cluster analysis was almost identical to the cluster-

solution rendered by the *k*-cluster analysis. Only *three* classrooms that were considered as mixed in the *k*-cluster analysis were considered as prosocial in the two-step cluster analysis. Nevertheless, this implies that 96.3% of the classrooms were clustered in exactly similar ways, showing that the finding on classroom profiles is robust.

Next, sensitivity analyses were run to ensure that the social network analyses were robust to some changes in the variables and model. First, prosocial and aggressive behavior were coded into five rather than four roughly equally populated categories based on quintiles of the variable's distribution pooled over all classes and time points, and all analyses (on all classrooms, and on prosocial, aggressive and mixed classrooms) produced highly comparable results, indicating that type of categorization did not affect the findings. Also, additional social network analyses were run without ego squared and alter squared effects, and without cross-behavior effects, to check whether the family of effects may not affect the findings, and results were the same.

#### **4.6 Discussion**

Ushered in with pubertal and social changes, adolescents increasingly attach value to achieving popularity among their peers. Behaviors associated with popularity therefore become highly valuable and salient and may be used as a tool to increase adolescents' popularity directly, or via affiliation with popular peers (Rambaran et al., 2013). As such, popular peers are assumed to set a norm ("popularity norm") for which behaviors are attractive and important in a particular context (Dijkstra & Gest, 2015) and function as role models. Prior work found that in classrooms with strong aggressive popularity norms, adolescents prefer highly aggressive peers as friends and adopt their friends' aggression, which may enhance the proliferation of aggression (Laniga-Wijnen et al., 2017). Unfortunately, a potential protective role of popular peers on more positive (such as prosocial) behaviors has not been considered to date. Moreover, aggressive and prosocial norms and friendship processes may both co-exist and interplay. For instance, one previous study – on partly the same data as the current study – used Latent Class Analysis to distinguish three classroom types: mixed (high prosocial and high aggressive popularity norms), prosocial (high prosocial and very low aggressive popularity norms), and aggressive classrooms (high aggressive and relatively low prosocial popularity norms; Laniga-Wijnen et al., 2018a). The

current study examined the role of these popularity norm combinations in prosocial and aggressive friendship processes. To this end, previously found classroom profiles (prosocial, aggressive, and mixed) were validated using another statistical approach (*k*-cluster analysis) and social network analyses were applied to examine how these profiles affect prosocial and aggressive friendship processes. Findings indicate that prosocial popularity norms encourage prosocial friendship processes and dampen aggressive friendship processes, but only when aggressive popularity norms are non-present or even negative (e.g., in prosocial classes). In contrast, aggressive popularity norms do have the power to diminish prosocial friendship processes and strongly encourage aggressive friendship processes, even in the presence of equally high prosocial popularity norms (e.g., in aggressive and mixed classes). In other words, a prosocial popularity norm is not able to buffer the impact of the aggressive popularity norm, while in contrast the aggressive popularity norm does buffer the impact of the prosocial popularity norm.

#### **4.6.1 Norm combinations and friendship processes**

**Prosocial classrooms.** In line with the reputational salience hypothesis (Hartup, 1996), and evolutionary-psychological theory (Ellis et al., 2016), it was found that if prosocial rather than aggressive behaviors are an important tool to reach adolescents' goal of popularity (e.g., in *prosocial classrooms*), conditions for the proliferation of aggression are diminished, whereas conditions for the proliferation of prosocial behavior are enhanced. More specifically, in prosocial classrooms, adolescents did not choose their friends based on aggression, but based on high prosocial behavior; whereas friendships were most likely to be maintained if friends were *low* in aggression or high in prosocial behavior. Adolescents who were low in prosocial behavior did not choose highly aggressive adolescents as friends; instead, they selected lowly aggressive peers as friends. This can be considered as protective, as previous research suggests that lowly prosocial adolescents usually are more prone to engage in aggression to compensate for their lack of prosocial skills (Pepler et al., 2008; Obsuth et al., 2015), and having lowly aggressive friends makes this less likely. Moreover, prosocial norms buffered against the general tendency to adopt low prosocial behavior from lowly prosocial friends. Prosocial norms also diminished the influential role of aggressive friends: Aggressive friends did not have the power to enhance adolescents' aggression or to decrease adolescents' prosocial behavior in

prosocial classrooms. In general, these findings illustrate that in prosocial classrooms, the prosocial behavior of popular peers may play a protective role by discouraging aggression (cross-behavior norm processes) and enhancing the importance of prosocial behavior.

There was one unexpected finding in prosocial classrooms: adolescents were more likely to increase in aggression – or less likely to decrease in aggression – if they had highly prosocial friends. This seems counter-intuitive, but can be explained in at least three ways. First, it could be that highly prosocial youth are more tolerant toward their friends and may be less inclined to speak up when their friends show aggression; because they do not want to get involved into fights with their friends themselves (Molano et al., 2013). In other words, highly prosocial friends may not put a strong brake on youth' aggression. Therefore, aggressive youth with more prosocial friends are more likely to increase – or less likely to decrease – in aggression. Second, this effect may be induced by bi-strategic friends, referring to friends who are both high in prosocial and aggressive behaviors (Hawley, 2003). It could be that in prosocial classrooms, only bi-strategic friends have the power to increase adolescents' aggression. In line with this reasoning, a previous study found that prosocial adolescents cannot mitigate the role of bi-strategic adolescents in making aggression salient (Laniga-Wijnen et al., 2019b). Third, there may be a statistical reason: aggression in prosocial classrooms is *so low*, hence the only way adolescents may change in this behavior, is by going up (regression to the mean).

**Aggressive classrooms.** In *aggressive classrooms*, there are both prosocial and aggressive norms, but aggressive popularity norms are significantly higher than prosocial popularity norms. Findings indicate that in such a situation, aggressive popularity norms overrule prosocial popularity norms in affecting friendship processes. Adolescents may maintain their friends based on similarity in aggression, and friendship maintenance based on prosocial behavior is less important in aggressive classrooms than in prosocial classrooms. Prosocial friends do not have the power to change adolescents' aggression or prosocial behavior, whereas aggressive friends have the power to diminish adolescents' prosocial behavior and to enhance adolescents' aggression.

**Mixed classrooms.** For *mixed classrooms*, most evidence was found for the hypothesis that aggressive popularity norms are stronger than prosocial popularity norms. Friends selected each other based on similarity in aggression

and not on similarity in prosocial behavior. Moreover, friendship influence on aggression in mixed classrooms was similar to aggressive classrooms; and friends influenced each other towards lower prosocial behavior. Aggression may be inherently more overruling, visible, dominating and impactful behavior than prosocial behavior, which has been suggested by various studies reviewing psychological literature on the power of negative events over positive events (Baumeister et al., 2001; Rozin & Royzman, 2001). As a result of innate predispositions and prior experiences, people seem to give greater weight to negative entities (negative behaviors, negative peer feedback) than to positive ones. Also, an experimental study found adolescents' visual attention toward popular peers to be stronger after a negative prime than after a positive prime, indicating that the negative behaviors rather than the prosocial behaviors of popular peers drive the greater attention they receive from adolescents (Lansu & Troop-Gordon, 2017). Because attention is a prerequisite for influence, adolescents may be more strongly influenced by aggressive popularity norms than by prosocial popularity norms. The finding that cross-behavior friendship processes were non-present supported the alternate hypothesis that in mixed classrooms, both behaviors are viewed as adaptive for reaching the goal of popularity and hence are not mutually exclusive (Hawley & Bower, 2018). Consequently, adolescents do not feel the need to change their prosocial behavior in response to their friends' aggression (or vice versa).

#### **4.6.2 Strengths, limitations and future studies**

Some limitations of the present study need to be acknowledged. First, popularity norms may change across the school year (Laniga-Wijnen et al., 2018a). In the current study, most classrooms (about 70%) remained stable within the same popularity norm combination across the school year; however, some classrooms made a transition toward another popularity norm combination, mostly from an aggressive or prosocial type toward a mixed type. Due to power issues it was not possible to investigate whether these transitions also affected friendship processes related to aggressive and prosocial behavior over time. Future researchers are encouraged to collect larger samples and a higher number of classrooms and schools to examine potential trajectories in popularity norm combinations and its impact on friendship processes related to aggressive and prosocial behavior across the school year. This also enables researchers to

examine whether the salience of aggression or prosocial behavior within classrooms depends on norms in a wider ecological level, such as the school (Bronfenbrenner, 1979).

Second, in this study, peer-reported aggression was examined as a unified construct, without consideration for its different forms (physical vs. relational) and functions (reactive vs. proactive). Most items assessed relational forms of aggression. Also, one item assessed aggression against *others*, whereas the other three items were about aggression directed against the nominator. Given the nature of these latter questions, it could be that some aggressive students would not end up being nominated, even if they engaged in aggressive behaviors. However, previous studies have shown that youth generally tend to overestimate their peers' antisocial behavior, such as aggression or deviant behavior (Prinstein & Wang, 2005), particularly the antisocial behaviors of popular peers (Helms et al., 2014). Moreover, many aggressive acts such as bullying occur in private, and thus may be hidden from peers (e.g., see Olweus, 2013). Therefore, the current study's way of framing aggression items potentially mitigates adolescents' general tendency to over-report on aggression. Moreover, all aggression items loaded strongly on one factor, the scale that was created was reliable across all waves, and deletion of the "who makes fun of others" item would result in a less desirable Cronbach's alpha. Therefore, this measure of aggression is expected to adequately capture aggression in the classroom context, and future studies are encouraged to more narrowly compare adolescents' reporting tendencies on individualized and general peer nomination items.

Third, it was not possible to examine to which extent students combined prosocial and aggressive behavior (bi-strategics; Hawley, 2003) and how this affects friendship processes. For instance, the unexpected effect that aggressive adolescents are less likely to decrease (or more likely to increase) in aggression when they have more prosocial friends, could be due to the fact that these prosocial friends are also high on aggression (e.g., bi-strategics, Hawley & Bower, 2018). Unfortunately, in the current study it is not possible to examine this properly, due to the complexity of already included effects. For instance, with regard to cross-behavior friendship influence, several avXAlt effects were included, which capture three-way interactions. An example of one included three-way interaction, is the interaction between 1) presence of friendship, 2) prosocial behavior of friend and 3) aggression of adolescent. Adding the aggression of a

friend as the fourth term to be included in this interaction, would be too demanding for the model, and highly complex to interpret. Nevertheless, because this study is one of the first to examine cross-behavior influence effects and this is a highly complex and unexplored area, the current study provides an important first step in the literature.

The limitations notwithstanding, the current study has several strengths. First, whereas previous studies mainly examined popular peers as risk factor (Dijkstra et al., 2008; Laninga-Wijnen et al., 2017; Rambaran et al., 2013), this study illuminated the protective role of popular peers. It was shown that in prosocial classrooms, prosocial popular peers may buffer against aggressive friendship processes or encourage prosocial friendship maintenance. Future studies may examine how prosocial popularity norms can enhance friendship influence toward high prosocial behavior, rather than mitigate friendship influence toward low prosocial behavior; or examine why adolescents may increase in aggression in the presence of prosocial friends, despite high prosocial popularity norms. Second, this study shows the benefit of examining *combinations* of popularity norms instead of only one popularity norm, as findings demonstrate that aggressive norms may dominate prosocial norms, even when both are equally present. Further research is encouraged to provide more insight in what contributes to the emergence of mixed classrooms and what factors may lead to multiple, somewhat contrasting norms co-existing within a setting. Third, this study is the first to examine *cross-behavior norm- and friendship processes*. In this way, this study made a next step in capturing reality's complexity by acknowledging that the influence of norms and friendship is not bound to one behavioral domain; but that multiple behaviors interplay via cross-behavior norm- and friendship processes. Fourth, highly complex stochastic actor-based analyses were used, while taking into account the multi-level structure of the data. Moreover, the current study adopted the "five-factor model" that has been recently referred to as superior to more traditional methods for estimating selection processes (Snijders & Lomi, 2019). Importantly, it was not possible to estimate endowment and creation functions for the ego and alter (squared) effects due to power issues, and therefore the findings for cross-behavior friendship selection should be interpreted with caution. Moreover, due to convergence issues, cross-behavior selection and maintenance processes could not be disentangled, which is an exciting avenue for future research.

### 4.6.3 Conclusion

In adolescence, popular peers are highly visible and powerful, and function as role models by setting a norm ("popularity norm") for which behaviors are attractive in a particular context (Dijkstra & Gest, 2015). Accordingly, aggressive popularity norms have been shown to strengthen the selection of aggressive peers as friends, and adolescents' tendency to adopt their friends' aggression (Laninga-Wijnen et al., 2017). Unfortunately, the potential protective role of prosocial behaviors of popular peers has not been considered to date, and research did not consider the co-existence and interplay of multiple norms and friendship processes. The current study examined how aggressive and prosocial popularity norm combinations within classrooms relate to prosocial and aggressive friendship processes using social network analyses. Findings demonstrate that popular peers can be prosocial role models, as long as they (or other popular peers in their classroom) do not engage in aggression. More specifically, when only prosocial behaviors are reputationally salient, prosocial behavior may flourish via prosocial friendship processes, whereas the proliferation of aggression may be largely mitigated. Instead, aggressive popularity norms diminish prosocial friendship processes and enhance aggressive friendship processes, even in the presence of (equally high) prosocial popularity norms (e.g., in aggressive and mixed classrooms). Thus, this study shows that popular peers are powerful role models in adolescence by setting the norm for (the coevolution of) peer relationships and behavioral development in the classrooms, and that popular peers' aggressive behaviors have a stronger impact than their prosocial behaviors. It could be that in adolescence, aggression may be a stronger way to get attention from others, as it is a means to bridge the "maturity gap" and to stand up against adult-like values (Moffitt, 1993). Theoretically, the findings of this study provide three key insights. First, the reputational salience of one behavior may affect friendship processes in another, related behavioral domain. Second, the reputational salience of a certain behavior can only be understood in relation to the reputational salience of other behaviors in the classroom. When multiple behaviors are equally rewarded with popularity (such as in mixed classrooms), it could still be that one norm dominates the other. Third, the reputational salience of a behavior may not only inform same-behavior friendship processes (Hartup, 1996), but also cross-behavior friendship dynamics. Hence, this study informs – among others – reputational salience hypothesis on the importance of the co-existence and interplay of (reputationally

salient) behaviors in adolescence. With regard to practical implications, interventions aiming at preventing or reducing aggressive (bullying) norms (such as the Meaningful Roles Intervention; Ellis et al., 2016) or at strengthening social-emotional core competences (SEL-programs, see Durlak et al., 2011) may need to not only encourage prosocial behavior by rewarding it with status, but to also actively discourage aggressive popularity norms. In this way, popular peers may be effective targets for promoting prosocial behavior and positive adjustment among youth within classrooms.

## Appendix (4A)

**Model specification control parameters.** In order to accurately assess friendship selection and maintenance processes, it is important to control for general network tendencies in the model. Therefore, the following control effects were included: *Rate parameters* refer to the rate of change in friendships between time points, indicating whether there is enough change in the friendship network (not reported for parsimony; available upon request). *Density* reflects the general tendency of select others as best friends. *Reciprocity* reflects the tendency to reciprocate received “best friend” nominations. *Transitive group formation* is measured with two “gwesp-effects”; that measure the tendency that “friends of friends become friends”. The *indegree-popularity* effect holds that adolescents who receive many nominations tend to receive more nominations over time, whereas the *outdegree-activity* effect reflects the tendency that adolescents who give many nominations will give more nominations over time. Finally, the *outdegree-popularity* effect represents adolescents who give many nominations to receive more nominations over time, and thus accounts for the relation between receiving and giving nominations. The inclusion of these effects accounts for observed degree differences in the data and offers protects against omitted variable bias related to ego- and alter effects of individual-level variables not included in the models (Ripley et al., 2017).

In order to accurately assess friendship influence on aggressive and prosocial behavior, this study controlled for the overall mean and variance of prosocial and aggressive behaviors by including the *linear shape* effect and the *quadratic shape* effect. For the latter effect, a negative parameter indicates pulling toward the mean, whereas a positive parameter indicates pushing away from the mean. Also, the effect of indegree on the behaviors was estimated (e.g., do received friendship nominations predict higher prosocial or aggressive behaviors?) as well as the outdegree (e.g., do adolescents with more given friendship nominations have a stronger tendency toward high values on prosocial or aggressive behavior?). Finally, this study controlled for the effect of gender, aggression and prosocial behavior (depending on the outcome variable) on behavioral tendencies in the network.

**Appendix (4B)**

**Control parameters.** As control parameters were fairly similar in all models, only those of the first model on *all* classrooms will be interpreted (Table 4.2). A negative parameter for density ( $\eta = -0.91$ ;  $OR = 0.40$ ) indicated that participants did not select everyone as a best friend. Adolescents reciprocated friendships ( $\eta = 1.61$ ;  $OR = 5.00$ ) and were likely to become friends with the friends of their friends via forward ( $\eta = 1.64$ ;  $OR = 5.16$ ) and backward ( $\eta = 0.23$ ;  $OR = 1.26$ ) nominations. Adolescents who received many nominations received less nominations over time ( $\eta = -0.55$ ;  $OR = 0.58$ ) and adolescents who gave many nominations decreased in nominations given over time ( $\eta = -0.63$ ;  $OR = 0.53$ ). Also, adolescents were likely to select same-gender peers as friends ( $\eta = 0.55$ ;  $OR = 1.73$ ). In general, boys were less prosocial and more aggressive compared to girls. General levels of prosocial behavior in the classroom were negatively affected by levels of aggression ( $\eta = -0.08$ ;  $OR = 0.91$ ) whereas prosocial behavior did not affect levels of aggression ( $\eta = -0.04$ ;  $OR = 0.96$ ).



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## The Role of Academic Status Norms in Friendship Selection and Influence Processes related to Academic Achievement

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**Author Contributions:**

L.L.-W. conceived of this study, participated in its design and data-collection, conducted and interpreted statistical analyses and drafted the manuscript; M.G. helped to draft the manuscript. J.K.D., W.V., R.V. and Z.H. designed the SNARE project where this study is part of, and helped to draft the manuscript.

This study examined the role of academic status norms in friendship selection and influence processes related to academic achievement across the 2nd year of secondary school (SNARE project,  $N = 1,549$  students from 70 classes;  $M_{age} = 13.69$  years). Academic status norms were operationalized as the class-level correlation between academic achievement and 4 types of peer status: popularity, acceptance, unpopularity and rejection. Longitudinal social network analyses indicated that the unpopularity and popularity norm play a role in friendship selection processes (but not influence processes) related to academic achievement. In line with our hypotheses, the unpopularity norm in the classroom strengthened similarity-based friendship selection among low-achieving adolescents, and predicted greater avoidance of academically similar friends among high-achieving adolescents. Also, the popularity norm strengthened friendship selection among similar peers, both among low- and high-achievers. Acceptance and rejection norms did not play a role in friendship processes. In sum, the average achievement of popular and unpopular peers shapes friendship preferences in the classroom, which may have important implications for adolescent academic development.

## 5.1 Introduction

Adolescent academic achievement is a key predictor of future success in education and occupation (Crosnoe & Benner, 2015). Peers may provide a crucial developmental context for adolescents' academic achievement (Rodkin & Ryan, 2012) and peer relationships may shape students' academic achievement through friendship selection and influence processes. Friendship *selection* refers to adolescents selecting similarly achieving peers as friends, because similarity enhances mutual understanding and facilitates communication, for instance when collaborating on academic tasks. This makes a relationship more rewarding and stable (similarity attraction hypothesis; Byrne, 1971). In turn, friendship *influence* can change individual academic achievement over time through, among others, information exchange modeling (Kindermann & Gest, 2009), supporting or distracting from learning (Rodkin & Ryan, 2012) and peer tutoring experiences (Gest, Rulison, Davidson, & Welsh, 2008). Both friendship selection and influence processes may result in similarity in achievement among friends, for better or worse: Hanging out with high-achieving friends may promote achievement,

whereas hanging out with low-achieving friends may dampen achievement over time (Shin & Ryan, 2014).

Some studies examined friendship processes related to achievement, but findings vary considerably regarding the *strength* and *direction* of friendship processes. In regard to the *strength* (i.e., the extent to which processes take place), most studies have found that influence processes take place, whereas friendship selection was found in some (Flashman, 2012; for girls; Gremmen, Dijkstra, Steglich, & Veenstra, 2017; Kretschmer, Leszczensky, & Pink, 2018; Rambaran et al., 2017) but not in other studies (Fortuin, Van Geel, & Vedder, 2016; for boys; Kretschmer et al., 2018; Shin & Ryan, 2014a). Regarding the *direction* of friendship selection (i.e., whether friendship selection is based on high or low achievement), one study found that adolescents select each other based on similarity in *low* achievement (Rambaran et al., 2017), whereas two studies found differences between settings in the direction of selection processes. Flashman (2012) found that in one school, high-achieving students mostly formed friendships with other high-achieving students, whereas in another school, similarity-based selection took place equally among low- and high-achieving students. Gremmen and colleagues (2017) indicated that in some classrooms, friendship selection mostly took place based on similarity in low achievement, whereas in other classrooms, similarity-based selection occurred both among low- and high-achieving peers. Only two studies examined the direction of friendship influence. One study indicated that friends influenced each other to increase rather than decrease in achievement over time (Rambaran et al., 2017). Another study showed that high-achievers were influenced to decrease in achievement, whereas low-achievers were influenced to increase in achievement over time (Gremmen et al., 2017). To promote adolescents' academic achievement, it is crucial to identify when adolescents' friendship processes are for better or for worse.

One reason why achievement-based friendship processes may vary across settings, is that different settings may present different peer contexts, which in turn has diverging implications for friendship processes (Kiuru et al., 2012). The peer context can be measured using the concept of peer norms, which represent how specific behaviors (here, academic achievement) are evaluated and appreciated within a specific context, which may determine the valence of certain behaviors for friendship processes (McCormick & Cappella, 2015). Therefore, the aim of our study was to examine whether peer norms play a role in the strength

and direction of selection and influence processes regarding academic achievement.

### **5.1.1 The role of peer norms in friendship processes related to academic achievement**

Similarity-based friendship selection and influence processes do not take place for just any characteristic or behavior; they may occur especially for characteristics or behaviors that are important and salient to adolescents (Fortuin et al., 2016). According to the reputational salience hypothesis (Hartup, 1996), similarity among friends occurs mainly for “reputationally salient” behaviors: behaviors that are an important tool to improve one’s social reputation. This is in line with the idea that adolescents prioritize achieving status (LaFontana & Cillessen, 2010) and that they actively avoid a low status among peers, because this may put them at risk for peer victimization and exclusion (Hopmeyer Gorman, Schwartz, Nakamoto, & Mayeux, 2011). According to goal-framing theory (Lindenberg, 2006), adolescents may particularly attend to behaviors that could serve their goal of obtaining a higher peer status. Therefore, these behaviors may become valuable and important for similarity-based friendship processes (Hartup, 1996; Haselager, Hartup, Van Lieshout & Riksen-Walraven, 1998). Whereas the reputational salience hypothesis is mainly about the *general* reputational salience of a certain attribute, we argue that previously found inconsistencies in the importance of achievement for friendship processes may indicate that the reputational salience of achievement varies across settings, such as the classroom (Laninga-Wijnen, Ryan, Harakeh, Shin, & Vollebergh, 2018b). One way of measuring the “setting-level” reputational salience of behavior is by examining the concept of *status norms*, also known as norm salience (Henry et al., 2000).

Status norms for academic achievement refer to the extent to which academic achievement is *positively* valued in classrooms because of its associations with high social peer status or, instead, *negatively* valued because of its associations with low social peer status. Although the original concept of status norms defined peer status by peer rejection and peer acceptance (Henry et al., 2000), recent studies have emphasized the need to examine four types of peer status: peer acceptance, popularity, rejection, and unpopularity (Cillessen & Marks, 2011; Hopmeyer Gorman et al., 2011). These four constructs are partly overlapping but also conceptually distinct because they are associated with

different behavioral, social-emotional and academic outcomes and therefore warrant being examined separately (Hopmeyer Gorman et al., 2011). Peer popularity (i.e., perceived as most popular) and unpopularity (i.e., perceived as least popular) are reputation-based constructs, representing high or low social power, visibility and prestige in the peer group (Adler & Adler, 1998; Cillessen & Borch, 2006). Peer acceptance (i.e., sociometric popularity, being liked) and peer rejection (i.e., being disliked) are dyadic, preference-based constructs that refer to the extent to which someone is accepted or rejected by peers (Cillessen & Marks, 2011; Hopmeyer Gorman et al., 2011). The class-level associations between achievement and these four status constructs represent four types of status norms: popularity norms, acceptance norms, unpopularity norms, and rejection norms.

So far, studies have not examined whether status norms play a role in friendship processes related to achievement. Status norms regarding academic achievement may differ between classrooms. In some classrooms low academic achievement might be considered 'cool', for instance because students in these classrooms react against adult-approved behaviors to achieve well in school (Moffitt, 1993), whereas in other classrooms, high achievement may be related to high peer status, because students are more occupied with their future education and careers (Rodkin & Ryan, 2012). Also, in line with the original ideas about norm salience (Henry et al., 2000), our focus on *four* types of status norms enabled us to (a) compare the power of social sanctions or social rewards of achievement (Brechwald & Prinstein, 2011) and (b) examine the relative impact of reputation-based norms (popularity, unpopularity) versus preference-based norms (acceptance, rejection).

Reputation-based constructs may generally be more relevant to adolescents than are preference-based constructs, because it is assumed that there is more consensus about someone's status for reputation-based constructs, so that people know whom they have to look to when they want to know what the norm is (Adler & Adler, 1998; Hopmeyer Gorman et al., 2011). Also, reputation-based constructs are assumed to be a more important reward (popularity) or sanction (unpopularity) than are preference-based constructs during the developmental period of adolescence. That is, previous work has indicated that popularity is prioritized over other social goals (LaFontana & Cillessen, 2010), such as being accepted by peers (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010). Moreover,

unpopularity seems to be a more severe sanction compared to being disliked, because unpopular peers experience more internal distress and are more at risk for victimization compared to disliked peers; and being 'disliked' sometimes even seems to be a payoff of being popular (Hopmeyer Gorman et al., 2011). However, we did not formulate hypotheses on the relative impact of the four status norms, because we are the first to examine these four status norms types and we examined them in a relatively unexplored area (academic achievement). Nevertheless, we expected that status norms would play a role in both the strength and direction of friendship processes, which we explain further in the next paragraph.

### **5.1.2 The role of status norms in the strength of selection and influence processes**

It can be argued that selection and influence take place based especially on reputationally salient attributes (Hartup, 1996). Hence, when achievement is positively *salient* (i.e., strongly associated with popularity or acceptance) or negatively *salient* (i.e., strongly associated with unpopularity or rejection) in a classroom, students may particularly select peers based on similarity in achievement, and may be more susceptible being influenced by their friends toward similarity in academic achievement. This is in line with two previous studies that examined the importance of popularity norms for the strength of similarity-based selection and influence processes related to two relatively deviant characteristics: aggressive behaviors (Laninga-Wijnen et al., 2017) and risk attitudes (Rambaran, Dijkstra, & Stark, 2013). These studies showed that, in line with the reputational salience hypothesis (Hartup, 1996), friendship selection and influence processes related to aggression (Laninga-Wijnen et al., 2017) and influence processes regarding risk attitudes (Rambaran et al., 2013) were strongest in classrooms where these behaviors and attitudes were associated with popularity.

### **5.1.3 The role of status norms in the direction of selection and influence processes**

In classrooms where high academic achievement is *positively salient* (with high popularity or acceptance norms), there may be a stronger tendency for *high*-achieving students to select similarly high-achieving peers as friends compared to

*low*-achieving students' selecting similarly *low*-achieving peers as friends (reputational salience hypothesis, Hartup, 1996). Similarity-based selection effects are expected to be weaker among *low*-achieving students, because for *low*-achieving students another process may occur as well: They may also select attractive high-achieving peers to become higher in peer status (goal-framing theory, Lindenberg, 2001, 2006; basking in reflected glory hypothesis: Dijkstra et al., 2010). Hence, in these classrooms *low*-achieving students may have a higher tendency to select high-achieving peers as friends than vice versa. Regarding influence, adolescents may become similar to their friends in *high* achievement, because this contributes to a higher peer status in these classrooms (Hartup, 1996).

By contrast, in classrooms where high achievement is *negatively salient* (high unpopularity or rejection norm), there may be a stronger tendency for *low*-achieving students to select similarly *low*-achieving peers as friends compared to *high*-achieving students selecting similarly high-achieving peers as friends (reputational salience hypothesis, Hartup, 1996; Haselager et al., 1998). That is, for high-achieving students an additional process may occur: They may also select *low*-achieving peers as friends to avoid a low peer status in these classrooms (Brechwald & Prinstein, 2011). Hence, high-achieving students may have a higher tendency to select *low*-achieving students, than vice versa. Regarding influence, adolescents may become similar to their friends in *low* achievement, because this may help to avoid a low peer status in these classrooms (Hartup, 1996).

## 5.2 Present Study

We examined whether the extent to which achievement is positively or negatively *salient* in a classroom determines the strength and direction of friendship selection and influence processes related to achievement. Regarding *strength*, we hypothesized that there would be stronger similarity-based selection and influence effects in classrooms in which high academic achievement is related to a *positive* peer status (i.e., popularity norm and acceptance norm) or a *negative* peer status (i.e., unpopularity norm and rejection norm).

Regarding the *direction* of selection processes, we hypothesized that when high achievement is related to a positive social status (i.e., high popularity or acceptance norms), similarity-based selection processes would be stronger between high-achieving peers compared to *low*-achieving peers. For influence

effects, we hypothesized that low-achieving students tend to increase their academic achievement in the direction of high-achieving students. By contrast, we hypothesized that when high achievement is related to a *negative* social status (i.e., high rejection or unpopularity norms), similarity-based selection effects would be stronger between low-achieving than high-achieving peers. For influence effects, we hypothesized that high-achieving students would have a tendency to decrease their academic achievement in the direction of low-achieving students.

We used “perceived friendship” as an indicator of friendship. That is, we assessed friendships using unlimited peer nominations on the question “Who are your best friends in class?” and we considered both asymmetrical and reciprocal friendships as “friendships”. Therefore, strictly speaking, what we studied was an index of “friendship choice” or “friendship selection”. Even though this is regular practice in social network studies on peer relations (Veenstra & Dijkstra, 2011), friendship reciprocity is of central importance in defining a friendship (Bukowski & Hoza, 1989; Degirmencioglu, Urberg, Tolson, & Richard, 1998; Furman, 1996). However, from a social network perspective, both asymmetrical and reciprocal friendships are important social ties that may influence adolescents’ behavior. That is, even when friendship ties are nonreciprocal, adolescents may become similar to the peers that they perceive to be their best friends. For instance, adolescents may be particularly motivated to behave in the same way as does their perceived best friend, to receive a friendship nomination back (Bot, Engels, & Knibbe, 2005). Nevertheless, we considered it important to stress that our measure of friendship may rather be a construct of perceived friendship.

### **5.3 Methods**

#### **5.3.1 Participants**

The Social Network Analysis of Risk behavior in Early adolescence (SNARE) project is a longitudinal study on adolescent social and behavioral development. All first- and second-year students in two secondary schools (one in the north and one in the middle of the Netherlands) were approached for enrollment in the SNARE project (Cohort 1) at the beginning of the 2011-2012 academic year. A second cohort of students entering the first year in these secondary schools was also approached to take part in the project the following academic year (2012-2013; Cohort 2). We examined friendship selection and influence in the second

year of secondary education. This implies that we selected the students of the SNARE study who were in Cohort 1 in the second year of secondary education in 2011-2012, students from Cohort 1 who were in the second year of secondary education in 2012-2013, and students from cohort 2 who were in the second year in 2013-2014. This yielded a sample of 1,568 students from 70 classes. Of the 1,568 second-year students who were approached, 0.01% ( $N = 19$ ) declined to participate for various reasons (e.g., the adolescent was dyslectic, or parents perceived the research to be too time-consuming). This yielded a sample of 1,549 second-year adolescents from 70 classes; 760 [49.1%] girls, with a mean age of  $M = 13.69$  ( $SD = .49$ ). Each class had 12 to 31 students ( $M = 22.13$  students per class). Of the participants, 54.3% were enrolled in lower-level education (including preparatory secondary school for technical and vocational training), and 45.7% were attending higher-level education (including preparatory secondary school for higher professional education and for university). The majority of the sample was native Dutch (around 80.0%). The socioeconomic status of participants was calculated based on the zip codes, using status scores from the Social Cultural Planning Office, the Netherlands (e.g., Benson, Nierkens, Willemsen, & Stronks, 2015). Status scores are calculated based on the average income of inhabitants within an area, the percentage of habitants with lower incomes, the percentage of lowly educated habitants, and the percentage of unemployed habitants. These scores indicated that 55.0% of our participants came from areas with a lower socioeconomic status compared to the average socioeconomic status in the rest of the Netherlands.

### 5.3.2 Procedure

Students received an information letter for themselves and their parents, in which they were asked to participate. If students or their parents wished to refrain from participation, they were asked to indicate this. During data collection, students were also made aware that they could opt out anytime. For all students, data were collected three times in one academic year, that is, in the fall, winter and spring. The survey was completed during regular lessons in the classroom by computer (under the supervision of a researcher) using Bright Answer socio software (SNARE software, 2011). Students who were absent that day were, if possible, assessed within a month. The privacy and anonymity of the students were warranted, and the study was approved by the Internal Review Board of

Utrecht University, see also Dijkstra et al., 2015; the name of approved project is: "Social Network Processes and Social Development of Children and Adolescents".

### 5.3.3 Measures

**Friendship.** Adolescents received a list of all consenting students in their class. They were asked to indicate their 'best friends' within their classroom. Participants could select an unlimited number of same-gender and opposite-gender classmates, and there was an option of selecting *nobody*, which allowed us to differentiate between missing responses and valid empty responses in the name generators. Based on these nominations, we constructed an adjacency matrix for each classroom at all waves containing all nominations, with 0 and 1 representing absence and presence of a tie between actors  $i$  and  $j$ , respectively.

**Academic achievement.** Academic achievement was derived from three school report cards with students' average grades (ranging between 1 and 10) per school subject (Grade Point Average [GPA]). We calculated the average grades over at least four out of six school subjects per student: Dutch, English, mathematics, biology, history, and geography.<sup>2</sup> Students' average school grades were categorized into seven subcategories, because RSIENA is not able to handle continuous measures. The categorization was as follows: 1 =  $GPA \leq 5.49$ ; 2 =  $5.50 \leq GPA \leq 5.99$ ; 3 =  $6.00 \leq GPA \leq 6.49$ ; 4 =  $6.50 \leq GPA \leq 6.99$ ; 5 =  $7.00 \leq GPA \leq 7.49$ ; 6 =  $7.50 \leq GPA \leq 7.99$ ; 7 =  $GPA \geq 8.00$ .

**Status norms.** Similar to the friendship measure, participants received a list of all consenting students in their classroom in a random order. They were asked to indicate "Who is most popular" (popularity), "Who is least popular" (unpopularity), "Who do you like?" (acceptance), and "Who do you not like at all?" (rejection). We calculated per student the proportion of received nominations. Subsequently, four types of status norms at T1 were calculated: (a) the within-

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<sup>2</sup> From one of the participating schools, we received the grades of students from September to October (representing the grades for Time 1 [T1]), from October to December (representing the grades for T2) and from December to April (representing the grades for T3). From the other school, we also received three school report cards; however, the school report card grades on the second and third report card included all grades from previous periods in that specific school year. Hence, for this school, report cards displayed the average grade from September to October (T1), September to December (T2) and September to April (T3). To account for this, we calculated the average grade for T2 by multiplying the grade of T2 times two and subtracting the previous average grade at T1. For calculating the grade for the period from December to April (T3) we performed a similar procedure, controlling for the longer time period between assessments.

classroom correlation between peer-nominated popularity and achievement (popularity norm), (b) the within-classroom correlation between peer-nominated unpopularity and achievement (unpopularity norm), (c) the within-classroom correlation between peer acceptance and achievement (acceptance norm), and (d) the within-classroom correlation between peer-nominated rejection and achievement (rejection norm).

**Gender.** Gender was coded 0 for girls and 1 for boys. Therefore, girls were indicated as reference category.

## 5.4 Analytic Strategy

### 5.4.1 Attrition analyses

Missing values on achievement and peer-nomination data across waves were 3.6%, 3.4% and 3.4% respectively, for instance due to illness and not being able to catch up on the questionnaire, or because adolescents were new at school and not yet in the nomination lists. Therefore, actual  $N$ s across waves were  $N_{w1} = 1,494$ ,  $N_{w2} = 1,500$  and  $N_{w3} = 1,500$ . Attrition analyses on partially missing cases and complete cases showed that students with missing data were on lower educational tracks ( $\chi^2(14, N = 1,533) = 768.00, p < .001$ ). There were no other significant or substantial differences in the research variables of interest between partially missing cases and complete cases. Missing friendship data due to nonresponse were handled using the RSIENA missing data method (Huisman & Steglich, 2008) using the "last observation carry forward" (LOCF) method proposed by Huisman and Snijders (2003). The percentage of missing values on achievement was about 2.8% across waves, for instance because adolescents left the school or instead, joined the school year later. Missing data were handled using the expectation maximization method. Little's missing completely at random test produced a normed chi-square ( $\chi^2/df$ ) of 3.52, indicating that the data were likely missing at random and that it was safe to impute missing values (Bollen, 1989). Therefore, to gain statistical power, we estimated missing values for achievement data across waves using the expectation maximization procedure, with all study measures as predictors (achievement across waves, as well as the different types of status and gender; see also Gupta & Chen, 2010; Van Buuren & Groothuis-Oudshoorn, 2011, p. 22).

### 5.4.2 RSIENA analyses

Analyses were conducted using longitudinal social network analysis (also called 'stochastic actor-based models'; Snijders, 2005) implemented using the RSIENA software program (Version 1.1-289 in R 3.2.2; <https://www.stats.ox.ac.uk/~snijders/siena/>). RSIENA estimates to what extent similarity among friends is due to friendship selection and influence processes (Snijders, Steglich, & Schweinberger, 2007), while controlling for structural network effects and the general development of a certain behavior in the network. This modeling technique allowed for simultaneously testing effects from Waves 1 to 2 and Waves 2 to 3 (for a detailed, more technical explanation of longitudinal social network analyses, refer to Snijders et al., 2007, and Veenstra, Dijkstra, Steglich, & Van Zalk, 2013).

**Friendship selection based on academic achievement.** To examine the extent to which friendship selection related to academic achievement took place, we estimated several effects. We included structural network effects that capture natural tendencies that generally take place in a friendship network, such as the tendency to reciprocate friendships (reciprocity) and to become friends with friends of friends (group formation tendencies). Next, the "*effect of achievement on friendship nominations received*" refers to which extent high achievement affects being nominated as a best friend (alter effect). Conversely, the "*effect of achievement on friendship nominations given*" indicates to what extent high achievement affects the number of best friend nominations *given* to peers (ego effect). The *similarity-based selection effect* (specifically, the SimX effect) provided an estimate for testing our hypothesis about the extent to which adolescents form new and maintain friendships with others based on similarity in achievement (the so-called evaluation effect).

**Friendship influence on achievement.** Friendship influence processes refer to the tendency of adolescents to become similar to their friends in achievement. A positive influence parameter (average similarity parameter) represents the tendency to adopt friends' achievement over time; this can work in an upward or downward direction (or remain similar). Friendship influence processes were estimated while controlling for the linear shape parameter, quadratic shape parameter, and the main effect of gender on achievement. The

*linear* and *quadratic shape* parameters model whether change in achievement conforms to linear or quadratic trends.

**The role of status norms in the coevolution of friendships and achievement.** The aforementioned effects were first analyzed for each class separately in RSIENA, yielding 70 parameters for each effect. To examine the moderating impact of the four types of status norms, we ran a meta-analysis, using Viechtbauer's (2010) meta-analysis method implemented in the R-package *metafor*. We aggregated these results for the total sample of 70 classes, while simultaneously including the four types of status norms as continuous class-level moderators. We adopted this approach to determine the unique contribution of all four types of status norms in predicting class-level variation in selection and influence processes on achievement, while controlling for each other. This is necessary because there might be some overlap between, for instance, low popularity and high unpopularity, even though these constructs are antagonistically distinct concepts, as indicated by previous work (see for instance Hopmeyer Gorman et al., 2011). To facilitate the interpretation of the findings, we calculated odds ratios by taking the exponential function of the parameter estimates ( $=\exp(\beta)$ ; Ripley, Snijders, Boda, Vörös, & Preciado, 2018). For friendship influence, we first divided the estimates by the number of answer categories minus one to reflect the effect of a one-unit increase or decrease on the scale. Odds ratios were not calculated for the quadratic shape terms, because these were not linear.

Next, when friendship selection processes were significantly present, we calculated ego-alter selection tables (Ripley et al., 2018), to examine whether similarity-based selection takes place especially among high-achieving or low-achieving students, and to examine whether high-achieving students have a higher tendency to select low-achieving students or vice versa. Also, when influence processes were significant, we calculated ego-alter influence tables to investigate whether friends influence each other in an upward or downward direction. For these ego-alter tables, we compared classrooms in the upper and lower 10% of status norms. We chose this criterion due to the skewed distribution of our popularity norm measure, because there were only a few classrooms with a positive association between popularity and achievement. If we had applied other criteria, classrooms with a neutral or even a negative association between popularity and achievement would have been included in our "high popularity

norm” classrooms. For consistency, we applied the 10% criterion to all types of status norms.

We also tested whether differences in the direction of effects were significant by giving weights to these differences and calculating a linear combination and standard deviation for each classroom with a certain status norm. We transformed this to a z-score with the following formula:  $(\sum(lc/se))/\text{sqrt}(N)$  where  $lc$ =linear combination in each classroom,  $se$  = standard error in each classroom and  $N$  = number of classrooms. We are the first social network study to apply this method because it was recently developed, so we refer to the newest RSIENA manual (Ripley et al., 2018) and <https://www.stats.ox.ac.uk/~snijders/siena/> for scripts and further explanation of this method.

**Goodness of fit of models and sensitivity analysis.** We assessed the goodness of fit with indegree distribution, outdegree distribution, triad census and geodesic distances, and the behavior distribution for GPA. For each goodness of fit statistic, we assessed the differences between the observed values in the network (summed across the three waves of data) and the simulated values in the model, using Mahalanobis distance for each classroom network (cf. Ripley et al., 2018). For all fit indices, less than 5% of the Mahalanobis distance values reached statistical significance, indicating an adequate goodness of fit (see also Laninga-Wijnen et al., 2018b). Violin plots indicated that in general, values were well represented in all classrooms. Model convergence was good.

We conducted three sensitivity analyses. First, we removed all adolescents who nominated all peers in the classroom as a best friend from the data set. This did not affect the interpretability of our results, so we decided to take the model *without* these adolescents who nominated everyone as a best friend as our final model. Second, we examined whether our pattern of results differed with and without imputed achievement values, which was not the case. Therefore, we chose the model with imputed data as our final model. Third, we included classroom means and variances in GPA as control variables in our analyses, yielding similar results. Results of all sensitivity analyses are available upon request.

## 5.5 Results

### 5.5.1 Descriptive results

In Table 5.1, the averages and correlations of GPA and different types of status are displayed. In general, at the individual level, having a high GPA is significantly associated with lower levels of popularity, higher levels of unpopularity (except at T2), higher levels of acceptance (except at T2), and higher levels of rejection (except at T3). However, the strength of correlations between GPA and different types of status is quite weak. There is relative stability in the extent to which students are perceived as popular and unpopular, and are being accepted and rejected by their peers, as indicated with moderate to high correlations across waves.

Table 5.2 presents descriptive statistics and stability coefficients for the status norms. At all time points, the popularity norm (i.e., the class-level association between being popular and GPA) was negative and the unpopularity norm (i.e., the class-level association between being unpopular and GPA) was positive. There were large between-classroom differences in status norms, and status norms were relatively stable, as represented by significantly positive inter-correlations between time points.

Table 5.1  
*Correlations between Different Types of Status and Grade Point Average (GPA) Across the School Year*

	<i>M(SD)</i>	Range	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. GPA T1	6.57(0.74)	[4.27 – 9.15]														
2. GPA T2	6.65(0.83)	[3.27 – 9.45]	.60**													
3. GPA T3	6.58(0.88)	[1.68 – 9.32]	.64**	.52*												
4. Popularity T1	0.14(0.16)	[0.00 – 0.82]	-.17**	-.17**	-.17**											
5. Popularity T2	0.14(0.16)	[0.00 – 0.90]	-.13**	-.13**	-.13**	.81**										
6. Popularity T3	0.13(0.16)	[0.00 – 0.88]	-.10**	-.10**	-.10**	.77**	.79**									
7. Unpopularity T1	0.12(0.18)	[0.00 – 0.94]	.10**	.00	.10**	-.41**	-.38**	-.36**								
8. Unpopularity T2	0.11(0.17)	[0.00 – 1.00]	.11**	.03	.11**	-.37**	-.36**	-.35**	.88**							
9. Unpopularity T3	0.11(0.17)	[0.00 – 0.95]	.12**	.04	.12**	-.38**	-.38**	-.38**	.81**	.86**						
10. Acceptance T1	0.39(0.16)	[0.00 – 0.86]	.10*	.01	.10**	.31**	.29**	.29**	-.43**	-.38**	-.36**					
11. Acceptance T2	0.38(0.18)	[0.00 – 0.83]	.06*	-.03	.06*	.25**	.29**	.26*	-.36**	-.36**	-.34**	.71**				
12. Acceptance T3	0.36(0.17)	[0.00 – 0.83]	.09*	-.01	.09**	.21**	.26**	.32**	-.33**	-.32**	-.32**	.55**	.63**			
13. Rejection T1	0.10(0.12)	[0.00 – 0.90]	-.06*	-.06*	-.06**	-.13**	-.14**	-.10**	.60**	.56**	.50**	-.53**	-.46**	-.39**		
14. Rejection T2	0.09(0.12)	[0.00 – 0.80]	-.07*	-.09**	-.07**	-.12**	-.13**	-.12**	.54**	.61**	.55**	-.47**	-.48**	-.41**	.74**	
15. Rejection T3	0.10(0.18)	[0.00 – 0.87]	-.05	-.11**	-.05	-.10**	-.12**	-.12**	.38**	.52**	.54**	-.40**	-.42**	-.45**	.66**	.72**

Note.  $N = 1,549$ . T1, T2, and T3 represent the measurement waves in October, December and April. GPA scores reflect report card scores, and all status scores refer to the average proportion of students within the classroom that nominated a particular individual for this characteristic. \*  $p < .05$ . \*\* $p < .01$ .

Table 5.2

*Descriptives of Popularity Norms, Unpopularity Norms, Acceptance Norms and Rejection Norms across the School Year*

	T1		T2		T3		Inter-correlations Correlations at T1 over time				
	M(SD)	Range	M(SD)	Range	M(SD)	Range	T1 – T2	T2 – T3	1.	2.	3.
1. Popularity norm	-.21(.24)	[-.85 to .29]	-.15(.22)	[-.66 to .34]	-.14(.26)	[-.71 to .51]	.55**	.54**	-		
2. Unpopularity norm	.14(.26)	[-.58 to .62]	.06(.26)	[-.54 to .69]	.11(.28)	[-.55 to .65]	.59**	.58**	-.56**	-	
3. Acceptance norm	.01(.27)	[-.66 to .86]	.04(.24)	[-.73 to .51]	.05(.26)	[-.64 to .61]	.38**	.41**	.31	-.47**	-
4. Rejection norm	-.06(.25)	[-.58 to .71]	-.08(.23)	[-.60 to .52]	-.05(.27)	[-.68 to .61]	.35**	.43**	-.10	.48**	-.43**

*Note.*  $N = 70$  classes. T1, T2, and T3 represent the measurement waves in October, December, and April, respectively (Times 1,2,3). \*  $p < .05$ . \*\* $p < .01$ .

Table 5.3  
*Description of the Sample, Network Characteristics, and Measures in all Classes*

	T1		T2		T3	
<i>Sample</i>	<i>M(SD)</i>		<i>M(SD)</i>		<i>M(SD)</i>	
Average number of friends	4.66(1.21)		4.60(1.14)		4.20(1.10)	
Cohesion in the friendship network	0.24(0.07)		0.24(0.07)		0.22(0.06)	
Proportion reciprocated Friendships	0.64(0.11)		0.62(0.11)		0.61(0.13)	
Proportion triadic relationships	0.65(0.10)		0.63(0.11)		0.63(0.14)	
<i>Academic Achievement</i>	<i>M(SD)</i>	<i>N</i>	<i>M(SD)</i>	<i>N</i>	<i>M(SD)</i>	<i>N</i>
Average boys	6.47(0.72) <sup>a</sup>	789	6.59 (0.82) <sup>a</sup>	789	6.50(0.86) <sup>a</sup>	789
Average girls	6.67(0.73) <sup>b</sup>	760	6.72 (0.84) <sup>b</sup>	760	6.65(0.90) <sup>b</sup>	760
<i>Respondents</i>	0.03(0.12)		0.03(0.16)		0.03(0.14)	
<i>Friendship and Achievement Change</i>	T1-T2		T2-T3			
Average number of friendship changes per classroom	59		63			
Proportion stable friendships	0.56		0.51			
Fraction increasing actors in achievement	31.2%		38.3%			
Fraction decreasing actors in achievement	38.4%		30.3%			

*Note.*  $N = 70$  classes; 1,549 participants. T1-T3 = Time 1 – Time 3 (Waves 1 – 3). For information on the calculation of the different network indices, see Veenstra & Steglich, 2012. Average achievement for boys and girls were compared and indicated with different subscripts.

### 5.5.2 The role of status norms in the coevolution of friendships and achievement

#### Description of network characteristics and academic achievement.

In Table 5.3, a description of the network is provided. On average, adolescents had more than four best friends. The density in the network (outdegree) represents the general tendency of students to have friendship ties. It was relatively low, with 22% – 24% of friendship ties being present in relation to the total amount of friendship ties possible. Also, most friendships were reciprocated, and adolescents tended to form triadic relationships. Boys and girls differed significantly but not substantially on academic achievement (effect sizes  $D_{t1} = 0.26$  and  $D_{t2} = 0.16$  and  $D_{t3} = 0.15$ ). Friendships were sufficiently stable to conduct social network analyses (Jaccard Index varying from .51 to .56). The Moran's  $I$  represents covariance of achievement in all friendship *dyads*, and this value was relatively low, in line with previous social network studies on achievement (Dieterich, 2015; Gremmen et al., 2017; Shin & Ryan, 2014a). It was significant in 50 out of 70 classrooms across the three waves (as calculated with permutation tests; see also Kretschmer, Leszczensky, & Pink, 2018). It is important to note that the fact that Moran's  $I$  was not large or significant in all classrooms does fit in with what we expected to see in the data, because we mostly anticipated an autocorrelation in classrooms where achievement was reputationally salient, and not necessarily in classrooms where achievement was unrelated to status.

Both friendship selection related to similarity in achievement and influence processes varied significantly across classrooms (selection:  $p < .001$ ; influence:  $p = .049$ ). We included the four types of status norms (popularity, unpopularity, acceptance, and rejection norms) as moderators to explain this between-classroom variance in friendship selection and influence processes related to achievement.

**The role of status norms in the strength of friendship selection.** The unpopularity and popularity norm played a significant role in the extent to which friendship selection based on similarity in GPA took place (i.e., the strength of selection;  $B = 1.56$ ,  $SE = .68$ ,  $p = .021$  for unpopularity norm and  $B = 1.30$ ,  $SE = .66$ ,  $p = .049$  for the popularity norm; see Table 5.4). In contrast, the other two types of status norms (i.e., the acceptance norm and the rejection norm) did not play a role in the strength of friendship selection processes.

Table 5.4  
*RSIENA Meta-analyses of Network and Behavior Dynamics for Academic Achievement with Four Types of Status Norms as Moderators*

	Estimates			Effect of four types of status norms on variations between classrooms in estimates			
	<i>B</i> ( <i>SE</i> )	<i>OR</i>	<i>CI</i>	Popularity	Unpopularity	Acceptance	Rejection
				norm	norm	norm	norm
<i>Network</i>				<i>B</i> ( <i>SE</i> )	<i>B</i> ( <i>SE</i> )	<i>B</i> ( <i>SE</i> )	<i>B</i> ( <i>SE</i> )
Tendency to make friends	-2.67(0.12)***	0.07	[-2.90, -2.45]	-0.19(0.70)	-0.40(0.71)	-0.51(0.53)	0.05(0.72)
Reciprocated friendships	1.91(0.08)***	6.75	[ 1.76, 2.07]	-0.51(0.42)	0.04(0.44)	0.01(0.35)	-0.72(0.43) <sup>†</sup>
Transitive group formation	0.48(0.02)***	1.62	[ 0.43, 0.53]	-0.07(0.13)	-0.06(0.14)	0.00(0.11)	0.00(0.13)
Transitive reciprocated groups	-0.18(0.03)***	0.84	[-0.23, 0.13]	-0.04(0.16)	-0.09(0.16)	-0.10(0.13)	0.10(0.15)
Cyclical group formation	-0.07(0.02)**	0.93	[-0.12, -0.02]	-0.04(0.15)	0.08(0.15)	-0.04(0.12)	-0.14(0.15)
Outdegree friendship	-0.17(0.01)***	0.84	[-0.20, -0.15]	0.06(0.06)	0.01(0.06)	0.05(0.05)	0.09(0.07)
Outdegree activity	0.03(0.00)***	1.03	[ 0.02, 0.04]	-0.01(0.03)	0.02(0.03)	0.02(0.02)	0.00(0.03)
Isolates	0.69(0.07)***	1.99	[ 0.54, 0.83]	-0.37(0.44)	-0.23(0.45)	0.27(0.34)	0.25(0.45)
<i>Selection Processes</i>							
Same gender selection	0.55(0.05)***	1.72	[ 0.44, 0.65]	0.65(0.28)*	0.38(0.29)	0.12(0.22)	0.25(0.27)
Effect of achievement on friendship nominations received	-0.01(0.01)	0.99	[-0.04, 0.02]	-0.06(0.09)	-0.03(0.09)	0.08(0.06)	0.02(0.08)
Effect of achievement on friendship nominations given	-0.04(0.02)	0.96	[-0.06, 0.00]	-0.05(0.11)	-0.04(0.12)	-0.01(0.08)	0.04(0.10)
Similarity-based selection of friends in achievement	0.37(0.12)**	1.45	[ 0.15, 0.60]	1.30(0.66)*	1.56(0.68)*	0.71(0.48)	-0.79(0.56)
<i>Influence Processes</i>							
Linear shape	0.01(0.02)	1.02	[-0.03, 0.06]	0.15(0.14)	0.14(0.13)	-0.06(0.11)	0.01(0.12)
Quadratic shape	-0.02(0.02)		[-0.05, 0.02]	0.06(0.10)	0.07(0.09)	0.00(0.07)	-0.02(0.08)
Effect of gender (1=boy) on achievement	0.00(0.04)	1.00	[-0.08, 0.08]	0.15(0.26)	0.02(0.24)	-0.27(0.21)	0.04(0.22)
Influence on achievement	1.09(0.44)*	1.20	[ 0.23, 1.95]	1.88(2.51)	1.05(2.36)	-1.47(2.17)	-2.10(2.31)

*Note.* *N*classes = 70; *N*students = 1549. Due to convergence issues we had to fix the rate effect for numerical stability at an empirically defined value of 2.5, and we had to fix the gender ego and gender alter effect in all analyses. In about five classrooms, it was not possible to identify some parameters due to standard errors that were too high; these classes were therefore excluded from the meta-analysis. This did not affect the interpretability of the results. *b* = the unstandardized multi-nominal logit coefficient. *OR* = Odds Ratio. *CI* = Confidence Interval. <sup>†</sup>  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

Table 5.5

*Ego-alter Selection Table for Academic Achievement in Classrooms with High Unpopularity Norms (N = 7) and High Popularity Norms (N = 6)*

Students' achievement	Peers' achievement						
High unpopularity norm classrooms	1	2	3	4	5	6	7
1	0.36	0.24	0.12	0.00	-0.13	-0.25	-0.37
2	0.24	0.26	0.13	0.01	-0.11	-0.23	-0.36
3	0.11	0.13	0.15	0.03	-0.10	-0.22	-0.34
4	-0.02	0.00	0.02	0.04	-0.08	-0.20	-0.33
5	-0.15	-0.13	-0.11	-0.09	-0.06	-0.19	-0.31
6	-0.28	-0.26	-0.24	-0.21	-0.20	-0.17	-0.30
7	-0.41	-0.39	-0.37	-0.37	-0.32	-0.30	-0.28
High popularity norm classrooms	1	2	3	4	5	6	7
1	0.02	0.00	-0.01	-0.03	-0.04	-0.05	-0.07
2	-0.04	0.04	0.02	0.01	-0.01	-0.02	-0.04
3	-0.10	-0.02	0.06	0.04	0.03	-0.01	0.00
4	-0.17	-0.08	0.00	0.08	0.06	0.05	0.03
5	-0.23	-0.15	-0.07	0.01	0.10	0.08	0.06
6	-0.29	-0.21	-0.13	-0.05	0.03	0.11	0.10
7	-0.35	-0.27	-0.19	-0.11	-0.03	0.05	0.13

*Note.* Numbers in the table reflect the strength of attraction for students to become friends with certain peers based on their levels of academic achievement (columns dependent on rows). The values in the cells in these tables can be transformed to odds by taking the exponential function ( $\exp(\beta)$ ). Numbers 1 – 7 reflect to different GPA categories: 1 = GPA  $\leq$  5.49; 2 = 5.50  $\leq$  GPA  $\leq$  5.99; 3 = 6.00  $\leq$  GPA  $\leq$  6.49; 4 = 6.50  $\leq$  GPA  $\leq$  6.99; 5 = 7.00  $\leq$  GPA  $\leq$  7.49; 6 = 7.50  $\leq$  GPA  $\leq$  7.99; 7 = GPA  $\geq$  8.00.  $N = 6$  for high popularity norm classrooms as one classroom did not converge properly.

**The role of status norms in the direction of friendship selection.** To examine our hypotheses on the direction of friendship selection, we calculated ego-alter tables for those classrooms where achievement was negatively salient (high unpopularity norms) and for those classrooms where achievement was positively salient (high popularity norms). Values in ego-alter tables can be transformed to odds by taking the exponential function. In *high unpopularity* norm classrooms (i.e., classrooms with a high correlation between academic achievement and unpopularity; see Table 5.5, upper part), low-achieving students selected each other based on similarity, whereas high-achieving adolescents were likely to avoid each other as friends. This is indicated by the decrease in strength of effects across the diagonal, running from .36 to -.28. This difference in log odds was significant [ $z = 1.97, p = .049$ ].

In classrooms with *high popularity* norms (Table 5.5, lower part), the ego-alter table indicates that high-achieving adolescents were somewhat more likely to select friends based on similarity in achievement than were low-achieving adolescents, evidenced by the slight increase of effects across the diagonal (.02 to .13). However, this increase was not significant ( $z = 0.84, p = .40$ ).

Next, both in high popularity norm classrooms and in high unpopularity norm classrooms, off-diagonal numbers of ego-alter tables indicate that the tendency of low-achieving adolescents to avoid high-achieving peers as friends was not significantly stronger than vice versa (-.41 versus -.37;  $z = 0.40, p = .69$  and -.35 versus -.07;  $z = 0.80, p = .42$ ).

Although we did not formulate specific hypotheses about the direction of selection effects in low (un)popularity classrooms, we illustrate patterns of selection processes in these classrooms by means of ego-alter tables, see Appendix (5A). There were no significant differences in the direction of selection processes within these classrooms ( $z$ -scores are available upon request).

**The role of status norms in the strength and direction of friendship influence.** In contrast to our hypotheses, status norms did *not* play a role in the extent to which friends became similar to each other in achievement over time (i.e., influence processes). Due to nonsignificant influence effects in high and low status norm classrooms, it was not useful to gain insights in the direction of influence processes (higher vs. lower achievement) by means of ego-alter influence tables.

**Supplemental analyses.** We performed supplemental analyses (available upon request) to investigate whether there were gender differences in (the role of status norms in) friendship processes, but this was not the case. Also, educational level was initially included as control variable, but it did not affect friendship processes. Lastly, we included the average classroom-level GPA (descriptive norm) as predictor, but this did not affect friendship processes either. Therefore, we presented the most parsimonious model without educational level.

## 5.6 Discussion

We tested the reputational salience hypothesis (Hartup, 1996) in a context-specific way, by examining whether the classroom-level relationship between academic achievement and four types of peer status (i.e., popularity, unpopularity, acceptance, and rejection), so called status norms, could explain differences between classrooms in friendship selection and influence processes regarding academic achievement. In general, adolescents chose their friends based on similar levels of achievement and were influenced by their friends in academic achievement. Of importance, unpopularity and popularity norms within the classroom explained differences in strength and direction of friendship selection processes (but not of influence processes) for academic achievement, whereas acceptance and rejection norms did not. More specifically, in classrooms where popular peers were high on academic achievement, both high- and low-achieving adolescents were most likely to select each other based on similarity in achievement. At the same time, in classrooms where unpopular peers were high on academic achievement, low-achieving adolescents selected friends based on similarity in achievement and high-achieving adolescents avoided similarly-achieving peers as friends. Consequently, both popularity norms and unpopularity norms appear to strengthen a friendship selection bias within the classroom, in that similar (e.g., low-achieving) peers mainly affiliate with each other. This may have important consequences for adolescents' academic development. For instance, it may limit opportunities for low-achieving adolescents to learn from their higher achieving peers; or vice versa, because adolescents may also learn from peer tutoring experiences that are most likely to occur when high-achievers explaining academic topics to low-achievers (Gest et al., 2008). Because we found that friendship influence processes occur in every classroom, this friendship selection bias may result in a process where similarly low-achieving friends

influence each other toward even lower levels of achievement, particularly in high unpopularity norm classrooms. This may negatively impact their academic development over time.

### **5.6.1 The role of academic status norms in friendship selection processes**

The finding that unpopularity norms and popularity norms strengthened friendship selection processes based on similarity in achievement was in line with our hypotheses. Hence, adolescents' preference for similarly achieving friends was strongest in classrooms where achievement was a salient and important characteristic due to its associations with popularity or unpopularity (reputational salience hypothesis; Hartup, 1996).

Remarkably, unpopularity norms played a role in the direction of friendship processes, whereas popularity norms did not. That is, in classrooms with *high unpopularity norms*, low-achieving adolescents selected friends based on similarity, but high-achieving adolescents did not; whereas in classrooms with high popularity norms, similarity-based friendship selection processes were equally strong among low-achieving and high-achieving adolescents. This latter finding was somewhat in contrast to our hypothesis; we expected that similarity-based selection would mainly take place among high-achieving students. A potential explanation for this finding is that in high popularity norm classrooms, high-achieving students chose each other based on preferential attraction, whereas low-achieving students were 'stuck with what they could get' (i.e., default selection, as found in a study on aggression; Sijtsema, Lindenberg, & Veenstra, 2010a). Importantly, this "default selection" did not occur among high-achievers in classrooms with high unpopularity norms. Instead, high-achieving peers were avoided as potential friendship partners, even by other high-achieving peers. This may indicate that adolescents' tendency to avoid unpopularity is stronger than the desire to obtain popularity (Brechwald & Prinstein, 2011; Hopmeyer Gorman et al., 2011). Maybe the consequences of selecting each other based on similarity in low achievement are less severe in high popularity norm classrooms (missing an opportunity to become more popular) than are the consequences of selecting each other based on similarity in high achievement in high unpopularity norm classrooms (risking unpopularity; Hopmeyer Gorman et al., 2011).

Whereas popularity norms and unpopularity norms played a role in similarity-based friendship processes, both types of status norms seemed to be not powerful enough to encourage bonds among friends who are *dissimilar* in achievement. We found that, irrespective of the (un)popularity norm, high-achieving students avoided low-achieving peers as friends and low-achieving students avoided high-achieving peers as friends. This was in contrast to our hypothesis, because we expected that adolescents would prefer friends who show reputationally salient characteristics (Lindenberg, 2001), for instance to avoid low peer status (Brechwald & Prinstein, 2011) or to bask in reflected glory (Dijkstra et al., 2010). One explanation for this finding is that it may be more important for adolescents to be to a certain extent similar to their friends than to achieve a higher peer status by selecting highly dissimilar peers as friends (i.e., to bask in reflected glory; Dijkstra et al., 2010). That is, high-achieving and low-achieving students often differ largely in the values, aspirations, academic behaviors, and principles that they endorse (Ryan, 2001). Therefore, they may be less attracted to each other as a friend (similarity attraction hypothesis; Byrne, 1971), irrespective of the status norm in the classroom.

Next, acceptance and rejection norms did not play a role in the strength and direction of friendship in selection processes in classrooms. This finding might be explained as follows: Even though the original concept of status norms focused on peer acceptance and rejection (Henry et al., 2000), reputation-based constructs such as popularity and unpopularity might be a stronger social reward or social sanction to adolescents. Previous studies have indicated that adolescents prioritize popularity over other social and relational domains (LaFontana & Cillessen, 2010), and that they might especially fear unpopularity as a social sanction because this increases their risk of social exclusion and victimization (Brechwald & Prinstein, 2011; Hopmeyer Gorman et al., 2011). Also, the norm of (un)popular peers might be more evident and clearer within the classroom. That is, conceptually, popularity and unpopularity are reputation-based constructs, reflecting a certain consensus on which youth achieved power, visibility and prestige within the peer group. In contrast, acceptance and rejection are preference-based constructs reflecting students' personal appraisals of their interactions with individual peers (Adler & Adler, 1998; Cillessen & Marks, 2011). Therefore, these preference-based constructs may be more variable on the group

level (Hopmeyer Gorman et al., 2011), and present a less clear norm within the classroom that may be less informative for friendship processes.

### **5.6.2 The role of academic status norms in friendship influence processes**

In contrast to our expectations, none of the status norms played a role in the strength and direction of friendship *influence* processes regarding academic achievement. In other words, we found that friends influenced each other over time in academic achievement, irrespective of the extent to which achievement was related to social sanctions or social rewards. Whereas previous studies have found that popularity norms strengthened friendship processes around aggression (Laniga-Wijnen et al., 2017) and risk attitudes (Rambaran et al., 2013), we found that this role of popularity norms (or any other type of status norms) could not be generalized to academic achievement. This may indicate that there is a potential limit to the power of high-status peers: their norms may affect friendship influence related to deviant social behaviors or attitudes, but not friendship influence related to academic achievement. There are several possible explanations for this finding.

First, academic achievement is not a social behavior that is directed to others, but rather an individual behavior that serves individual goals and aspirations (Ryan & Deci, 2000). Therefore, academic achievement may be a less visible characteristic, and a less strong strategy to gain a higher status in the peer group. Second, *parents* may exert more influence on their child's academic achievement than on their children's social behaviors in the classroom, which may be at the cost of the role of (high-status or low-status) peers in achievement (Im, Hughes, & West, 2016). For instance, parents can be highly involved with their children's academic development by monitoring school activities, helping them with their homework or by encouraging them to take extra classes. This may affect adolescents' achievement over time, irrespective of what kind of classroom these children are in (Marion, Laursen, Kiuru, Nurmi, & Salmela-Aro, 2014). Future studies are encouraged to further examine potential buffering effects of parents on the role of peers in academic achievement. Third, because adolescents *did* become similar to their friends over time, friends can also be seen as important socializers of adolescents' academic achievement, irrespective of the status norm in the classroom. Previous studies indicated that adolescents often fulfill their academic tasks in the presence of their friends (Rizzuto, LeDoux, & Hatala, 2009).

For instance, adolescents may be especially inclined to do homework, exchange information, and collaborate on assignments with their friends. Also, friendship influence on achievement might (partly) occur outside the classroom context, for instance at home (Geven, Weesie, & Van Tubergen, 2013). These quite intensively shared experiences among friends, partly outside the classroom context, may result in more similarity between friends in achievement over time, irrespective of status norms within the classroom.

Fourth, status norms related to objective achievement may not be the strongest indicator of the importance of achievement in the broader peer context, because it may go together with diverging motivational processes or academic endeavors that may have distinct implications for friendship processes. For instance, adolescents may strive for high achievement to develop competence (i.e., mastery goal) or to outperform others (i.e., performance goal; Poortvliet & Darnon, 2010). A previous study indicated that when mastery goals were associated with popularity, there were strong friendship influence processes related to peer-perceived achievement, whereas this was not the case when performance goals were associated with popularity (Laninga-Wijnen et al., 2018b). Hence, it might be that the underlying motive for *why* high-status students obtain high grades is more important for friendship processes than is the obtained grade itself.

### **5.6.3 Strengths, limitations and future directions**

Our study has several strengths. First, our study is strongly theoretically driven by the reputational salience hypothesis (Hartup, 1996) and we are the first to test the importance of status norms regarding friendship processes in academic achievement. Our study indicates that academic achievement is made salient within the classroom by virtue of its associations with social status, but only regarding selection processes and not influence processes. Besides the fact that our findings on selection processes are generally in line with the reputational salience hypothesis, these might also add new information. The original reputational salience hypothesis (Hartup, 1996) is mainly about the *general* reputational salience of a certain attribute and does not go into potential contextual variations in this reputational salience. However, our study indicates that the salience of an attribute might vary across different settings (e.g., classrooms) and, in turn, can explain differences in friendship processes between

these classrooms. Hence, these found variations in attributes' reputational salience across different peer contexts (such as the classroom) may present an important addition to the reputational salience hypothesis as formulated by Hartup (1996).

Second, we used a broader concept of status norms compared to that in previous studies by examining not only the association between achievement and social rewards, that is, popularity and peer acceptance, but also its relation with social sanctions, that is, unpopularity and peer rejection. Because we found an effect for both the popularity and the unpopularity norm on friendship selection processes, this seems a fruitful way for future studies to examine status norms. Apparently, approaching status norms by examining only the social rewards may result in overlooking another potentially more important process that might occur as well: avoiding social sanctions (Brechwald & Prinstein, 2011).

Third, we used actual grades of students (instead of, for instance, academic reputation among peers; Gest et al., 2008), which can be seen as a strong point for several reasons. Most previous social network studies have used objective achievement as an attribute, and our aim was to extend upon those studies by examining whether status norms may explain why these previous studies found some inconsistencies. Moreover, particularly for friendship influence processes it is important to examine whether friends may influence each other's actual grade and not the perception of someone's academic functioning. That is, when adolescents hang out with high-achieving peers, it might be that other peers perceive those adolescents as also academically competent, even when this is not the case. Instead, actual academic achievement is a relatively objective measure of students' academic functioning because grades are provided by different teachers, on different courses (multiple informants). Moreover, actual grades determine whether a student passes a class, and they influence further educational and occupational opportunities (Crosnoe & Benner, 2015).

However, our study should also be viewed in light of its limitations. First, we included evaluation effects for selection processes, which encompass both the selection (creation) and maintenance (endowment) of friendships based on similarity (or dissolution based on dissimilarity; Ripley et al., 2018), due to convergence issues. Because previous studies have indicated that maintenance related to achievement occurs as well (Laniga-Wijnen et al., 2018b; Rambaran et al., 2017), and that norms may play a distinct role in friendship selection and

friendship maintenance (Laninga-Wijnen et al., 2017), we encourage future studies to try to disentangle these two processes.

Second, we only examined friendship selection and influence processes related to a general average grade on six *academic* subjects. It might also be interesting to examine subject-specific status norms and friendship processes related to a particular subject. However, all six subjects were negatively linked with popularity and rejection, and positively or neutrally linked with peer acceptance and unpopularity. Therefore, all school subjects contributed equally to our construct of academic status norms and therefore may play a similar role in friendship selection and influence processes.

Third, as explained in the introduction, we assessed “perceived friendship” rather than friendship in the current study. However, we did control for reciprocity, and by asking adolescents about their “best friends” we hoped to capture a certain quality of a friendship. Moreover, a previous study indicated that reciprocal best friendships and asymmetric best friendships did not differ regarding perceived friendship quality (Bowker, 2004). Nevertheless, future studies may profit from taking into account the quality of friendships in explaining the mechanisms by which adolescents become similar to their friends in achievement, for instance by examining ordered networks (Elmer, Boda, & Stadtfeld, 2017).

#### **5.6.4 Implications**

Our study provides insight on the importance of (un)popularity norms for the strength and direction of friendship selection processes. Future studies are encouraged to pay attention to potential implications of these findings. For instance, future studies may examine how the friendship selection bias that is triggered by high popularity and unpopularity norms may influence the (academic) development of both low- and high-achieving students. For instance, when low-achieving adolescents mainly select similarly low-achieving students as friends, this may dampen their academic development over time. Future studies are encouraged to examine not only whether this is the case, but also whether such a situation can be prevented by investigating which factors may contribute to the emergence and development of academic (un)popularity norms. This would help in understanding why in certain classrooms academic achievement is a valuable characteristic (due to its associations with high status), whereas in other classrooms it is not. Also, it may be an exciting avenue for future studies to

investigate which factors (e.g., parents, teachers) may buffer the role of high unpopularity norms. These promising avenues for future studies may provide insights on which factors may predict the value that adolescents attach to their achievement, which may promote their educational and work-related success in later life.

## Appendix (5A)

Table S5.1

*Ego-alter Selection Table for Academic Achievement in Classes with Low Popularity and Unpopularity Norms*

Students' achievement	Peers' achievement						
	1	2	3	4	5	6	7
Low unpopularity norm classrooms							
1	0.08	0.05	0.01	-0.03	-0.06	-0.10	-0.13
2	0.03	0.07	0.04	0.00	-0.03	-0.07	-0.11
3	-0.02	0.02	0.07	0.03	-0.01	-0.04	-0.08
4	-0.08	-0.03	0.01	0.06	0.02	0.01	-0.05
5	-0.13	-0.09	-0.04	0.01	0.05	0.02	-0.02
6	-0.18	-0.14	-0.09	-0.05	0.00	0.04	0.01
7	-0.24	-0.19	-0.15	-0.11	-0.05	-0.01	0.04
Low popularity norm classrooms							
1	0.11	0.05	-0.01	-0.01	-0.12	-0.18	-0.24
2	0.08	0.09	0.03	-0.03	-0.09	-0.14	-0.20
3	0.04	0.06	0.07	0.01	-0.05	-0.10	-0.16
4	0.01	0.02	0.04	0.05	-0.01	-0.07	-0.12
5	-0.02	-0.01	0.00	0.02	0.03	-0.03	-0.09
6	-0.05	-0.04	-0.03	-0.02	0.00	0.01	-0.05
7	-0.08	-0.07	-0.07	-0.05	-0.03	-0.02	-0.01

*Note.* Numbers in the table reflect the strength of attraction for students to become friends with certain peers based on their levels of academic achievement (columns dependent on rows). The values in the cells in these tables can be transformed to odds by taking the exponential function ( $\exp(\beta)$ ). Numbers 1 – 7 reflect to different GPA categories: 1 = GPA  $\leq$  5.49; 2 = 5.50  $\leq$  GPA  $\leq$  5.99; 3 = 6.00  $\leq$  GPA  $\leq$  6.49; 4 = 6.50  $\leq$  GPA  $\leq$  6.99; 5 = 7.00  $\leq$  GPA  $\leq$  7.49; 6 = 7.50  $\leq$  GPA  $\leq$  7.99; 7 = GPA  $\geq$  8.00.



## Chapter

## 6

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The Moderating Role of Popular Peers' Achievement Goals in 5<sup>th</sup>-  
and 6<sup>th</sup>-Graders' Achievement-Related Friendships:  
A Social Network Analysis

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**This chapter is based on:**

Lanina-Wijnen, L., Ryan, A. M., Harakeh, Z., Shin, H. & Vollebergh, W. A. M. (2018). The moderating role of popular peers' achievement goals in 5<sup>th</sup> and 6<sup>th</sup> graders' achievement-related friendships: A social network analysis. *Journal of Educational Psychology, 110*, 289-307.

**Author Contributions:**

L.L.-W. conceived of this study, conducted and interpreted statistical analyses and drafted the manuscript; A.M.R. helped drafting the manuscript and designed the CUTRAN project. Z. H. and W. V. helped drafting the manuscript. H. Shin collected data for the CUTRAN project and helped drafting the manuscript.

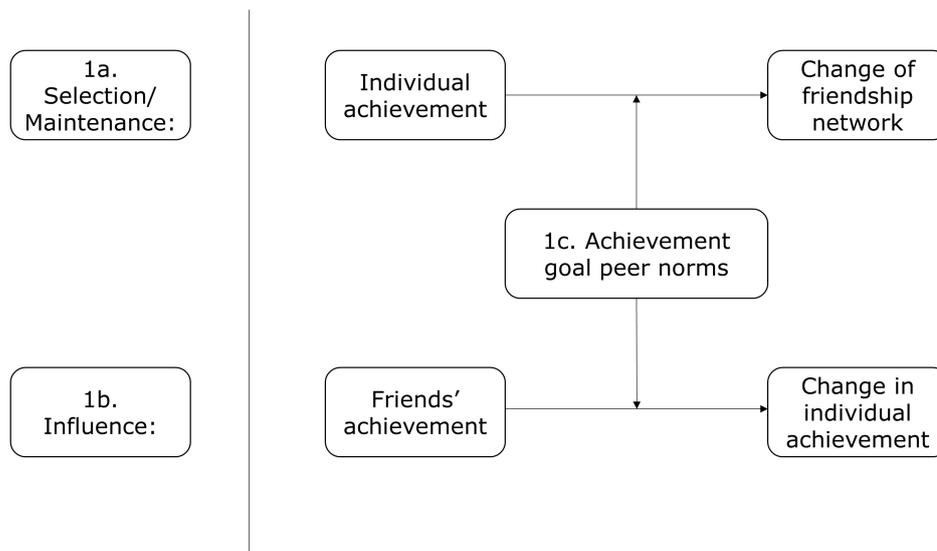
This research investigated whether classroom-based peer norms for achievement goals moderate friendship selection, maintenance, and influence processes related to academic achievement in 46 Grade 5 and Grade 6 classrooms ( $N = 901$ , 58.7% Grade 5 students, 48.5% boys). A distinction was made between peer norms for mastery (i.e., developing competence) and performance (i.e., demonstrating competence) goals. Peer norms were measured in terms of popularity norms (the within-classroom correlation between student achievement goals and popularity) and descriptive norms (the class-level aggregated average achievement goals). As hypothesized, longitudinal social network analyses revealed that achievement goal popularity norms played a role in friendship processes, rather than achievement goal descriptive norms. Specifically, adolescents formed friendships with similarly achieving peers in classrooms with high performance goal popularity norms but not in classrooms with low performance goal popularity norms. Conversely, adolescents remained friends with similarly achieving peers in classrooms with low performance goal popularity norms but not in classrooms with high performance goal popularity norms. Furthermore, friendship influence on achievement took place in classrooms with high mastery goal popularity norms, but not in classrooms with low mastery goal popularity norms. This study indicates that friendship processes regarding achievement depend upon the extent to which certain achievement goals are made salient by virtue of their association with popularity in classrooms.

## 6.1 Introduction

Academic achievement in adolescence is a crucial predictor of future educational and occupational success (Crosnoe & Benner, 2015). For better or worse, peers may provide an important developmental context for adolescent academic achievement (Rodkin & Ryan, 2012). Academic achievement may shape peer relationships through processes in which adolescents select or maintain similarly achieving others as friends; relationships, in turn, may shape individual academic achievement, through friendship socialization (i.e., influence) processes. These processes result in similarity in academic achievement among friends. However, friendship selection, maintenance and influence processes do not operate in isolation, but take place in broader peer contexts, such as classrooms

and schools (Veenstra & Dijkstra, 2011), which may play a role in the direction and magnitude of these friendship dynamics. One way of characterizing the broader social context in the classroom is by using the concept of *peer norms* (Dijkstra & Gest, 2015). As peer norms reflect the expected and accepted behaviors and attitudes of a social group (Shaw, 1981), they may play a role in determining whether academic achievement is a salient attribute for friendship selection, maintenance and influence processes. Therefore, the current study examined the role of peer norms in friendship processes (i.e., selection, maintenance and influence) related to adolescents' academic achievement (see Figure 6.1 for a conceptual model).

In the current article, we focus on *peer-perceived achievement* (or *academic reputation*; Gest, Rulison, Davidson, & Welsh, 2008) as index of academic achievement, as this has both practical and theoretical value for the current study. First, peer-perceived achievement has been shown to be a valid indicator of adolescent academic competence that is highly correlated with Grade Point Average (GPA; correlations varying from .60 to .70; Gest et al., 2008), but that also captures unique information on how well adolescents are doing at school. Peers can be seen as expert observers and have a unique perspective on classmates' academic functioning, because their proximity to and direct interaction with classmates permit unique observations about the speed and ease (or difficulty) with which classmates finish assignments, expend effort on tasks, and give or receive help. These insights may not always be captured by tests, GPA, or teacher ratings (Gest et al., 2008). Second, having a positive academic reputation (i.e., high peer-perceived achievement) may be associated with having academic successes recognized and remembered by peers, being approached more often for academic help (which is fruitful for one's own academic development as well), and affiliating with other classmates perceived as high-achieving (Greenwood, 1991), which in turn may have implications for friendship selection, maintenance, and influence processes.



*Figure 6.1.* Conceptual model on the role of achievement goal peer norms in friendship selection, maintenance, and influence on achievement.

### **6.1.1 Friendship selection, maintenance, and influence processes related to achievement (Figure 6.1a and 6.1b)**

Theoretically, selection and maintenance of friends on the basis of similarity in achievement can be explained with the similarity-attraction hypothesis (Byrne & Nelson, 1965), which states that adolescents prefer interacting with partners who maintain similar attitudes and values, as this enhances perceived trust and predictability in social interactions (Byrne & Lamberth, 1971). Friends may not only be similar in achievement due to selection or maintenance processes, but also due to socialization (i.e., influence) processes. Friends are assumed to socialize adolescents' achievement through information exchange, modeling, reinforcement of peer norms and values (Kindermann & Gest, 2009; Ryan, 2000), and peer tutoring experiences (Gest et al., 2008).

Innovative methodological advances in social network analysis allow researchers to disentangle the dynamic, reciprocal interplay of friendship selection, maintenance, and influence processes in a methodologically sound way, yielding reliable and accurate indications of the strength and direction of these processes (using stochastic actor-based models; Steglich, Snijders, & Pearson, 2010). A few previous studies have applied these statistical techniques to investigate the extent to which friendship selection and influence processes related

to achievement take place, but their findings on the presence and direction of friendship processes vary considerably across and within studies; and only one study addressed friendship maintenance processes.

With regard to the *presence* of friendship processes, one study on high-school students (Grades 9 and 10) found that influence, maintenance, and (especially) selection processes contributed to similarity in achievement among friends (Rambaran et al., 2016), whereas another study on elementary students (Grade 6) found influence but not selection processes contributed to similarity in achievement among friends (Shin & Ryan, 2014a). Furthermore, in one other previous study, the extent to which selection and influence were present varied across contexts within the study. This study of Flashman (2012) on high-school-students' academic achievement in eight schools (Grades 7 through 12) indicated that both selection and influence explained similarity in GPA among high school friends at the two largest schools analyzed, but not at the six small, private and rural schools analyzed.

With regard to the *direction* of friendship processes, one study indicated that friendship selection and maintenance mainly occurred among similarly low-achieving peers (Rambaran et al., 2016), whereas the direction of friendship selection varied between schools in the study of Flashman (2012). That is, in one large, public school, high-achieving students mostly formed relations with other high-achieving students, whereas in the other large, public school, similarity-based selection took place equally among low-achieving students and high-achieving students. Only one study examined the direction of friendship influence on achievement, indicating that friends influenced one another to increase rather than decrease in achievement over time (Rambaran et al., 2016). On the basis of these studies, it can be concluded that maintenance processes have been under-investigated, and, more importantly, that the magnitude and the direction of friendship selection and influence processes varied across studies and even across different settings within the same study (i.e., larger schools compared with smaller schools; Flashman, 2012). So far, studies have only reported this variation between settings; an explanation of why selection and influence processes vary across different settings is lacking.

In the current study, we propose that one reason why friendship processes related to achievement may vary across settings is that different settings represent different peer contexts, which in turn have diverging implications for

friendship processes (Kiuru et al., 2012). One way of measuring the peer context is by using the concept of peer norms, which has received attention in several recent studies due to its linkages with adolescent behavior and peer relations (Dijkstra & Gest, 2015; Laninga-Wijnen et al., 2017; McCormick & Cappella, 2015; Rambaran, Dijkstra, & Stark, 2013). Peer norms represent the expected and appropriate behaviors and attitudes in a particular setting and, therefore, may determine the valence of certain behaviors for friendship selection, maintenance and influence processes (McCormick & Cappella, 2015). That is, according to social misfit theory (Wright, Giammarino, & Parad, 1986), adolescents have a tendency to conform to the peer norm in order to fit in with the expectations of the peer group and to gain acceptance and avoid rejection by their peers. When adolescents are liked in a particular setting, peers may perceive them as attractive friendship partners and, hence, these adolescents have a greater chance of being selected and maintained as friends. Furthermore, based on social identity theory (Tajfel & Turner, 1986), it could be reasoned that adolescents may be especially susceptible for friendship influence related to behaviors that are in line with the peer norm, as this yields a shared identity that provides emotional and social support, behavioral confirmation and a sense of self. Therefore, peer norms in the classroom may foster friendship selection, maintenance and influence processes, for instance related to achievement (Veenstra & Dijkstra, 2011).

Indeed, two previous studies indicated that peer norms played an important role in determining the direction and magnitude of friendship influence and selection processes related to peer-perceived aggression (Laninga-Wijnen et al., 2017) and risk attitudes (Rambaran et al., 2013). In the current study we will extend this work by examining whether classroom-based peer norms for achievement goals also play a role in friendship processes related to achievement. As detailed next, we consider achievement goal peer norms given extensive theory and research about the importance of achievement goals for academic beliefs and behaviors as well as for interpersonal relations in the classroom (Linnenbrink-Garcia & Patall, 2016; Poortvliet & Darnon, 2010; Wigfield et al., 2016).

### **6.1.2 Achievement goal popularity norms and friendship processes (Figure 6.1c)**

In achievement settings, two contrasting goals are often evident: mastery and performance goals (Ames, 1992; Dweck, 1986; Elliot, 2005). When mastery

goals are salient in the classroom, there is a focus on developing academic competence or task mastery, whereas when performance goals are salient, there is a focus on demonstrating academic competence relative to other students, through superior performance or looking smart (Pintrich, 2000). An extensive body of research has shown that the salience of these achievement goals (due to manipulation in experiments or natural variation in classrooms) affects academic motivation and behavior (Anderman & Wolters, 2006; Linnenbrink-Garcia & Patall, 2016; Wigfield et al., 2016). Relevant to the present study, achievement goals have been found to influence social interactions with peers on academic tasks (Darnon, Dompnier, & Poortvliet, 2012; Levy-Tossman, Kaplan, & Assor, 2007; Levy-Tossman, Kaplan, & Patrick, 2004; Poortvliet & Darnon, 2010).

In the achievement goal literature, theory and research have tended to focus on how teachers make achievement goals salient in the classroom (Ames, 1992; Patrick, Mantzicopoulos, & Sears, 2012). However, teachers and peers both contribute to the classroom context (Pianta & Hamre, 2009). In the current study, we focus on how peers can make particular achievement goals salient within the classroom, as during early adolescence, students may become more likely to model behaviors after their peers and might be less likely to model parent- or teacher behaviors (Cairns, Cairns, Xie, Leung, & Hearne, 1998; Galván, Spatzier, & Juvonen, 2011; Sumter, Bokhorst, Steinberg, & Westenberg, 2009).

Ushered in with the pubertal and social changes of early adolescence, youth show increased susceptibility to peer influence (Steinberg, 2007). Peers can set a norm for adolescents' academic behaviors and attitudes in the classroom (McCormick & Cappella, 2015). Yet, it is unlikely that all peers are equally influential, and during early adolescence especially popular peers may set a norm within the classroom (Rambaran et al., 2013), as there is a peak in the desire for popularity among peers during this age period (LaFontana & Cillessen, 2010). As a result, adolescents may be highly attuned to the behaviors and attitudes of popular peers, as these behaviors and attitudes are reputationally salient (reputational salience hypothesis; Hartup, 1996). This implies that these behaviors and attitudes are positively valued within a setting and an important tool for improving an adolescent's own reputation (i.e., popularity).

Popular students can make the achievement goals they endorse salient (i.e., set a norm) within the classroom via task-related messages that refer to mastery or performance goals, or via academic behaviors and endeavors (Urdu

& Schoenfelder, 2006). More specifically, students are likely to voice various reasons for and reactions to their work that may refer to mastery goals or performance goals, respectively. For instance, when working on some math problems, some students might especially try to hurry and be the first to finish (performance goal), whereas others might focus on learning the material, solving problems themselves, and not compare themselves to others (mastery goals). All of these goals could go together with visible behaviors and explicit comments (e.g., “Yeah, I am first compared with all of you!” or “Yeah, I solved this problem myself!”; see Shin & Ryan, 2014b). Indeed, numerous studies and experiments have indicated that achievement goals are outwardly exhibited and can be recognized by specific behaviors and messages referring to these goals (see for instance Darnon et al., 2012, and Poortvliet & Darnon, 2010, for an overview). In this way, students may notice the goals of popular peers, and these goals may pose an important norm to adolescents.

One approach to capture the norms of popular adolescents (i.e., the popularity norm; Laninga-Wijnen et al., 2017) is by examining the within-classroom correlation between popularity and behaviors or attitudes (also referred to as *norm salience*; Henry et al., 2000; Rambaran et al., 2013). These achievement goal popularity norms, in turn, may have important implications for the coevolution of interpersonal relations and achievement within the classroom, which we describe in the following text.

### **6.1.3 Friendship selection and maintenance related to achievement**

Performance goal peer norms and mastery goal peer norms can be linked with friendship selection and maintenance processes related to achievement based on social comparison theory (Festinger, 1954). In classrooms where performance goals are salient, interpersonal standards are used to define relative competence. As a result, adolescents tend to use social comparison to ensure that they did better (or not worse) than others in terms of their achievement (see Brophy, 2005, for a review). These social comparison processes may play a role in friendship selection and maintenance processes related to achievement in two ways. On the one hand, it could be hypothesized that when performance goals are salient in the classroom, students have a higher tendency to select and maintain similarly achieving peers as friends than when performance goals are less salient in the classroom. Differences in achievement to a friend can be threatening because of

the emphasis on social comparison and achievement as validating one's sense of self-worth (Elliot, Murayama, & Pekrun, 2011; Festinger, 1954). When the levels of achievement are similar, comparisons would be less threatening for self-worth. Therefore, it could be expected that when popularity norms make performance goals salient, similarity-based selection and maintenance related to achievement would take place, both among low-achieving students and among high-achieving students. On the other hand, it could be hypothesized that when performance goals are salient, students have a lower tendency to select and maintain similarly achieving peers as friends because they have self-enhancement motives. More specifically, to fulfill the need of maintaining a positive self-view (i.e., self-enhancement), adolescents may tend to select and maintain lower achieving peers as friends and use them as a proximal comparison standard (Régner, Escribe, & Dupeyrat, 2007) to boost their self-view with a favorable comparison.

In regards to mastery goal norms and friendship selection and maintenance, two alternate hypotheses can be formulated as well. When mastery goals are salient, the focus is on personal improvement and task mastery, and not on interpersonal differences in achievement (Poortvliet & Darnon, 2010). In such a situation, achievement differences (i.e., social comparison; Festinger, 1954) among students may be less important or valuable for friendship selection and maintenance processes. Therefore, it can be hypothesized that mastery goal peer norms may not be powerful enough to break down the general tendency of selecting and maintaining similar friends (similarity-attraction hypothesis, Byrne & Lamberth, 1971), which would result in similarity-based selection and maintenance of friends irrespective of whether popularity norms make mastery goals salient. On the other hand, it can be considered that classrooms with salient mastery goals *are* characterized by social comparison, as social comparison with others can also serve the goal of self-improvement (Collins, 1996, 2000). Social comparison can be a useful learning resource for gaining accurate information for self-evaluation and acquiring information about how to improve, which are compatible with the requirements of mastery goals (Butler, 1995; Collins, 1996, 2000; Lockwood & Kunda, 1997; Régner et al., 2007). In this way, achievement may be a valuable characteristic and important indicator of competence, and students may use social comparison (i.e., upward comparison) to seek out friends they can learn from (i.e., the high-achieving students). Therefore, it could also be hypothesized that when popularity norms make mastery goals salient, friendship

selection and maintenance takes place based on dissimilarity in achievement, with students selecting and maintaining higher achieving peers as friends.

#### **6.1.4 Friendship influence on achievement**

Achievement goal peer norms can be linked with friendship influence processes by social interdependence theory (Johnson & Johnson, 1989, 2005). Social interdependence exists when individual goal attainment is affected by others' actions (Johnson & Johnson, 1989, 2005). There are two types of interdependence: *Positive interdependence* refers to a situation in which there is a positive relation between goal attainments of individuals, whereas *negative interdependence* exists when individuals perceive that they can obtain their goals (only) if the other individuals with whom they are competitively linked fail to reach their goals (Deutsch, 1949, 1962; Johnson & Johnson, 1989, 2005). The extent to which a classroom is characterized by positive or negative interdependence has implications for social interactions around academic tasks (Deutsch, 1949, 1962; Roseth et al., 2008), and hence, for the magnitude and direction of friendship processes related to achievement.

In classrooms where performance goals are salient, individuals may experience negative interdependence with their classmates (also referred to as a *competitive goal structure*; Deutsch, 1949, 1962; Elliot et al., 2016), because they reach their goals when others do not reach their goals, as they aim at outperforming others (Poortvliet & Darnon, 2010). This negative interdependence may result in oppositional interaction patterns within the classroom, with individuals discouraging and obstructing each other's efforts to achieve their goals. In such a situation, individuals focus both on being productive and on preventing any other person from being more productive than themselves (Deutsch, 1949). In other words, individuals may develop an exploitation orientation toward information exchange, which reflects the incentive to profit from task-related efforts of exchange partners, paired with a reluctance to offer good or valuable information in return (Poortvliet, Janssen, Van Yperen, & Van de Vliert, 2007; Poortvliet & Darnon, 2010). Indeed, previous studies indicated that when performance goals are made salient within a setting, individuals have a reduced willingness to coordinate efforts with potential exchange partners, a reluctance to be dependent on the actions of others (for instance with regard to asking for help; Ryan, Gheen, & Midgley, 1998; Ryan & Shim, 2012), and a reduced readiness to

be influenced by exchange (see Poortvliet & Darnon, 2010). There may even be suspiciousness about exchanging information as performance goals have been linked to tactically deceiving peers in order to outperform them (Poortvliet, Anseel, Janssen, Van Yperen, & Van de Vliert, 2012). Therefore, on the basis of the social interdependence theory (Deutsch, 1949, 1962) it could be hypothesized that when popularity norms make performance goals salient, productive social interactions around academic tasks are less likely, which minimizes the opportunities for friends to influence each other and become similar over time.

When mastery goals are salient in a setting, students are more likely to perceive positive interdependence with fellow students (Elliot et al., 2016; Poortvliet & Darnon, 2010), as they see others as helpers in achieving their goals (Karabenick, 2003; Roussel, Elliot, & Feltman, 2011; Ryan & Shim, 2012). Positive interdependence (also referred to as a *cooperative goal structure*; Deutsch, 1949, 1962) is associated with promotive interaction, implying that individuals encourage and facilitate each other's efforts to complete tasks in order to reach the group's goals (Deutsch, 1949). Social exchanges can serve as an important means by which individuals can obtain their goal of self-improvement, which may enhance an adolescent's willingness to invest in relationship building with potential exchange partners. Indeed, previous research indicated that when mastery goals are salient, students have a higher tendency to reciprocally share valuable information, actively engage in adaptive help-seeking, have constructive discussions and collaborate on academic issues (Darnon et al., 2012; Karabenick, 2003; Ryan & Shim, 2012). Also, mastery goals have been linked to the provision of resources and effort to help team members who are apparently failing to perform well (Porter, 2005). We therefore hypothesized that in classrooms where popularity norms make mastery goals salient, the conditions and processes through which friends have the potential to influence each other are enhanced (Kindermann & Gest, 2009; Ryan, 2000), which results in more similarity among friends in achievement. More specifically, we expect that these promotive interaction patterns will result in positive friendship influence; that is, we expect that friends will influence adolescents to increase rather than to decrease in achievement over time.

### **6.1.5 Achievement goal descriptive norms and friendship processes (Figure 6.1c)**

Another approach to examine classroom peer norms and achievement goals is to use descriptive norms rather than popularity norms. Descriptive norms refer to the average behaviors or attitudes of all peers in a given setting, for instance a classroom (Wright et al., 1986). However, previous studies indicated that descriptive norms were not predictive of variations in friendship processes regarding peer-perceived aggression (Laninga-Wijnen et al., 2017) and risk attitudes (Rambaran et al., 2013). According to social impact theory, the strength of social forces (in this case: peer norms) is a function of the status of peers, closeness of peers, and number of peers present (Latané, 1981). Descriptive norms only represent the last, quite subtle aspect of this function and hence may not be strong enough to determine social impact (Laninga-Wijnen et al., 2017). Therefore, we do not expect that descriptive norms play a role in friendship processes related to achievement. However, given the examination of popularity and descriptive norms in relation to friendship processes is quite new, we examine both to add to the empirical evidence on this issue.

## **6.2 Present Study**

We examined the role of achievement goal peer norms in friendship processes related to achievement (see Figure 6.1). We hypothesized that achievement goal popularity norms rather than achievement goal descriptive norms would play a role in friendship processes related to achievement, because popularity norms represent the behaviors and attitudes that are positively valued in classrooms (i.e., reputationally salient; Hartup, 1996), especially during early adolescence. We conducted our investigation in the context of math and science classrooms, where academic achievement is likely to be especially salient to peers. In contrast to language arts or social studies classrooms, which often emphasize writing and evaluating information that can be interpreted in different ways, math and science coursework more often involves formulas and clear-cut “right” or “wrong” answers (Franke, Kazemi, & Battey, 2007; Martin, Way, Bobis, & Anderson, 2015; Fredricks et al., 2016). Thus, it may be easier for students to garner information about their peers’ performance in math and science classrooms because they can more readily compare results on assignments and tests (Stodolsky & Grossman, 1995; Wang, Fredricks, Hofkens, & Schall, 2016).

## 6.3 Methods

### 6.3.1 Procedure and participants

Data were collected as part of the Classroom and Peer Ecologies Project, a longitudinal study examining early adolescent social and academic adjustment in school. Schools were recruited from three school districts located in small urban communities with comparable demographics in the Midwest region of the United States. The school districts serve a sizable proportion of low-income (50% to 71%) as well as middle-income families. In these school districts the elementary schools contained students in kindergarten through Grade 5 and the middle schools contained Grades 6 through 8. All of the middle schools in these districts ( $N = 6$ ) agreed to participate in the project. Two feeder elementary schools for each middle school also agreed to participate ( $N = 12$ ). In the elementary schools, children were in a self-contained classroom with one teacher for the majority of the day. In the middle schools, students rotated among different teachers for their main academic subjects. However, middle school students and teachers were organized into smaller teams within their grade level, so students saw many of the same peers in their different classrooms at middle school.

To provide a common reference point across the different school settings, we focused on the classroom context in the domains of math and science (for a similar approach, see Eccles et al., 1993; Midgley, 2002). We focused on both math and science to garner a higher number of unique teachers and distinct classrooms at the middle school level than would have been possible had we exclusively focused on just math or science teachers. All math and science teachers in Grade 6 at the middle schools agreed to participate and we chose one of their classrooms to administer surveys. For the teachers from the feeder elementary schools, we aimed to focus on math or science in equal proportions (e.g., if there were two math and two science teachers at the middle school we would focus on math class for one teacher and science class for the other teacher within each of the two feeder elementary schools). Two factors contributed to our sample having more math than science classrooms: (1) there were more Grade 6 math than science teachers in the middle schools and (2) for some elementary school teachers, science instruction was not occurring during the time frame of our study (e.g., science and social studies instruction would alternate every few weeks). In those cases we conducted our investigation in math class.

Letters describing the project were given to all students to take home to their parents early in the school year. Eighty-four percent of the students returned permission slips granting them parental approval to participate. About 2 to 3 months into the school year, surveys were administered to students in their classrooms by two trained research assistants. Instructions and items were read aloud while students read along and responded. Survey administration was repeated about 6 months later in the spring of the school year. Not all classrooms did complete all measures at Wave 2 due to timing and scheduling constraints (predominantly coming from one elementary and one middle school). The missing data included measures used in the present study and thus students from those classrooms were not included in this investigation. The total sample ( $N = 901$  at wave 1 and  $N = 859$  at wave 2) was about half female (51.5%) and ethnically diverse (36.8% African American, 46.9% European American, 7.0% Hispanic and 8.8% other ethnic groups). Students came from 46 classrooms, each with different teachers and students (19 classrooms at the 6<sup>th</sup> grade level, consisting of 11 math classrooms and 8 science classrooms and 27 classrooms at the 5<sup>th</sup> grade level, consisting of 20 math classrooms and 7 science classrooms) situated within 16 schools (5 middle schools and 11 elementary schools).

### 6.3.2 Measures

**Friendship networks.** Adolescents' friends within classrooms were measured by asking students to nominate their friends in the classroom, further described to students as "the friends you hang around with and talk to the most". Embedded in each child's survey was a class list, and students were told they could nominate as many or as few friends as they wanted by putting a check next to the names of their friends. Friendship networks were calculated for each classroom. A value of 1 equaled a given friendship nomination, whereas a value of 0 depicted an absent nomination.

**Peer-perceived academic achievement.** Students were asked to nominate which peers within the classroom "gets good grades." Similar to the friendship networks, students put a check next to names on a class list that followed the question. The number of nominations received were standardized by class for all participants into z-scores. Because RSIENA analyses (Ripley, Snijders, Boda, Vörös, & Preciado, 2016) require ordinal categorical dependent behavior

variables, these peer-perceived achievement z-scores were recoded into four roughly equally populated categories based on quartiles (for wave 1: category 1 =  $z \leq -.737$ ; category 2 =  $-.737 < z \leq -.338$ ; category 3 =  $-.338 < z \leq .581$  and category 4 =  $z > .581$ ; for wave 2: category 1 =  $z \leq -.748$ ; category 2 =  $-.748 < z \leq -.392$ , category 3 =  $-.392 < z \leq .580$ ; and category 4 =  $z > .580$ ).

**Achievement goal peer norms.** Achievement goal popularity norms were measured at Time 1 (T1) as the within-classroom correlation between peer-nominated popularity and achievement goals (Dijkstra & Gest, 2015; Dijkstra, Lindenberg, & Veenstra, 2008; Laninga-Wijnen et al., 2018a). Peer-nominated popularity was assessed by taking the average of two items: (1) "Which students in this class do you admire most?" and (2) "Which students in your class are really cool?"; in line with Sandstrom (2011). The correlations between these two items were  $r = .60$  and  $r = .70$  for Waves 1 and 2, respectively (both  $p < .001$ ). To assess the achievement goals of students, we used the Patterns of Adaptive Learning Survey (Midgley, Arunkumar, & Urdan, 1996). Mastery goals were measured with six items focusing on developing academic competence (e.g., "An important reason I do my math/science work is because I want to improve my skills" and "An important reason I do my math/science work is because I like to learn new things"). Performance goals were measured using five items focusing on demonstrating high academic competence relative to other students in the class (e.g., "Doing better than other students in my math/science class is important to me" and "An important reason I do my math/science work is because I want to do better than other students in my class"). Participants were asked to rate on a 5-point Likert scale, ranging from 1 (*not at all true*) to 5 (*very true*). The scales measuring achievement goals were found to be reliable in the present sample at both time points (Cronbach's  $\alpha$   $a_{T1} = .84$  and  $a_{T2} = .87$  for mastery goals, and  $a_{T1} = .84$  and  $a_{T2} = .87$  for performance goals). The mastery items and the performance items were averaged to create scales for mastery goals and performance goals, respectively.

We made a distinction between three types of classrooms based on quartiles of the within-classroom correlation between popularity and achievement goals. Classrooms with *low* popularity norms were characterized by a correlation in the lowest quartile for performance or mastery goal popularity norms (Low Mastery:  $r < -.13$ ,  $N_{\text{classrooms}} = 11$ ; Low Performance:  $r < -.26$ ,  $N_{\text{classrooms}} = 11$ ). Classrooms with *average* popularity norms scored in the middle quartiles (25% to 75%) of

achievement goal popularity norms (Moderate Mastery:  $-.13 \leq r \leq .29$ ,  $N_{\text{classrooms}} = 24$ ; Moderate Performance:  $-.26 \leq r \leq .11$ ,  $N_{\text{classrooms}} = 24$ ). Classrooms with *high* popularity norms scored in the highest quartile of achievement goal popularity norms (High Mastery:  $r > .29$ ,  $N_{\text{classrooms}} = 11$ ; High Performance:  $r > .11$ ;  $N_{\text{classrooms}} = 11$ ).

Descriptive norms were measured at T1 as the aggregated average score for mastery and performance goals, respectively, across all students in the class (Dijkstra & Gest, 2015; Rambaran et al., 2013; Laninga-Wijnen et al., 2018a). We made a distinction between three types of classrooms based on quartiles, both for mastery goal norms and performance goal norms. As the distribution of mastery goal descriptive norms was negatively skewed in that most classrooms were characterized by quite high mastery goal norms (in line with previous studies, see for instance Ryan & Shim, 2012), classrooms in the lowest quartile for mastery descriptive norms were indicated as “moderate mastery goal descriptive norm classrooms” ( $M < 4.08$ ,  $N_{\text{classrooms}} = 11$ ). Classrooms in the lowest quartile of performance goal descriptive norms were referred to as “low performance goal descriptive norm classrooms” ( $M < 2.93$ ,  $N_{\text{classrooms}} = 11$ ). Classrooms with descriptive norms in the middle quartiles (25% to 75%) of achievement goals, were referred to as “high mastery goal descriptive norm classrooms” and “moderate performance goal descriptive norm classrooms”, respectively (high mastery:  $4.08 \leq M \leq 4.41$ ,  $N_{\text{classrooms}} = 24$ ; moderate performance:  $2.93 \leq M \leq 3.47$ ,  $N = 24$ ). Classrooms in the highest quartile of achievement goals were indicated as “very high mastery goal descriptive norm classrooms” and “high performance goal descriptive norm classrooms” (very high mastery:  $M > 4.41$ ,  $N_{\text{classrooms}} = 11$ ; high performance:  $M > 3.47$ ;  $N_{\text{classrooms}} = 11$ ).

The class-level correlation of achievement goal norms from T1 to T2 was moderate for popularity norms (with  $r_{T1-T2\text{mastery}} = .33$ ,  $p = .02$ ; and  $r_{T1-T2\text{performance}} = .40$ ,  $p = .01$ ), and moderate to high for descriptive norms (with  $r_{T1-T2\text{mastery}} = .43$ ,  $p = .01$ ; and  $r_{T1-T2\text{performance}} = .60$ ,  $p = .001$ ). Correlations between popularity norms and descriptive norms were low and nonsignificant ( $r_{\text{mastery}} = .05$ ,  $p = .77$ ;  $r_{\text{performance}} = .23$ ,  $p = .13$ ). Correlations between mastery norms and performance norms were low for popularity norms, and moderate for descriptive norms ( $r_{\text{popularity}} = .14$ ,  $p = .37$ ;  $r_{\text{descriptive}} = .50$ ,  $p < .001$ ).

## 6.4 Analytic Strategy

### 6.4.1 Attrition analyses

We performed attrition analyses for students who had partially missing data on the achievement (goal) variables (13.8% in T1 and 12.0% in T2), and we did not find significant or substantial differences between partially missing cases and complete cases on achievement and achievement goals. Little's missing completely at random test produced a normed chi-square ( $\chi^2/df$ ) of 1.48, indicating that the data were likely missing at random and that it was safe to impute missing values on achievement (goal) data (Bollen, 1989). Therefore, to gain statistical power, we estimated missing values for achievement (goal) data in SPSS using the expectation maximization procedure (Gupta & Chen, 2010).

For the friendship nomination data, missing data due to nonresponse were handled through the SIENA missing data method (Huisman & Steglich, 2008), and participants who joined and left the friendship network between time points were treated using the "last observation carry forward" method (Ripley et al., 2016). In this method, for each missing tie variable, the last previous non-missing value (if any) is imputed; if the previous values are missing as well, the value 0 (referring to no friendship tie) is imputed. Whenever imputed values are used, parameter estimate updates are based on the non-imputed parts of the data. This minimizes the impact of imputations on the results.

### 6.4.2 RSIENA analyses

Analyses were conducted using longitudinal social network analysis (also called "stochastic actor-based models"; Snijders, Steglich, & Schweinberger, 2007) with the Simulation Investigation for Empirical Network Analyses (RSIENA 4.0–R Version 3.1.2; RSIENA Version 2.8.9) software program. SIENA allows us to examine the extent to which similarity between friends in academic achievement is the result of selection or socialization processes<sup>3</sup>. An assumption

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<sup>3</sup> We used multigroup analyses because our classroom-level networks were rather small which prevented us from obtaining well-converged parameter estimates when analyzing the classrooms separately. Therefore, in line with various previous studies that included rather small classrooms (i.e., Svensson et al., 2012; Delay et al., 2016; Shin & Ryan, 2014a; Logis, Rodkin, Gest, & Ahn, 2013; Weerman, 2011), we combined classrooms and analyzed them simultaneously using multigroup analyses. The multigroup option binds these separate class-level data sets into a large multigroup project, assuming that different data sets are unrelated with one another except for having the same parameter values. In other words, each classroom network is assumed to follow the same rule to evolve, except for the behavioral and network rate functions which are allowed to vary (i.e., class-level variation) within the same multigroup project. In this way, multigroup analyses differ from meta-analyses which take into account class-level variation for each parameter in the model. For more

of SIENA is that adolescents change their friendship ties and their behaviors in continuous time between the observation moments (i.e., measurement waves) on the basis of individual preferences. At a given moment, students may either change a friendship tie (i.e., create a new tie, drop an existing tie, or maintain a tie) or their behavior (go one step up, one step down, or keep their behavior the same; also called *micro-steps*) in response to the current network structure and the behavior of other peers in the network. In this way, SIENA controls for dynamic feedback between behavior change and friendship change, as well as for structural network and individual predictors for changes in friendships and academic achievement. An important assumption of the model is that students have full information about the relationships and behaviors in the network, which is quite realistic in the current study as we examine small class-level networks (in which adolescents spent most of their time at school) and achievement as perceived by peers (not “objective” achievement like GPA). Parameter estimates are derived from iterative simulations using the Robbins-Monro stochastic approximation algorithm (Ripley et al., 2016). For a detailed, more technical explanation of longitudinal social network analyses, we refer to Snijders and colleagues (2007) and Veenstra, Dijkstra, Steglich, and Van Zalk (2013). In the following paragraphs we discuss the parameters we analyzed in our models. See Table S6.1 in the online supplemental material for further conceptual interpretation of these effects, for information on how the terminology used in this study corresponds to the terminology used in prior RSIENA studies, and for information on how each variable label can be interpreted.

**Parameters in the RSIENA model.** RSIENA analyses yield parameter estimates related to the network (i.e., structural dynamics and attribute-dependent selection and maintenance dynamics) and behavior dynamics (i.e., influence dynamics and behavioral tendencies). Most of these parameters can be considered as “control parameters,” which have to be included to more accurately assess and avoid overestimation of selection and influence dynamics (Snijders, Van de Bunt, & Steglich, 2010). In the following text, we discuss the parameters that are of main interest for testing our hypotheses. See Appendix (6A) for more details regarding control parameters.

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information on multigroup analyses, we refer the reader to the *RSIENA Manual* (see p. 96 and further; Ripley et al., 2016).

**Selection parameters (Figure 6.1a).** To assess the extent to which similarity in achievement among friends is explained by friendship selection processes, we included several selection parameters. The “*effect of achievement on friendship nominations received*” indicated the extent to which achievement predicted being selected as a friend. Conversely, the “*effect of achievement on friendship nominations given*” indicates the extent to which achievement predicted the number of friendship nominations given to peers. By including these two parameters, the “*similarity-based selection of friends based on achievement*” provided a reliable estimate to test our hypotheses about the extent to which adolescents had the tendency to select similarly achieving friends, depending on the peer norm. Next, to assess the direction of friendship selection, we calculated ego-alter selection tables (cf. Ripley et al., 2016) that contained the log odds for friendship selection (i.e., formation). These tables indicate whether similarity-based selection takes especially place among higher achieving students or among lower achieving students.

**Maintenance parameters (Figure 6.1a).** We examined the extent to which being similar in achievement predicted that a friendship present at one time point would still be present at the next time point (using endowment effects). A positive parameter for similarity-based maintenance of friends indicates that similarity in achievement predicts friendship maintenance, whereas dissimilarity in achievement predicts friendship dissolution (i.e., deselection). Next, to assess the direction of friendship maintenance, we calculated ego-alter maintenance tables (cf. Ripley et al., 2016) that contained the log odds for friendship maintenance. These tables indicate whether similarity-based maintenance takes place among higher achieving students or among lower achieving students.

**Influence parameters (Figure 6.1b).** To assess the extent to which friendship influence on achievement took place, we included the “*friendship influence on achievement*” parameter (average similarity). This reflects the tendency of students to change their academic achievement to more closely resemble their friends’ average achievement. This tendency could work in the upward or in the downward direction (or remain similar), depending on whether friends display higher or lower levels of achievement than the adolescent does. To assess the direction of friendship influence on achievement, we calculated ego-alter influence tables (cf. Ripley et al., 2016), indicating whether friends influenced adolescents to increase or decrease in achievement over time.

**The moderating role of achievement goal peer norms (Figure 6.1c).**

We tested whether peer norms at T1 play a role in friendship processes related to academic achievement in four steps. In Step 1, the aforementioned parameters (selection, maintenance, influence and control parameters) were analyzed in RSIENA for all 46 classrooms in multigroup analyses (Ripley et al., 2016).<sup>1</sup> Hence, in this first step (in line with previous studies) the peer norm within the classroom was not taken into account. In Step 2, we performed 12 additional multigroup analyses for all types of classrooms separately (i.e., classrooms with low, moderate, and high performance goal and mastery goal popularity norms; those with low, moderate, high performance goal descriptive norms; and those with moderate, high, and very high mastery goal descriptive norms, respectively). In Step 3, we tested whether there were significant differences between parameter estimates of selection, maintenance, and influence parameters across classrooms with low, moderate, and high norms (and moderate, high, and very high norms for mastery goal descriptive norms) using the following formula:

$$\frac{\hat{\beta}a + \hat{\beta}b}{\sqrt{(s.e.a)^2 + (s.e.b)^2}}$$

with estimates  $\hat{\beta}a$  and  $\hat{\beta}b$  and standard errors  $s.e.a$  and  $s.e.b$ , respectively. This resulted in a z-score that under the null-hypothesis of equal parameters has an approximate standard normal distribution (see Steglich, Sinclair, Holliday, & Moore, 2012, p. 367; Laninga-Wijnen et al., 2017). We used the significance criterion of  $p < .05$ . In Step 4, we assessed convergence of all our models and calculated auxiliary statistics to assess the goodness of fit. Four auxiliary network statistics were assessed: outdegree distribution, indegree distribution, geodesic distance, and triadic census. One auxiliary behavior statistic was assessed: behavioral distribution for achievement. For each auxiliary statistic, the differences between the values in the observed network (summed across the two waves of data) and the simulated values in the model were assessed with the Mahalanobis distance (Ripley et al., 2016) and visually inspected using violin plots.

To facilitate the interpretation of the findings, we calculated odds ratios by taking the exponential function of the parameter estimates ( $\exp(\beta)$ ). Odds ratios represent the odds that an outcome will occur given a particular situation, compared with the odds of the outcome occurring in the absence of that situation.

For selection and maintenance processes, the odds ratios indicate the odds of adding or retaining someone as a friend relative to the odds for choosing others, conditional on the rest of the model and given the current state of the network. For influence processes, having one additional friend who scores higher (or lower) than oneself increases the odds of an increase (or decrease) in achievement as compared with no change by a factor. For the friendship influence dynamics, we first divided the estimates with the number of answer categories minus one to reflect the effect of a one-unit increase or decrease on the scales. Odds ratios were not calculated for the quadratic shape terms because these are not linear.

## **6.5 Results**

### **6.5.1 Descriptive statistics**

Description of the network and individual variables are presented in Table 6.1 and Table 6.2 for classrooms distinguished based on performance goal status norms and mastery goal status norms, respectively. See Appendix (6B) for a more detailed discussion of these descriptive results. Preliminary analyses indicated that the results were similar for Grade 5 and Grade 6 classrooms. First, we found no significant differences between 5<sup>th</sup>- and 6<sup>th</sup> grade classrooms in popularity norms and descriptive norms. Furthermore, the presence and direction of friendship processes related to achievement did not differ significantly between 5<sup>th</sup> and 6<sup>th</sup> Grade. We also found that the role of peer norms in friendship processes was similar in Grade 5 and Grade 6. Therefore, we performed our final analyses on both grades together, in order to gain power. Convergence of all models was good (overall *t*-ratio for convergence < .21), and in one case, one class was omitted from the multigroup analyses in order to get desirable convergence, which did not affect the interpretability of results. The goodness of fit was acceptable or good for all auxiliary statistics in all classrooms, indicated by a nonsignificant Mahalanobis distance and violin plots indicating that the simulated values did not depart too far from observed values.

Reported in Table 6.3 are the controlling variables that do not pertain to our research questions, see also Appendix (6C). In the following text, we discuss the main results of interest for testing our hypotheses. As expected, popularity norms played a role in friendship processes rather than descriptive norms. Therefore, we first display our results on popularity norms.

### 6.5.2 Popularity norms and friendship selection

**Performance goal popularity norms.** The similarity-based selection effect was significant in the model with *all classrooms* ( $OR = 1.35$ ; Table 6.3 and Figure 6.1a). However, the analyses on classrooms with low, moderate and high performance goal popularity norms separately (Figure 6.1c), indicated that the parameter for similarity-based selection related to achievement was *significantly positive* in classrooms with high performance goal popularity norms and *significantly negative* in classrooms with low performance goal popularity norms. Moreover, similarity-based selection was significantly more likely in classrooms with high performance goal popularity norms compared to classrooms with moderate popularity norms [ $z = 2.04, p = .04$ ] and low popularity norms [ $z = 4.11, p < .001$ ]. Also, similarity-based selection was significantly more likely in classrooms with moderate performance goals popularity norms compared to classrooms with low popularity norms [ $z = 2.97, p = .003$ ]. These results are in line with the hypothesis that adolescents in classrooms with higher performance goal popularity norms have an increased tendency to select peers as friends based on similar levels of achievement, and not in line with the alternate hypothesis that adolescents would have an increased tendency to select lower achieving peers as friends in classrooms with salient performance goals.

Next, we calculated ego-alter selection tables to inspect the direction of selection processes in classrooms with high and low performance goal popularity norms (ego-alter tables for moderate performance goal classrooms are available upon request). In classrooms with high performance goal popularity norms, similarity-based selection especially took place among equally high-achieving peers. Moreover, in low performance goal popularity norm classrooms, ego-alter tables indicate that particularly dissimilar adolescents selected each other as friends (Table 6.4). These findings are generally in line with our hypotheses.

**Mastery goal popularity norms.** For mastery goal popularity norms (Table 6.5), the similarity-based selection effects did not differ significantly from each other [low versus high mastery popularity norms:  $z = 0.49, p = .62$ ; low versus moderate mastery popularity norms:  $z = 0.26, p = .79$ ; moderate versus high popularity norms:  $z = 0.29, p = .77$ ]. These results are in line with the hypothesis that mastery goal popularity norms are not strong enough to break down adolescents' tendency to select peers as friends based on similar levels of achievement, and not with the alternate hypothesis that mastery goals would

strengthen friendship selection based on similarity in high achievement. We did not calculate ego\*alter tables as none of the selection parameters were significant (available upon request).

### 6.5.3 Popularity norms and friendship maintenance

**Performance goal popularity norms.** In the model with all classrooms, the friendship maintenance parameter was significant ( $OR = 1.36$ ; Table 6.3, first column; Figure 6.1a). However, the analyses on classrooms with low, moderate, and high *performance goal popularity norms* separately (Figure 6.1c), indicated that the similarity-based maintenance for achievement was *only* significantly positive in classrooms with low performance goal popularity norms. Furthermore, maintenance processes based on similarity in achievement took significantly *less* place in classrooms with high performance goals than in classrooms with low performance goal popularity norms [ $z = 2.33, p = .02$ ], whereas differences between other types of classrooms were nonsignificant [low versus moderate performance popularity norms:  $z = 1.00, p = .32$ ; moderate versus high performance popularity norms:  $z = 1.84, p = .07$ ]. Hence, in low performance goal popularity norm classrooms, students were more likely to maintain a friend who matched their own achievement than to maintain a friend with a different achievement. We calculated ego-alter maintenance tables for low and high performance goal popularity norms which indicated that in high performance goal popularity norm classrooms, adolescents maintained friendships with peers who were dissimilar in achievement; for instance, adolescents with higher achievement had a tendency to maintain lower achieving peers as friends (Table 6.4). At the same time, in low performance goal popularity norm classrooms, high-achieving peers (rather than low-achieving peers) maintained each other as friends based on similarity in achievement (Table 6.4). These findings are in line with the hypothesis that in high performance goal popularity norm classrooms, adolescents remain friends with peers who were dissimilar in achievement and not with the alternate hypothesis that they would remain friends with similarly achieving peers.

Table 6.1

*The Role of Performance Goal Popularity Norms in Changes in Friendship Networks and Achievement: Descriptives*

	Low performance goal popularity norms		Moderate performance goal popularity norms		High performance goal popularity norms	
	Mean (SD)		Mean (SD)		Mean (SD)	
	T1	T2	T1	T2	T1	T2
<i>Friendship</i>						
Average number of friends	5.37 (2.00)	5.04 (1.24)	5.59 (1.49)	5.33 (1.55)	6.16 (1.90)	6.13 (2.57)
Cohesion in friendship network	0.30 (0.09)	0.28 (0.06)	0.31 (0.09)	0.28 (0.07)	0.31 (0.08)	0.31 (0.09)
Proportion reciprocated friendships	0.41 (0.08)	0.39 (0.11)	0.46 (0.12)	0.43 (0.10)	0.39 (0.06)	0.41 (0.13)
Proportion triadic friendships	0.55 (0.09)	0.57 (0.08)	0.56 (0.09)	0.57 (0.08)	0.56 (0.11)	0.55 (0.09)
<i>Achievement Change</i>						
Fraction increased students	T1-T2 18.0%		T1-T2 17.8%		T1-T2 22.2%	
Fraction decreased students	23.1%		17.7%		20.1%	
Fraction stable students	58.9%		64.5%		56.4%	
<i>Friendship change</i>						
Average number of friendship changes	84.36 (33.97)		83.83 (37.27)		76.82 (34.68)	
Proportion of stable friendships	0.41 (0.08)		0.45 (0.10)		0.41 (0.09)	
Friendships emerged	38.45 (17.98)		39.62 (20.81)		54.18 (34.12)	
Friendships dissolved	45.91 (24.68)		44.21 (22.30)		47.55 (27.55)	
Friendships maintained	76.36 (37.92)		81.67 (36.17)		86.36 (39.62)	
Nclasses	11		24		11	
Nstudents	209		471		221	

Note. Achievement refers to peer-perceived achievement. T1 = Time 1 (fall); T2 = Time 2 (spring).

Table 6.2  
*The Role of Mastery Goal Popularity Norms in Changes in Friendship Networks and Achievement from Fall to Spring: Descriptives*

	Low mastery goal popularity norms		Moderate mastery goal popularity norms		High mastery goal popularity norms	
	Mean (SD)		Mean (SD)		Mean (SD)	
	T1	T2	T1	T2	T1	T2
<i>Friendship</i>						
Average number of friends	4.85 (1.33)	4.97 (1.37)	6.07 (1.97)	5.77 (1.95)	5.63 (1.10)	5.24 (1.78)
Cohesion in friendship network	0.29 (0.06)	0.28 (0.05)	0.31 (0.09)	0.29 (0.08)	0.32 (0.12)	0.30 (0.07)
Proportion reciprocated friendships	0.47 (0.12)	0.42 (0.10)	0.42 (0.09)	0.41 (0.12)	0.44 (0.11)	0.42 (0.12)
Proportion triadic friendships	0.56 (0.09)	0.55 (0.09)	0.56 (0.09)	0.56 (0.08)	0.55 (0.10)	0.56 (0.07)
<i>Achievement Change</i>						
Fraction increased actors	T1-T2 16.1%		T1-T2 20.1%		T1-T2 19.6%	
Fraction decreased actors	16.3%		20.1%		22.9%	
Fraction stable actors	67.6%		59.8%		57.5%	
<i>Friendship change</i>						
Average number of friendship changes	72.55 (29.00)		97.88 (44.86)		82.91(3) 6.31)	
Proportion of stable friendships	0.45 (0.09)		0.43 (0.10)		0.41 (0.09)	
Friendships emerged	36.18 (20.42)		46.17 (24.21)		42.18 (28.81)	
Friendships dissolved	36.36 (14.73)		51.71 (29.04)		40.73 (12.42)	
Friendships maintained	61.72 (27.78)		90.25 (38.06)		82.27 (36.79)	
Nclasses	11		24		11	
Nstudents	207		488		206	

Note. Achievement refers to peer-perceived achievement. T1 = Time 1 (fall); T2 = Time 2 (spring).

Table 6.3

*Performance Goal Popularity Norms and Friendship Dynamics Related to Achievement: RSIENA Multigroup Analyses in All Classes and Classes With Low, Moderate, and High Associations Between Popularity and Performance Goals*

	All classes (N = 46)			Low performance goal popularity norms (N = 11)			Moderate performance goal popularity norms (N = 24)			High performance goal popularity norms (N = 11)		
	B	SE	OR	B	SE	OR	B	SE	OR	B	SE	OR
<i>Network dynamics</i>												
Tendency to make friends	-1.69***	0.04	0.18	-1.71***	0.07	0.18	-1.77***	0.05	0.17	-1.60***	0.07	0.20
Reciprocated friendships	1.03***	0.04	2.80	0.95***	0.09	2.59	1.20***	0.06	3.32	0.77***	0.08	2.16
Transitive group formation	0.20***	0.01	1.22	0.20***	0.01	1.22	0.21***	0.01	1.23	0.18***	0.01	1.20
Cyclical group formation	-0.23***	0.01	0.79	-0.25***	0.03	0.78	-0.24***	0.02	0.79	-0.19***	0.02	0.83
<i>Selection dynamics</i>												
Same gender selection	0.51***	0.03	1.67	0.57***	0.06	1.75	0.46***	0.04	1.58	0.58***	0.05	1.79
Same race selection	0.24***	0.03	1.27	0.34***	0.06	1.40	0.21***	0.04	1.23	0.22***	0.05	1.25
Effect of achievement on friendship nominations received	0.08***	0.01	1.08	0.11***	0.03 <sup>a</sup>	1.12	0.09**	0.02 <sup>a</sup>	1.09	0.08*	0.03 <sup>a</sup>	1.08
Effect of achievement on friendship nominations given	0.04***	0.01	1.04	0.13***	0.03 <sup>a</sup>	1.14	-0.01	0.02 <sup>b</sup>	0.99	0.06	0.03 <sup>ab</sup>	1.06
Similarity-based selection of friends	0.30*	0.16	1.35	-0.91*	0.37 <sup>a</sup>	0.40	0.36	0.21 <sup>b</sup>	1.43	1.19***	0.35 <sup>c</sup>	3.29
<i>Maintenance dynamics</i>												
Similarity-based maintenance of friends	0.31*	0.15	1.36	1.07*	0.39 <sup>a</sup>	2.92	0.26	0.21 <sup>b</sup>	1.30	-0.15	0.35 <sup>c</sup>	0.86
<i>Influence dynamics</i>												
Achievement linear shape	-0.13*	0.06	0.88	-0.32	0.15	0.73	-0.10	0.09	0.90	-0.05	0.10	0.95
Achievement quadratic shape	0.36***	0.07		0.47*	0.19		0.36***	0.09		0.29**	0.12	
Friendship influence on achievement	2.49***	0.78	2.29	3.51	2.05 <sup>a</sup>	3.22	2.25*	1.09 <sup>a</sup>	2.12	2.26	1.41 <sup>a</sup>	2.12

*Note.* All models represent separate multi-group analyses. *B* = the unstandardized multinomial logit coefficient. Different superscripts of Standard Errors (*SE*'s) indicate that class types differ significantly from each other in estimate (as computed with z-tests). Low, moderate and high performance goal popularity norms refer to low, moderate and high class-level associations between popularity and performance goals. Achievement refers to peer-perceived achievement. \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

Table 6.4  
*Likelihood of Peer Selection and Maintenance Based on Achievement in Classes With Low and High Performance Goal Popularity Norms*

Individual	Peer			
	1	2	3	4
Selection in classrooms with low performance goal popularity norms				
1	-0.74	-0.33	0.09	0.50
2	-0.30	-0.49	-0.08	0.33
3	0.13	-0.06	-0.25	0.16
4	0.57	0.38	0.19	-0.01
Selection in classrooms with high performance goal popularity norms				
1	0.52	0.21	-0.12	-0.44
2	0.18	0.66	0.34	0.02
3	-0.16	0.32	0.79	0.47
4	-0.50	-0.02	0.45	0.93
Maintenance in classrooms with low performance goal popularity norms				
1	0.11	-0.14	-0.39	-0.64
2	-0.12	0.35	0.10	-0.14
3	-0.34	0.13	0.60	0.35
4	-0.57	-0.10	0.37	0.84
Maintenance in classrooms with high performance goal popularity norms				
1	-0.29	-0.17	-0.04	0.09
2	-0.19	-0.16	-0.03	0.09
3	-0.08	-0.06	-0.03	0.10
4	0.02	0.05	0.08	0.10

*Note.* Numbers (1 through 4) in the table reflect the strength of attraction for students to select or to remain friends with certain peers on the basis of their levels of achievement (columns dependent on rows). The values in the cells can be transformed to odds by taking the exponential function ( $\exp.[\beta]$ ).

Table 6.5  
*Mastery Goal Popularity Norms and Friendship Dynamics related to Achievement: RSIENA Multi-group Analyses in Classes with Low, Moderate and High Associations between Popularity and Mastery Goals*

	Low mastery goal popularity norms (N = 11)			Moderate mastery goal popularity norms (N = 24)			High mastery goal popularity norms (N = 11)		
	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>
<i>Network dynamics</i>									
Tendency to make friends	-1.83***	0.08	0.16	-1.65***	0.05	0.19	-1.92***	0.08	0.15
Reciprocated friendships	1.19***	0.11	3.29	1.00***	0.06	2.72	1.03***	0.10	2.80
Transitive group formation	0.27***	0.02	1.31	0.19***	0.01	1.21	0.27***	0.02	1.31
Cyclical group formation	-0.31***	0.03	0.73	-0.21***	0.02	0.81	-0.28***	0.03	0.76
<i>Selection dynamics</i>									
Same gender (1=boy) selection	0.54***	0.06	1.72	0.42***	0.04	1.52	0.64***	0.06	1.90
Same race selection	0.13*	0.06	1.14	0.25***	0.04	1.28	0.33***	0.06	1.39
Effect of achievement on friendship nominations received	0.06	0.03 <sup>a</sup>	1.06	0.10***	0.02 <sup>a</sup>	1.11	0.08*	0.03 <sup>a</sup>	1.08
Effect of achievement on friendship nominations given	0.02	0.03 <sup>a</sup>	1.02	0.06*	0.02 <sup>a</sup>	1.06	0.03	0.03 <sup>a</sup>	1.04
Similarity-based selection of friends	0.40	0.26 <sup>a</sup>	1.49	0.31	0.23 <sup>a</sup>	1.36	0.18	0.36 <sup>a</sup>	1.20
<i>Maintenance dynamics</i>									
Similarity-based maintenance of friends	0.19	0.28 <sup>a</sup>	1.21	0.34	0.23 <sup>a</sup>	1.40	0.34	0.35 <sup>a</sup>	1.40
<i>Influence dynamics</i>									
Linear shape	0.01	0.14	1.01	-0.12*	0.08	0.89	-0.28	0.19	0.76
Quadratic shape	0.07***	0.16		0.34***	0.09		0.65**	0.25	
Friendship influence on achievement	-2.00	1.69 <sup>a</sup>	0.51	2.26*	0.99 <sup>b</sup>	2.12	6.93*	3.28 <sup>b</sup>	10.07

*Note.* All models represent separate multi-group analyses. *B* = the unstandardized multinomial logit coefficient. Different superscripts of Standard Errors (*SE*'s) indicate that class types differ significantly from each other in estimate (as computed with z-tests). Low, moderate and high mastery goal popularity norms refer to low, moderate and high class-level associations between popularity and mastery goals. Achievement refers to peer-perceived achievement. \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

**Mastery goal popularity norms.** Next, analyses on *mastery goal popularity norms* indicated that there were no significant differences in maintenance processes between the three types of classrooms [low versus high mastery popularity norms:  $z = 0.33$ ,  $p = .74$ ; low versus moderate mastery popularity norms:  $z = 0.42$ ,  $p = .67$ ; moderate versus high mastery popularity norms:  $z = 0.01$ ,  $p = .99$ ]. These findings are in line with the hypothesis that mastery goals are not strong enough to break down the tendency of maintaining similar friends, and not with the alternate hypothesis that mastery goals strengthen adolescents' tendency of selecting higher-achieving peers as friends. We did not calculate ego\*alter tables as maintenance parameters were nonsignificant (available upon request).

#### 6.5.4 Popularity norms and friendship influence

**Performance goal popularity norms.** In the model with *all classrooms*, the friendship influence parameter was significant ( $OR = 2.29$ ; see Table 6.3 and Figure 6.1b), indicating that in general, adolescents had a tendency to become similar in academic achievement to their friends. Furthermore, the influence parameter estimates did not differ significantly across classrooms with low, moderate, and high associations between popularity and performance goals (Figure 6.1c), implying that, in contrast to our hypothesis, performance goal popularity norms did not play a significant role in friendship influence on achievement [low versus high performance popularity norms:  $z = 0.51$ ,  $p = .61$ ; low versus moderate performance popularity norms:  $z = 0.55$ ,  $p = .58$ ; moderate versus high performance popularity norms:  $z = 0.00$ ,  $p = .996$ ]. We did not calculate ego\*alter tables to further inspect the direction of friendship influence as the influence effects did not differ significantly between classrooms.

**Mastery goal popularity norms.** The analyses separated across classrooms with low, moderate, and high mastery goal popularity norms indicated that the friendship influence parameter was negative and nonsignificant in classrooms with low mastery goal popularity norms. Friendship influence processes occurred in classrooms with moderate mastery goal popularity norms, and particularly in classrooms with high mastery goal popularity norms, indicating an increase in strength of friendship influence processes as the within-classroom association of popularity with mastery goals increased (Table 6.5). The estimate for influence processes did not differ significantly between classrooms with high

and moderate mastery goal popularity norms [ $z = 1.36, p = .18$ ]; but it differed significantly between classrooms with moderate and low mastery goal popularity norms [ $z = 2.17, p = .03$ ] as well as between classrooms with low and high mastery goal popularity norms, [ $z = 2.42, p = .02$ ]. This implies that, in line with our hypothesis, the tendency to become similar to friends in achievement increases when the within-classroom association between popularity and mastery goals increases.

We calculated ego-alter tables to further inspect the direction of friendship influence on achievement in high mastery goal popularity norm classrooms (and not in low mastery goal popularity norm classrooms as the influence effect was nonsignificant, available upon request). In these classrooms, the differences in the top rows were larger than in the bottom rows, indicating that in contrast to our hypothesis, students were more likely to decrease in achievement when they had low-achieving friends than to increase in achievement when they had high-achieving friends (Table 6.6).

Table 6.6

*Likelihood of Peer Influence on Student's Achievement in Classes with High Mastery Goal Popularity Norms*

Peer achievement	Individual achievement			
	1	2	3	4
1	6.04	2.19	-0.37	-1.64
2	3.73	4.50	1.94	-0.67
3	1.42	2.19	4.25	2.98
4	-0.89	-0.12	1.94	5.29

*Note.* Numbers (1 through 4) in the table reflect the strength of friendship influence on certain levels of peer-perceived achievement for the student resulting from the average levels of their friends' achievement (columns dependent on rows). The values in the cells in these tables can be transformed to odds by taking the exponential function ( $\exp.[\beta]$ ).

### 6.5.5 Descriptive norms and friendship dynamics

As expected, descriptive norms did not play a role in the extent to which friendship processes took place within classrooms (see Tables S6.2 and S6.3 in the supplemental material;  $z$ -scores are available upon request). Hence, the average aggregated mastery and performance goals within the classroom did not

play a role in friendship selection, maintenance, and influence processes with regard to achievement over time. Ego-alter tables are also available upon request.

## **6.6 Discussion**

The current study investigated the role of achievement goal peer norms in friendship processes related to academic achievement. Our results indicate that the salience of mastery and performance goals within the classroom context, measured in terms of popularity norms, has meaningful implications for the magnitude and direction of these processes. Hence, the extent to which popular peers pursue mastery goals or performance goals has implications for the coevolution between friendships and academic achievement across the school year.

### **6.6.1 The moderating role of achievement goal popularity norms in friendship processes**

**Selection and maintenance.** In line with our expectations, we found that performance goal popularity norms moderated friendship selection and maintenance processes related to achievement. Interestingly, the salience of performance goals had a differential impact on friendship selection and maintenance processes: the higher the performance goal popularity norms, the higher the tendency of adolescents to select similarly achieving peers as friends, and the lower the tendency of adolescents to maintain similarly achieving peers as friends. These results provide valuable insight in the differential impact of performance goal popularity norms on friendship selection and maintenance processes. With regard to selection processes, we found in line with one of our hypotheses that similarity-based selection took place among both low-achieving and (especially) high-achieving students in classrooms with high performance goal popularity norm classrooms. Hence, our alternate hypothesis that adolescents would select lower achieving peers as friends (possibly due to self-enhancement perspectives) was not supported. In classrooms with high performance goal popularity norms, it may be useful to select similarly achieving friends for two reasons. First of all, classrooms where performance goals are salient are generally characterized by competition and social comparison, implying that students are highly attuned to interpersonal differences in achievement and academic reputation (Brophy, 2005). It could be theorized that when levels of achievement

are similar, comparisons are less threatening for self-worth (Elliot et al., 2011; Festinger, 1954). Second, selecting similarly high-achieving friends (which took place most often) may be useful in classrooms where performance goals are salient, as adolescents may have an exploitation orientation toward other students, even toward friends (Levy-Tossman et al., 2007; Poortvliet et al., 2007). One can profit from information exchange from similarly high-achieving friends and take advantage of their knowledge and skills (Poortvliet et al., 2007) to reach the goal of outperforming others. Therefore, forming friendships with similarly high-achieving friends may serve the salient goal of achieving superiority over others.

However, with regard to maintenance processes, friendships among similarly high-achieving peers are less likely to last in classrooms where performance goals are made salient by popular peers (compared with classrooms with low performance goal popularity norms). More specifically, in line with our hypothesis, adolescents had an increased tendency to maintain friendships with peers who were dissimilar in achievement in classrooms where performance goals were salient. Hence, the alternate hypothesis that adolescents would maintain similarly achieving peers as friends was not supported. This might be due to the fact that, as soon as similarly achieving peers become friends, social comparison may increase because they become closer to each other (and the higher the proximity, the more social comparison may take place; Festinger, 1954). Due to this increased proximity, minor differences in academic functioning may become more visible and threatening (for instance, when one friend receives positive feedback from a teacher whereas another does not, or when one friend scores slightly higher on a test than the other; see also Sommet et al., 2014; Sommet, Darnon, & Butera, 2015). As a consequence, similarly high-achieving friends may increasingly see each other as a threat toward obtaining the goal of outperforming others, which may result in the dissolution of friendships among these similarly high-achieving peers. As very different others are a less relevant source for comparison, friendships among dissimilar peers may be less threatening at the longer term (Festinger, 1954). Second, it could also be theorized that friendships among similarly high-achieving peers dissolve because the quality of these friendship decreases due to the aforementioned competition or “exploitation practices”, which may lead to mutual mistrust, tension, and lower intimacy among friends (Levy-Tossman et al., 2007; Poortvliet et al., 2007).

Next, in line with one of our hypotheses, mastery goal popularity norms did not play a role in similarity-based selection, nor in similarity-based maintenance, related to achievement. Hence, the alternate hypothesis that mastery goals would strengthen friendship selection and maintenance based on similarity in high achievement was not supported. Even though previous studies indicated that social comparison may take place in classrooms where mastery goals are salient (Collins, 1996, 2000), it might be the case that social comparison does not take place based on achievement, but rather based on aspirations and underlying motivation to learn more about a particular topic. Therefore, if social comparison would take place in these classes with salient mastery goals, it might not play a role in friendship selection and maintenance related to achievement. In general, it seems that the focus on developing competence and the intrinsic value of learning might not be strong enough to break down the tendency to select and maintain similar friends (similarity-attraction hypothesis, Byrne & Lamberth, 1971). Hence, the attraction to similar peers as friends due to higher levels of perceived trust and predictability (Byrne & Lamberth, 1971) may be important in all classrooms, regardless of the mastery goal popularity norm within the classroom.

**Friendship influence.** Contrary to our hypothesis, we found that performance goal popularity norms did not play a role in the extent to which adolescents have a tendency become similar to their friends in terms of achievement. Even though friendship influence was generally lower when the association between popularity and performance goals was higher, the influence parameter did not significantly diverge across classrooms with different performance goal popularity norms. This finding can be explained as follows: although performance goal popularity norm classrooms may be characterized by less information exchange (Poortvliet et al., 2009), even among friends (Levy-Tossman et al., 2007), it could be hypothesized that students are highly attuned to any useful or high-quality information within their exchanges with their friends because of their exploitation orientation (Poortvliet et al., 2007). In this way, fewer interactions among students may still have important implications for the extent to which friends may influence each other in achievement over time. Future work that includes examination of the quality and quantity of information exchanged in the classroom could further our understanding of the implications of achievement goal norms for friend processes in the classroom.

Next, in line with our hypothesis, mastery goal popularity norms played a role in the extent to which adolescents became similar to their friends in terms of academic achievement. First of all, the tendency of adolescents to become similar to their friends increased when the association between mastery goals and popularity increased. Adolescents are more susceptible to friendship influence on academic achievement in classrooms where mastery goals are the popularity norm. Prior work indicates that mastery goals yield a cooperative goal structure in which adolescents perceive others as helpers to achieve their goals (Elliot et al., 2016; Karabenick, 2003; Roussel et al., 2011; Ryan & Shim, 2012). It could be hypothesized that this may be associated with useful exchange patterns and elaborated problem solving discussions (Harris, Yuill, & Luckin, 2008) in which adolescents reciprocally share information with each other (Porter, 2005; Poortvliet et al., 2007). Information exchange is the mechanism theorized to underlie peer socialization (Kindermann & Gest, 2009; Ryan, 2000) and our results indicate that when popular students increase the conditions for this mechanism by endorsing mastery goals, socialization is enhanced. Future studies are encouraged to test whether the increased tendency to be influenced by friends in these high mastery goal popularity norm classrooms indeed could be due to higher levels of information exchange.

Second, our results indicate that this increased susceptibility for friendship influence in high mastery goal popularity norm classrooms can be beneficial (in that adolescents' achievement will increase when their friends' achievement is higher on average) or detrimental (in that friends may influence adolescents to become lower in achievement). These unanticipated detrimental effects may be explained in two ways. First, previous studies have found that students with mastery goals are less apt to detect low-quality information when working with others, which can hinder task performance (Poortvliet et al., 2007). This may be due students' cooperative mindset (i.e., the inclination to view other students as helpers, even lower achieving students; Porter, 2005). Further, the salience of mastery goals may enhance a focus on what is interesting, which could distract students from the focus of the task. This finding implies it is important for teachers to provide guidance for productive discussions and help-seeking among students, even when they are focused on mastery goals. Second, our finding could be due to the fact that we measured peer-perceived achievement (i.e., academic reputation) instead of teacher-assigned grades. It could be hypothesized that

mastery goal popularity norm classrooms are characterized by higher levels of information exchange among students that provide more opportunities for students to learn more about the academic skills of their classmates compared with in classrooms with less information exchange (i.e., high performance goal popularity norm classrooms). As the school year unfolds, there are more opportunities to see classmates struggle with challenging tasks, which may affect their perception on how well their peers are doing at school. Therefore, especially in these high mastery goal popularity norm classrooms, students may be more highly aware of the struggles and difficulties their fellow students experience, which may result in a decline in peer-perceived achievement of classmates and friends. Future studies could compare friendship processes related to peer-perceived achievement and teacher-assigned grades in mastery goal popularity norm classrooms to investigate whether potential differences may be due to increased knowledge about each other's difficulties in completing tasks.

### **6.6.2 Achievement goal descriptive norms and friendship processes**

As expected, descriptive norms did not play a role in the extent to which friendship selection, maintenance and influence processes take place. First of all, this finding could be due to the fact that descriptive norms are a quite subtle aspect of the environment as they represent average aggregated goals. This does not say much about the valence of a particular behavior, as it might be the case that there is a lot of variation within classrooms regarding these goals, and this variation is not taken into account. Moreover, according to social impact theory, the strength of social forces (in this case, peer norms) is a function of the status of peers, closeness of peers, and number of peers present (Latané, 1981). Descriptive norms only represent the last, quite subtle aspect of this function and hence may not be strong enough to determine social impact (Laniga-Wijnen et al., 2017). Second, descriptive norms represent only the behavioral characteristics of a group, whereas popularity norms refer to corresponding rewards of a group given compliance with the norm (i.e., gaining popularity). Third, descriptive norms place equal weight on all students within the classroom, but not all students may be equally influential. As shown in former studies and in the current study, popular students may be especially influential, as popularity is often more highly desired and more actively pursued by adolescents than by children (LaFontana & Cillessen, 2010), and behaving like popular peers may be an important tool to gain

popularity in the peer group (Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010). Descriptive norms also include the behaviors of less popular peers and students may have the tendency to behave opposite to the behaviors of these nonpopular students (Teunissen et al., 2012). Therefore, descriptive norms may be less important for friendship processes. Fourth, in the current study, there was not a high variation in the averages of descriptive norms (especially for mastery goals, which is a common finding in other studies, e.g., Kaplan, Middleton, Urdan, & Midgley, 2002; Patrick, Kaplan, & Ryan, 2011; Régner et al., 2007; Urdan, Midgley, & Anderman, 1998). However, previous studies indicated that even variation at the higher end of the mastery goal scales seemed to matter for academic adjustment and interpersonal relations (Kaplan et al., 2002; Patrick et al., 2011; Régner et al., 2007; Urdan et al., 1998). Therefore, even though there was not a high variation in average descriptive norms, this variation could still have been predictive of friendship processes.

### **6.6.3 Limitations and strengths**

Several limitations of the present study need to be acknowledged. First, our reasonably complex model could initially not be identified (convergence problems) in our small classroom-level networks of just 11 to 30 students. Therefore, we combined classrooms with similar levels of peer norms (low, moderate and high) and analyzed them simultaneously using multigroup analyses, which is an approach that is in line with various previous studies that included rather small classrooms (i.e., Delay et al., 2016; Logis et al., 2013; Shin & Ryan, 2014a; Svensson, Burk, Stattin, & Kerr, 2012; Weerman, 2011). Although the use of multigroup analyses increases power and allows for model identification, class-level variation is only considered for some and not all parameters. In this way, multigroup analyses differ from meta analyses which take into account class-level variation for each parameter in the model. Future studies with larger sample sizes may attempt to replicate our study with meta-analyses, so that class-level variation can be taken into account for all parameters in the model. Moreover, these future studies also could include class-level variables like gender-ratio and educational level, as these variables may play a role in the extent to which achievement goal peer norms are associated with friendship processes on achievement (Anderman & Midgley, 1997; Gherasim, Butnaru, & Mairean, 2013; Shin & Ryan, 2014a).

A second limitation is that we analyzed math and science classrooms without attention to potential differences between subjects (and did not have an adequate design or number of classrooms to do so). Some recent work has conceptualized science and math classrooms as having many similar features that affect adolescents' motivation and engagement similarly (see Fredricks et al., 2016; Wang et al., 2016). However, there are also differences in classroom activities (e.g., doing experiments in science but not math). Future work that assesses peer dynamics, engagement and achievement in both domains for the entire sample could address potential differences.

Third, we did not specifically address potential differences in achievement goals and friendship processes between fifth and sixth grade students due to power limitations. Preliminary analyses revealed no significant differences between Grade 5 and Grade 6 with regard to our research questions (see the Results section). Hence, our findings might imply that the extent to which popular students make achievement goals salient for friendship processes related to achievement might be independent of how often students are together. Indeed, previous studies and theory argue that group dynamics emerge when teacher and students come together each day in classroom, be it for an hour or for most of the day (Veenstra & Dijkstra, 2011). Moreover, both grades consist of early adolescents, which experience quite similar levels of hormonal changes and a similar peak in the desire for popularity (Steinberg, 2007). Also, previous studies indicated that peer-perceived achievement in middle school math and science classrooms operated in similar ways as in elementary school classrooms (North & Ryan, 2017). Future studies with larger sample sizes are encouraged to further examine whether achievement goals of the norms of popular peers play a similar role in the coevolution of friendships and achievement in both Grade 5 and 6.

These limitations notwithstanding, this research has several strong and innovative points. First, our study responds to the "context gap" in the current literature on friendship processes regarding academic achievement. Until now, studies investigated achievement-related friendship processes without considering the broader social peer context in which these processes take place. Our study, aimed at capturing the broader social context in terms of achievement goal peer norms (specifically in terms of popularity norms), found that the direction and magnitude of friendship processes is dependent upon the broader social peer context in which they take place. An avenue for future research on the role of peer

norms and friendship processes related to achievement would be to analyze whether peer norms play a role in the relative contribution of selection and socialization processes (e.g., Rambaran & colleagues, 2016). On the basis of the results of the current study, it could be expected that in classrooms with higher performance goals, selection processes would contribute more to similarity than socialization, whereas in classrooms with higher mastery goals, this would be the opposite.

Second, next to selection processes, we analyzed friendship maintenance processes, which have been rarely studied so far with regard to achievement. Our results indicate the importance of making a distinction between these two processes, as the context (in terms of performance goal popularity norms) may play a differential role in the direction and magnitude of these processes. Hence, future studies are encouraged to make a distinction between maintenance and selection processes related to achievement. Also, we encourage future researchers to take into account the quality (e.g., a “close” friend or an acquaintance; see for instance Berndt, 1999) of the friendship relationship in examining the role of norms on friendship processes.

Third, an innovative point is that we examined friendship dynamics related to peer-perceived achievement and not to actual grades. The use of peer-perceived achievement as an outcome variable has both practical and theoretical value for the current study. First of all, an important assumption of SIENA is that students have full information about behavior in the network. The use of peer-perceived achievement assures us that we really measure the perception, and thus, the actual information students have on others’ behaviors in the network. Second, previous studies indicated that adolescents may especially be influenced (in their friendship choices and in their behavior) by what they think their peers are doing (Bandura, 1986; Helms, Choukas-Bradley, Widman, Giletta, Cohen, & Prinstein, 2014). They may not always be aware of the GPA of other peers, but their close proximity and interactions with classmates may certainly contribute to their perceptions on how well someone is doing at school (Gest et al., 2008). Hence, capturing the perceptions of peers may provide novel intriguing information on how selection, maintenance, and influence processes related to achievement take place.

#### 6.6.4 Contributions and future directions

Contributions of our study are twofold. First of all, our research adds to the current field by adopting a social psychology perspective on the role of achievement goals (Doise, 1986; Darnon et al., 2012) and by adequately examining processes of achievement-based friendship selection, maintenance, and socialization with stochastic actor-based modeling. In this way, the current study adds a new dimension to a more social understanding of achievement goals and contributes to our understanding of the interpersonal effects of achievement goals (Darnon et al., 2012). Future studies are encouraged to expand upon the current study to examine whether other types of academic peer norms relate to friendship processes on achievement as well, as there may be a variety of peer norms regarding academic behaviors and attitudes.

Second, the current study examined descriptive norms and popularity norms, and showed that (in line with an increasing number of studies on social adjustment; i.e., Laninga-Wijnen et al., 2017; Rambaran et al., 2013) popularity norms create an important context for the coevolution of friendships and behavior (i.e., achievement in the current study). Our results show that in classrooms where performance goals are endorsed by popular students, this may be detrimental for friendships among peers with similar levels of achievement. Moreover, influence processes are marginal, indicating that there are less possibilities to really learn from each other and to improve skills (i.e., “everybody on their own island”). Classrooms where popular students endorse mastery goals seem to provide an environment in which every student can be successful, but also an environment with certain hazards. Students may profit from interactions with friends who are high-achievers, resulting in similarity in achievement over time. However, we also found that higher achieving students may be disadvantaged by interactions with lower achieving friends (possibly because these friends do not share high-quality information in exchanges). Hence, teachers need to provide guidance and support for students’ task-related interactions so that the exchanged information remains of high quality (Poortvliet et al., 2007). The higher susceptibility for peer influence in classrooms where popularity norms make mastery goals salient has potential benefits and drawbacks. Therefore, more studies are needed on the protective factors that could play a role in the direction of friendship influence on achievement in these classrooms with mastery goal popularity norms.

By indicating the importance of popularity norms for friendship processes related to achievement, the current study presents a clarion call to perform more studies in the educational field on the role of popularity norms for academic behaviors and social relations (McCormick & Cappella, 2015). Especially during adolescence, when popularity is such a highly valued characteristic and goal, the norms of popular adolescents may have a profound impact on which academic behaviors are positively valued and reputationally salient within a particular setting (Hartup, 1996). Another interesting area of future research would be to also examine the potential moderating role of individual-level popularity in friendship processes related to achievement in this age-group. This may provide a fuller account of the role of popularity in friendship processes related to achievement in early adolescence. Importantly, in the current study we made a first step in investigating the role of achievement goal salience in friendship processes, by focusing on the role of performance and mastery goal status norms separately. Our study provides a basis regarding these key relations for future studies that may examine the effect of these popularity norms more in depth. For instance, as performance goals and mastery goals can also form constellations within classrooms (Tuominen-Soini, Salmela-Aro, & Niemivirta, 2011) according to the multiple goals perspective (Pintrich, 2000). It therefore might be interesting to examine what friendship processes look like in classrooms where both performance and mastery goals are salient, compared with classrooms where either mastery or performance goals are salient or in classrooms where neither achievement goals are salient.

### **6.6.5 Conclusion**

In conclusion, by considering the achievement goals of popular students in classrooms in relation to friendship dynamics across the school year, the present research contributed to the literature on achievement goals as well as friendship processes related to achievement. Classrooms are social places where students are developing friendships and learning, and our results shine light on the complex interplay between social and academic adjustment during early adolescence. For decades, theory and research has given much attention to how teachers affect students' achievement goals and learning outcomes (Ames, 1992; Brophy, 2005). There has been growing recognition in recent years about the role that teachers play in peer dynamics in classrooms (Farmer, Lines, & Hamm, 2011; Gest, Madill,

Zadzora, Miller, & Rodkin, 2014). An implication of our findings is that attention to popularity dynamics by teachers is warranted and likely to play a key role in the motivational climate in classrooms of early adolescent students. Teachers receive little to no training in how to manage peer relationships in the classroom. When asked about their efficacy for managing peer relations, both elementary and middle school teachers reported feeling less efficacious about this aspect of their work compared with instruction, motivation and classroom management (Ryan, Kuusinen, & Bedoya-Skoog, 2015). Thus, research and theory to guide professional development supporting teachers in managing peer relationships is an important direction for educational psychology that could advance our understanding of how educators can best support early adolescents' social and academic adjustment.

**Supporting Information to:**

“The Moderating Role of Popular Peers’ Achievement Goals in 5<sup>th</sup>-and 6<sup>th</sup>-graders’ Achievement-related Friendships: A Social Network Analysis.”

List of Appendices:

**Table S6.1.** Mathematical representation and interpretation of the effects used in the present study.

**Appendix (6A).** Overview of control effects we included in our models.

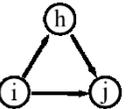
**Appendix (6B).** Description of the friendship network and achievement in different achievement goal classes.

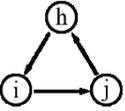
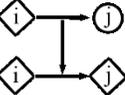
**Appendix (6C).** Discussion control variables in analyses as reported in Tables 6.3 and 6.5, and Tables S6.2 and S6.3.

**Table S6.2.** Performance Goal Descriptive Norms and Friendship Dynamics related to Achievement: RSIENA Multi-group Analyses in Classes with Low, Moderate, and High Aggregated Average Performance Goals

**Table S6.3.** Mastery Goal Descriptive Norms and Friendship Dynamics related to Achievement: RSIENA Multi-group Analyses in Classes with Moderate, High and Very High Aggregated Average Mastery Goals

Table S6.1  
*Interpretation of the parameters used in the current study*

Term for parameter in current study	SIENA term	Conceptual meaning	Graphical representation
<i>Descriptives</i>			
Average number of friends	Average outdegree	Average number of friends	
Cohesion in friendship network	Density	Total number of friendship ties divided by the total number of possible friendship ties	
Proportion reciprocated friendships	Reciprocity	Proportion of reciprocated relationships within the friendship network	
Proportion triadic friendships	Transitivity	Proportion of transitive relationships within the friendship network	
Average number of friendship changes	Hamming Distance	Average number of friendship changes from one time point to the next	
Proportion of stable friendships	Jaccard index	The proportion of stable friendship relations out of the total number of created, resolved, and stable friendship relations	
<i>Structural Network Dynamics</i>			
Tendency to make friends	Outdegree	Tendency to have friends at all	
Reciprocated friendships	Reciprocity	Tendency to form reciprocated relationships	
Transitive group formation	Transitive triplets effect	Tendency toward network closure (friends of my friends are my friends). Transitive triplets are hierarchical in nature	

Cyclical group formation	3-cycles effect	Tendency toward forming three-cycles, which is the simplest form of generalized exchange and is opposed to hierarchy	
<i>Selection Dynamics</i> Effect of achievement on friendship nominations received	Alter Effect	Tendency of adolescents to select high-achieving peers as friends	
Effect of achievement on friendship nominations given	Ego Effect	Tendency of high-achieving adolescents to send friendship nominations	
Similarity-based selection of friends based on achievement	Evaluation similarity effect	Tendency for adolescents and friends to select each other based on similarity between the adolescents and friends in the independent variable (i.e., achievement).	
<i>Influence Dynamics</i> Friendship influence on achievement	Average similarity effect	Tendency of friends to become more similar in behavior over time: the friends' behavior predicts changes in the adolescent's behavior (i.e., achievement)	

**Appendix (6A).** Overview of control parameters we included in our models.

**Structural network tendencies.** We included four control parameters to more accurately assess and avoid over-estimation of selection and influence dynamics. The "*tendency to make friends*" parameter functions as an intercept in the friendship model, capturing the overall tendency of adolescents to form friendship ties. Data-sets like ours are characterized by high interdependencies, as we do not investigate random samples of students, but groups of students who share a quite intensely experienced classroom context. A strong point of RSIENA is that it allows for taking into account these interdependencies. In general, friendships are characterized by a strong tendency to reciprocate relationships, resulting in non-independence among incoming and outgoing ties *within* a dyad. We controlled for this tendency by including the parameter of "*reciprocated relationships*". Adolescents also have a tendency to form groups of friends (i.e., "friends of my friends are my friends"), resulting in non-independence *between* dyads. This departure from interdependence is controlled for in RSIENA using the "*transitive group formation*" and "*cyclical group formation*" parameters. Transitive groups are hierarchical in nature, as some peers receive more friendship nominations than others. Cyclical groups are more egalitarian; a positive "cyclical group formation" effect indicates a tendency to have no pronounced differences in the number of friendship nominations that group members receive (i.e., more three-cycles), whereas a negative parameter estimate represents a tendency to have local hierarchical ordering with relatively few three-cycles. By examining these four structural network parameters, we are able to take into account the dependency in friendship networks. Also, we avoid over-estimation of selection, maintenance, and influence effects (Snijders et al., 2010). For instance, two adolescents may become friends because they are similar in their academic achievement, but they may also become friends because they share a common friend (i.e., "friends of my friends are my friends", measured using group formation tendencies).

**Behavioral tendencies in the network.** We estimated friendship influence processes while controlling for the linear shape parameter, quadratic shape parameter, and the main effect of gender and race on achievement. It is crucial to control for the overall development of achievement within a particular context (i.e., the classroom) to provide more reliable estimates of the extent to which the adolescent's achievement is influenced by friends. The *linear* and

*quadratic shape* parameters represent the rate of change, indicating whether achievement change conforms to linear or quadratic trends. More specifically, a positive quadratic shape parameter implies that the higher an adolescent scores on achievement, the stronger the adolescent's tendency to increase his or her achievement even higher (escalation); a negative quadratic shape parameter means that the higher an adolescent scores on achievement, the lower the adolescent's achievement gets over time (self-corrective).

**Control parameters related to students' traits.** Next to the fact that we controlled for structural network variables in examining selection processes and for behavioral tendencies in examining influence processes, we included control parameters based on students' traits (i.e., gender and race). For selection, we included "*the effect of gender on friendship nominations received*" and "*the effect of gender on friendship nominations given*" as well as "*the effect of race on friendship nominations received*" and "*the effect of race on friendship nominations given*" in our models. However, none of these parameters were significant and the model fit did not significantly improve by including these parameters. Therefore, in line with previous SIENA studies (i.e., Dijkstra et al., 2013) these effects were included as "fixed effects" which implies that they are not allowed to vary for that model. Similarity-based selection for gender and race were captured with the *same gender* and *same race* parameters; these parameters served as control parameters because a lot of friendships are organized by race and gender.

For influence, we included parameters "*effect of race on achievement*" and "*effect of gender on achievement*" to assess the extent to which gender and race were predictive of peer-perceived achievement in our models. However, because these parameters were not significantly predictive of achievement and because the model fit did not improve by including these parameters, we fixed these parameters in the model as well.

**Appendix (6B).** Description of the friendship network and achievement in different achievement goal classes.

Table 6.1 and Table 6.2 present a description of the friendship network and achievement. The amount of friendship nominations varied between 5 and 7 across time points and across achievement goal classes, which is in line with previous studies (see Laninga-Wijnen et al., 2017; Shin & Ryan, 2014a). Hence, adolescents on average had 5 to 7 friends. The network was characterized by moderate reciprocity, with participants reciprocating about 40% to 50% of the friendship ties. This is somewhat less than the 60-70% reciprocated ties that are commonly found in studies with unlimited best-friend nominations, and reflects that we relied on defining a network based on friends that adolescents “hang around” with; which is probably less reciprocal compared to a network of best friends (Rambaran et al., 2016). The proportion of triadic friendships and density (i.e., cohesion of the network) were comparable to previous studies. The *Jaccard Index* showed satisfactory stability in friendship ties of more than 40% which is necessary for longitudinal social network analysis (Veenstra, Dijkstra, Steglich, & van Zalk, 2013). With regard to achievement change, there are differences between achievement goal classes. In performance goal popularity norm classes, most adolescents increased in achievement in high performance goal classes and decreased in achievement in low performance goal classes. High mastery goal popularity norm classes were characterized by higher levels of change in achievement compared to moderate and low mastery goal classes. In high mastery goal classes achievement was least stable with relatively more decreases and increases in achievement compared to other classes.

**Appendix (6C).** Discussion control variables in Tables 6.3 and 6.5.

**Network effects.** Because the results of the control variables (i.e., network effects) were fairly similar in all models, we discuss the network effects based on the model reflecting multi-group analyses on *all* classes. The negative outdegree parameter (tendency to make friends) indicated the low density of the network: friendships were not formed with just anyone in class. The positive reciprocity parameter (reciprocated friendships) indicated that respondents reciprocated the friendship nominations they received from their peers. The positive transitive triplets parameter reflected that respondents befriended the friends of their friends, and the negative cyclical group formation parameter indicated that there was local hierarchy in the peer groups, implying that some adolescents within a group received more friendship nominations than others.

**Selection dynamics.** Selection parameters for gender and race were also similar across all multi-group analyses. The positive same gender and same race effects indicated that, on average, more same-gender and more same-race classmates were chosen as friends than cross-sex and cross-race classmates. In the multi-group analyses on all classes, ego effects and alter effects were both significant, indicating that in general, high-achieving peers received and gave more friendship nominations. However, the different multi-group analyses indicated that ego effects ("*effect of achievement on friendship nominations given*") were significantly higher in low performance goal popularity norm classes compared to in moderate performance popularity norm classes. Furthermore, alter effects ("*effect of achievement on received friendship nominations*") varied across different types of classes. These differences reached statistical significance for mastery goal descriptive norms (as indicated with different superscripts): in high mastery goal descriptive norm classes, high-achieving students received more friendship nominations.

Students' peer-perceived achievement changed in relatively similar ways across the different types of classes. First, the negative linear shape parameter indicated that in almost all classes, achievement declined (except for moderate mastery goal descriptive norms). The positive quadratic shape parameter (in all different types of classes) indicated that those high in achievement tend to become even higher in achievement across the school year, whereas those low in achievement tend to become even lower in achievement across the school year.

Table S6.2

*Performance Goal Descriptive Norms and Friendship Dynamics related to Achievement: RSIENA Multi-group Analyses in Classes with Low, Moderate, and High Aggregated Average Performance Goals*

	Low performance goal descriptive norms ( $N = 11$ )			Moderate performance goal descriptive norms ( $N = 24$ )			High performance goal descriptive norms ( $N = 11$ )		
	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>
<i>Network Dynamics</i>									
Tendency to make friends	-2.12***	0.08	0.12	-1.65**	0.05	0.19	-1.73***	0.08	0.18
Reciprocated friendships	1.15***	0.10	3.16	1.01***	0.06	2.75	0.93***	0.10	2.53
Transitive group formation	0.33***	0.02	1.39	0.18***	0.01	1.20	0.25***	0.02	1.28
Cyclical group formation	-0.30***	0.04	0.74	-0.21***	0.02	0.81	-0.27***	0.03	0.76
<i>Selection Dynamics</i>									
Same gender (1=boy) selection	0.59***	0.07	1.80	0.47***	0.04	1.60	0.55***	0.06	1.73
Same race selection	0.35***	0.06	1.42	0.21***	0.04	1.23	0.19**	0.06	1.21
Effect of achievement on friendship nominations received	0.05*	0.03 <sup>a</sup>	1.05	0.07***	0.02 <sup>a</sup>	1.07	0.13**	0.04 <sup>a</sup>	1.14
Effect of achievement on friendship nominations given	0.00	0.03 <sup>a</sup>	1.00	0.04*	0.02 <sup>a</sup>	1.04	0.07*	0.04 <sup>a</sup>	1.07
Similarity-based selection of friends	0.49	0.29 <sup>a</sup>	1.63	0.17	0.21 <sup>a</sup>	1.19	0.52	0.41 <sup>a</sup>	1.68
<i>Maintenance Dynamics</i>									
Similarity-based maintenance of friends	0.25	0.34 <sup>a</sup>	1.28	0.35	0.20 <sup>a</sup>	1.42	0.36	0.44 <sup>a</sup>	1.43
<i>Influence Dynamics</i>									
Achievement linear shape	-0.26	0.15	0.77	-0.16	0.09	0.85	0.00	0.10	1.00
Achievement quadratic shape	0.55***	0.16		0.42**	0.11		0.10	0.12	
Friendship influence on achievement	3.05	1.87 <sup>a</sup>	2.76	3.32**	1.33 <sup>a</sup>	3.02	0.72	1.39 <sup>a</sup>	1.27

*Note.* All models represent separate multi-group analyses. *B* = the unstandardized multinomial logit coefficient. *SE* = Standard Error. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$  Different superscripts of *SE*'s indicate that class types differ significantly from each other in estimate (as computed with z-tests). Low, moderate and high performance descriptive norms refer to low, moderate and high class-level aggregated average performance goals. Achievement refers to peer-perceived achievement.

Table S6.3

*Mastery Goal Descriptive Norms and Friendship Dynamics related to Achievement: RSIENA Multi-group Analyses in Classes with Moderate, High and Very High Aggregated Average Mastery Goals*

	Moderate mastery goal descriptive norms ( $N = 11$ )			High mastery goal descriptive norms ( $N = 24$ )			Very high mastery goal descriptive norms ( $N = 11$ )		
	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>	<i>B</i>	<i>SE</i>	<i>OR</i>
<i>Network Dynamics</i>									
Tendency to make friends	-1.69***	0.07	0.18	-1.69***	0.05	0.18	-1.95***	0.09	0.14
Reciprocated friendships	1.13***	0.09	3.10	0.96***	0.06	2.61	1.11***	0.11	3.03
Transitive group formation	0.20***	0.01	1.22	0.19***	0.01	1.21	0.30***	0.02	1.35
Cyclical group formation	-0.24***	0.02	0.79	-0.21***	0.02	0.81	-0.35***	0.04	0.70
<i>Selection Dynamics</i>									
Same gender selection	0.52***	0.06	1.68	0.49***	0.04	1.63	0.68***	0.07	1.97
Same race selection	0.23**	0.06	1.26	0.25***	0.04	1.28	0.29***	0.07	1.34
Effect of achievement on friendship nominations received	0.04	0.03 <sup>a</sup>	1.04	0.09***	0.02 <sup>ab</sup>	1.09	0.13***	0.04 <sup>b</sup>	1.14
Effect of achievement on friendship nominations given	0.03	0.03 <sup>a</sup>	1.03	0.05*	0.02 <sup>a</sup>	1.05	0.04	0.04 <sup>a</sup>	1.04
Similarity-based selection of friends	0.73*	0.29 <sup>a</sup>	2.07	0.01	0.23 <sup>a</sup>	1.01	-0.17	0.42 <sup>a</sup>	0.84
<i>Maintenance Dynamics</i>									
Similarity-based maintenance of friends	0.16	0.32 <sup>a</sup>	1.17	0.37	0.21 <sup>a</sup>	1.45	0.79	0.49 <sup>a</sup>	2.20
<i>Influence Dynamics</i>									
Achievement linear shape	0.05	0.12	1.05	-0.26**	0.09	0.77	-0.01	0.12	0.99
Achievement quadratic shape	0.28*	0.14		0.48***	0.10		0.13	0.14	
Friendship influence on achievement	2.43	1.67 <sup>a</sup>	2.25	2.46*	1.13 <sup>a</sup>	2.27	1.69	1.59 <sup>a</sup>	1.76

*Note.* All models represent separate multi-group analyses. *B* = the unstandardized multinomial logit coefficient. *SE* = Standard Error. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ . Different superscripts of *SE*'s indicate that class types differ significantly from each other in estimate (as computed with z-tests). Mastery descriptive norms refer to class-level aggregated average mastery goals. Achievement refers to peer-perceived achievement.

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## Classroom Popularity Hierarchy Predicts Prosocial and Aggressive Popularity Norms Across the School Year

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**Author Contributions:**

L.L.-W. conceived of this study, participated in its design and data-collection, conducted and interpreted statistical analyses and drafted the manuscript; Z.H, C. G, J.K.D., R.V. and W. V. designed the SNARE project and helped to draft the manuscript.

This study examined the coevolution of prosocial and aggressive popularity norms with popularity hierarchy (asymmetries in students' popularity). Cross-lagged-panel analyses were conducted on 2,843 secondary school students ( $N_{\text{classrooms}} = 120$ ;  $M_{\text{age}} = 13.17$ ; 51.4% girls). Popularity hierarchy predicted relative change in popularity norms over time, but not vice versa. Specifically, classrooms with few highly popular and many unpopular students, increased in aggressive popularity norms at the beginning of the school year and decreased in prosocial popularity norms at the end of the year. Also, strong within-classroom asymmetries in popularity predicted relatively higher aggressive popularity norms. These findings may indicate that hierarchical contexts elicit competition for popularity, with high aggression and low prosocial behavior being seen as valuable tools to achieve popularity.

## 7.1 Introduction

In early adolescence, being popular becomes prioritized over other domains in life (LaFontana & Cillessen, 2010). Popularity can be defined as a social reputation characterized by social power, dominance, and visibility (Cillessen & Marks, 2011). Popularity provides access to valuable social and material resources (Hawley, 2003) such as peers' attention, awe and admiration, to which early adolescents become increasingly sensitive (Chein, Albert, O'Brien, Uckert, & Steinberg, 2011; Crone & Dahl, 2012). Behaviors associated with popularity in a particular social setting, such as the classroom, are seen as valuable tools to obtain or maintain high popularity (Hartup, 1996). Whereas aggression is associated with unpopularity or rejection during childhood, it becomes in adolescence an adaptive behavior that – just as prosocial behavior – helps adolescents to gain or maintain popularity (Cillessen & Mayeux, 2004; Hawley, 1999; Pouwels, Lansu, & Cillessen, 2018). The within-classroom associations between popularity and aggressive or prosocial behaviors are referred to as "popularity norms" or norm salience (Dijkstra & Gest, 2015). Importantly, the extent to which aggressive and prosocial behaviors are associated with popularity varies largely across classrooms (Laninga-Wijnen, Harakeh, Dijkstra, Veenstra, & Vollebergh, 2018a). Previous work focused on the consequences of these variations in popularity norms, suggesting that high aggressive popularity norms may create undesirable environments by promoting aggressive behaviors (Laninga-Wijnen, Harakeh, Steglich, Dijkstra, Veenstra & Vollebergh, 2017), whereas high prosocial popularity norms may foster prosocial behaviors (Laninga-Wijnen et al., 2018a). However, little is known about the origins of these between-classroom differences in popularity norms in the first place.

One classroom characteristic that may predict popularity norms is the degree to which popularity is unequally distributed in the classroom: the within-classroom popularity hierarchy (Koski, Xie, & Olson, 2015). From a *functionalist perspective* (Pellegrini & Long, 2002), a popularity hierarchy results in a clearly-organized classroom network, where all students know and accept their position. In such a well-established, orderly and harmonious environment, prosocial behaviors are highly valued and rewarded with popularity whereas aggression is not (i.e., high prosocial and low aggressive popularity norms). In contrast, the *balance of power* perspective (Garandeanu, Lee, & Salmivalli, 2014) argues that strong popularity hierarchies may evoke a power battle – competition for popularity – as resources associated with popularity are unequally divided among classmates. In such a competitive context, aggression may be seen as a valuable tool rewarded with popularity, resulting in high aggressive and low prosocial popularity norms. In sum, these two theoretical perspectives suggest that popularity hierarchy plays a role in the emergence of popularity norms; but they make opposite predictions regarding the direction (positive or negative) of these associations. It is also conceivable that prosocial and aggressive popularity norms predict popularity hierarchy over time (Closson, 2009), as the aggressive and prosocial behaviors of popular youth may serve to maintain or further crystallize hierarchy within a classroom (Pratto, Pearson, Lee, & Saguy, 2008). Therefore, this longitudinal study examined the coevolution of popularity hierarchy and popularity norms across the school year.

### **7.1.1 The concept of popularity hierarchy**

Popularity hierarchy is often operationalized as the degree of variation (i.e., standard deviation) in popularity among the students of a classroom; with strong variations in popularity indicating hierarchical classrooms and small variations indicating egalitarian classrooms (e.g., Garandeanu, Ahn, & Rodkin, 2011; Garandeanu et al., 2014; Zwaan, Dijkstra, & Veenstra, 2013). This approach assesses the *strength* of the hierarchy, but not the *shape* of the hierarchy (Pattiselanno, Dijkstra, Steglich, Vollebergh, & Veenstra, 2015). For example, a classroom with large variations in popularity could include a few highly popular individuals and many unpopular individuals (pyramid shape; see Figure 7.1a, 7.1b) or many popular individuals and a few unpopular individuals (inverted pyramid, see Figure 7.1c) or an equal number of individuals high and low in popularity (Figure 7.1d). Therefore, in addition to considering the classroom variation in popularity (i.e., strength of popularity hierarchy), it is important to examine the *popularity hierarchy pyramid structure*. This is operationalized by subtracting the

classroom popularity median score from the mean (Pattiselanno et al., 2015). Specifically, positive values represent pyramid hierarchies where only a few adolescents have a popular status, suggesting popularity to be a privilege, whereas negative values indicate inverted pyramid hierarchies with a higher number of highly popular students than unpopular students. Therefore, in order to understand how popularity hierarchies affect the development of norms, both approaches should be considered. The present study is the first to investigate both types of hierarchy in relation to norms.

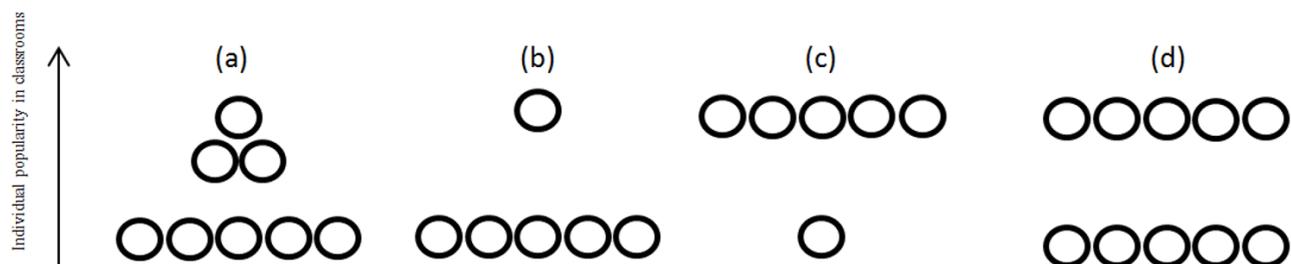


Figure 7.1.

Examples of potential configurations of popularity hierarchy structures: pyramid (a, b), inverted pyramid (c), or symmetric (d).

### 7.1.2 Popularity hierarchy as predictor of popularity norms

**Functionalist approach.** Inspired by evolutionary theory (see Anderson & Brown, 2010), a *functionalist perspective* (Pellegrini & Long, 2002) proposes that hierarchies serve an important *function*: they promote harmony and social order, and contribute to a better organization of activities through everyone’s awareness of their status position in relation to others (Halevy, Chou, & Galinsky, 2011). Clear status differences should diminish competition and stabilize social relationships within the classroom; in turn, this should reduce aggression by making it more costly than rewarding (Pellegrini & Long, 2002). That is, individuals at the bottom of the hierarchy may recognize that aggressive confrontations with highly popular peers are unlikely to lead to positive outcomes, whereas top-ranking individuals should not feel the need to get into violent conflicts with less popular peers as they already benefit from a privileged access to social and material resources (Hawley, 2003; Savin-Williams, 1979). Instead, aggressive competition for high popularity should be enhanced in a context of small differences in students’ popularity or a context with a higher number of highly popular

adolescents than unpopular adolescents (inverted pyramid shape), as in such situations, popular adolescents should feel that their status can easily be challenged by others (Adler & Adler, 1998). In order to maintain their social ranking in such contexts, popular adolescents might be more inclined to display aggressive behaviors that reflect and emphasize a powerful and dominant position among peers (Cillessen & Mayeux 2004). Therefore, from this functionalist perspective, egalitarian classrooms and classrooms with an inverted pyramid shape should increase in aggressive popularity norms; whereas classrooms with strong variations in popularity or with a pyramid-shaped hierarchy should decrease in aggressive popularity norms.

The popularity hierarchy may also affect *prosocial popularity norms*. Prosocial behaviors foster friendly peer relationships and are generally associated with high status (e.g., Coie, Dodge, & Kupersmidt, 1990; Rubin, Wojslawowicz, Rose-Krasnor, Booth-LaForce, & Burgess, 2006); however prosocial action also involves risk as the individual enacting such behaviors does not know whether it will be reciprocated. Individuals mostly tend to display prosocial behavior if they expect similar acts in return. However, reciprocity is less certain in competitive environments, which can be costly for one's reputation (Clark & Mills, 1993). Therefore, according to a functionalist approach, contexts with strong popularity differences among students or with a pyramid popularity structure should be characterized by higher prosocial popularity norms than egalitarian classrooms or classrooms with an inverted pyramid shape.

**Balance of power approach.** In contrast to the functionalistic approach, the "*balance of power*" perspective (Garandean et al., 2014; Juvonen, Nishina, & Graham, 2006), argues that a strong popularity hierarchy reflects a power imbalance, which facilitates abuse of power through aggression while inhibiting prosocial behavior among popular peers (i.e., high aggressive and low prosocial popularity norms). An individual's social status is always relative to the social status of other individuals in a group. Therefore, social status is less salient in egalitarian contexts, but it gains particular significance and visibility in contexts with strong asymmetries in popularity or where high popularity is a privilege, as all the benefits associated with being popular are not equally available to everyone (Hawley, 2003). When popular status is rare, it becomes more valuable, which should make adolescents to compete for it more strongly (Anderson & Brown, 2010). In a competitive context, the position of highly popular youth is vulnerable. Consequently, they may use high aggression or low prosocial behavior to protect their position and the valuable resources associated with it (Garandean et al., 2014). Regarding the *strength of popularity hierarchy*, it can be expected that a strong

popularity hierarchy should promote higher aggressive and lower prosocial popularity norms over time; whereas more egalitarian classrooms would be less competitive and more democratic environments with high prosocial and low aggressive popularity norms. Regarding *popularity structure*, popular adolescents may feel the need to defend their position more in classrooms where popularity is a privilege (pyramid structure) than in classrooms where most adolescents enjoy the benefits associated with popularity (inverted pyramid), resulting in high aggressive and low prosocial popularity norms in pyramid-structured classrooms.

**Empirical studies.** So far, no study has examined to which extent popularity hierarchy may predict popularity norms. A few studies investigated whether the strength of popularity hierarchy moderated *individual-level associations* between popularity and aggressive behavior in classrooms or peer groups. The findings of two cross-sectional studies are mainly consistent with the functionalist perspective. One study found a weaker association between aggression and status in classrooms with stronger hierarchy among same-sex peers (Zwaan et al., 2013). A second study found that aggression was associated with higher peer acceptance for boys in less hierarchical classrooms (Barbarro et al., 2017). Three other studies found support for the “balance of power” perspective. The concurrent link between aggression and perceived popularity was found to be stronger in hierarchical classrooms than in egalitarian classrooms (Ahn, Garandeau, & Rodkin, 2010; Garandeau et al., 2011). One longitudinal study showed that aggressive boys, but not aggressive girls, became less popular over time in more egalitarian classrooms (Ahn & Rodkin, 2014). Another study found support for both the functionalist and balance of power approach, looking at both the strength and the structure of popularity hierarchy and examining associations between status and both aggressive and prosocial behavior. Aggression was more strongly related to status in girls’ cliques with an inverted pyramid hierarchy; but prosocial behavior was more strongly related to status in both boys and girls groups with an inverted pyramid hierarchy (Pattiselanno et al., 2015). Taken together, previous work does not clearly support one perspective over the other.

**Developmental processes.** One reason for these inconsistent findings may be that the role of popularity hierarchy in prosocial and aggressive popularity norms *changes over time*, for instance when a school year unfolds (La Freniere & Charlesworth, 1983; Pellegrini & Bartini, 2001). When a hierarchy emerges at the beginning of a school year, not everyone may readily accept their position (Pellegrini & Bartini, 2001). For this reason, the established hierarchy could elicit a competition for resources where high

aggression or low prosocial behavior are seen as valuable tools to defend one's high position in the hierarchy. However, this competition is not constant in peer groups: over time, individuals tend to understand and accept the implications of their own position in the group (Hawley, 1999). Therefore, later in the school year, the hierarchy may have stabilized and elicit fewer conflicts (Faris & Felmlee, 2011; Pellegrini & Long, 2002). In other words, dynamics at the beginning of the school year may support the balance of power approach, whereas processes later in the year may be more consistent with the functionalist approach. The cross-sectional design of previous studies prevented them from revealing these potential changes across a school year. Therefore, we will extend previous findings by investigating the role of popularity hierarchy in behavior-status associations across one school year. We will examine the effect of hierarchy on classroom-level popularity norms, rather than individual-level associations between popularity and behaviors. This enables us to provide a more complete picture on how popularity hierarchy may predict differences *between classrooms* in the extent to which prosocial and aggressive behavior are seen as valuable and salient due to their associations with popularity.

### **7.1.3 Popularity norms as predictor of popularity hierarchy**

Our longitudinal approach allows us to extend upon previous studies in an additional way: to test whether popularity norms also predict classroom popularity hierarchy over time by investigating the coevolution of popularity norms and popularity hierarchy. Being highly aggressive or being *non*-prosocial to others can be seen as a strategy to enhance one's own status while damaging the reputation of others (Neal, 2010). In some classrooms, popular youth may purposefully use these behaviors to manipulate and control their peers' position in the hierarchy and to intimidate others who want to challenge them, which may enhance status discrepancies among individuals in a classroom (Mayeux & Cillessen, 2008). In line with this reasoning, ethnographic studies have described how popular leaders purposefully resort to aggressive means or exclude others from prosocial acts in order to maintain or enhance their position and to ensure that others will decrease – or at least, not increase – in their status (e.g., Adler & Adler, 1998; Merten, 1997). Also, an experimental game study indicated that an initially egalitarian context could turn into a more hierarchical context when individuals used aggression in order to gain power at others' expense (Pratto et al., 2008). Therefore, high aggressive popularity norms and low prosocial popularity norms may result in a

stronger popularity hierarchy over time, and in a more pyramid-shaped hierarchy; hence popularity norms and hierarchy may co-evolve over time within a classroom.

## **7.2 Present Study**

In this longitudinal study, we examine the coevolution between popularity norms and popularity hierarchy across one school year. First, we expect that at the beginning of the school year, both a strong and a pyramid-shaped hierarchy predict an increase in aggressive and a decrease in prosocial popularity norms (Hypothesis 7.1a). However, when the school year unfolds, both a strong and a pyramid-shaped popularity hierarchy may result in a more harmonious, orderly environment with high prosocial and low aggressive popularity norms (Hypothesis 7.1b). We expect that both types of hierarchy independently contribute to the popularity norm (Pattiselanno et al., 2015; Hypothesis 7.1c). Second, we expect that high aggressive and low prosocial popularity norms might strengthen the popularity hierarchy over time (Hypothesis 7.2). In line with previous studies, we control for educational level, grade, classroom size, and sex proportion in our analyses (Garandeanu et al., 2014; Zwaan et al., 2013). Also, as examining both types of hierarchy is relatively new, we examined whether they interact in predicting the popularity norm to add to empirical evidence on this matter. For instance, it could be that the effects of a pyramid-shaped hierarchy on norms are strongest if asymmetries in popularity are higher; hence it may matter whether the pyramid is flat or not. As there is no literature or empirical evidence on this issue, this analysis was exploratory.

## **7.3 Methods**

### **7.3.1 Participants and procedure**

We approached all first- and second-year students in two secondary schools to take part in the Social Network Analyses of Risk behavior in Early Adolescence (SNARE) project (Cohort 1) at the beginning of the academic year 2011-2012. A second cohort of students entering first year in these secondary schools was asked to participate in the project the following academic year 2012-2013 (Cohort 2). A third cohort of first-, second-, and third-year students was approached at another school in the Netherlands in the academic year 2016 – 2017. Data were collected three times in one academic year, in the fall, winter, and spring of 2011 – 2012 (Cohort 1), 2012 – 2013 (Cohort 2), and 2016 – 2017 (Cohort 3); with one pre-assessment at the beginning of the school year (T0). Before data-collection started, students received an information letter

describing the goal of the study and offering the possibility to refrain from participation. Parents who did not want their children to participate in the study were asked to indicate this and students were made aware that they could cease their participation at any time. The survey took about 40 minutes to complete, and was – under supervision of a researcher – filled in by all participating students at once in the classroom on computers using the SNARE software developed by Bright Answer (customized based on Survey Lab; SNARE software, 2011). The privacy and anonymity of the students were warranted, and the study was approved by the Internal Review Board (IRB) of one of the participating universities.

Of the 2,914 approached students, 71 (2.4%) declined to participate (including those without parental consent and those who declined to participate themselves). The final sample comprised 2,843 participants from 120 classrooms, with 12 – 30 participants per classroom ( $M = 23.69$ ), with 54% first year-, 37% second year- and 9% third year students. Participants were aged between 11 and 17 ( $M = 13.17$ ,  $SD = 0.80$ ), with 51.4% girls. Of the participants, 40.0% were enrolled in lower-level education (i.e., preparatory secondary school for technical and vocational training), whereas 60.0% were attending higher-level education (including preparatory secondary school for higher professional education and for university). Most students were native Dutch (84.8%), and 84.9% of the 15.2% non-native Dutch students were born in the Netherlands. All participating students spoke Dutch fluently. The percentage of native Dutch students varied across classrooms from 25.9% to 100%. In total, 13 participants (0.005% of the total sample) changed classrooms across the whole school year, which resulted in a slight change in composition for 15 classrooms. We decided to include them in the construction of our variables in the classroom that they were in by that time point, as at that time they also contributed to a hierarchy or norm.

The socioeconomic status of participants was calculated based on the zip codes, using 'status scores' of the Social Cultural Planning Office, The Netherlands (see for instance Benson, Nierkens, Willemsen, & Stronks, 2015). These status scores were based on the percentage of inhabitants with lower incomes, the percentage of lowly educated inhabitants, average income of inhabitants within an area, and the percentage of unemployed inhabitants. We were not able to determine the social status of 8.3% of our sample, either because these participants did not fill in their zip code or because the zip code was not in the system of the Social Cultural Planning Office. A small percentage of participants (10.7%) came from areas with a high socioeconomic status, whereas 39.7% had a low socioeconomic status and 41.3% had a moderate socioeconomic status. In

general, our sample had a somewhat lower socioeconomic status compared to the average socioeconomic status of inhabitants in the rest of the Netherlands.

### 7.3.2 Measures

All research variables described below were based on peer nominations, measured at each of the three waves (T1, T2, and T3), and assessed by asking participants questions about their classmates. Participants could nominate an unlimited number of same-sex and opposite-sex classmates. There was also the option of selecting 'nobody', allowing for differentiation between missing responses and valid empty responses. For each item, the number of received nominations was divided by the number of potential nominators, so that scores represented the proportion of classmates that had nominated an adolescent for that item.

**Aggressive behavior.** Peer-perceived aggressive behavior was assessed using within-classroom peer nominations on four items about aggressive behavior: "Who quarrels and/or initiates fights with you?"; "Who sometimes spreads rumors or gossips about you?"; "Who bullies you?" and "Who makes fun of others?" (in line with Garandeau et al., 2011; Zwaan et al., 2013). Principal component factor analyses for all waves showed that these four items loaded on one factor, explaining 61.6% to 66.5% of the variance (factor loadings varying from 0.74 to 0.85). Therefore, these four items were averaged for each wave to create a scale for aggressive behavior. This scale represented the average proportion of peers who nominated a particular adolescent as aggressive using the four items, which could vary from 0 (= nominated by nobody on the four items) to 1 (nominated by everyone on all four items). Cronbach's alphas were  $\alpha_{T1} = .72$ ,  $\alpha_{T2} = .77$  and  $\alpha_{T3} = .73$ , indicating good internal consistency.

**Prosocial behavior.** Peer-perceived prosocial behavior was assessed using peer nominations on three items (see also Laninga-Wijnen et al., 2018a): "Who gives others the feeling that they belong to the group?"; "Who helps others by giving good advice?"; "and "Who helps you with problems (e.g., with homework, repairing a flat tire, or when you feel down)?"". Principal component factor analyses for the three waves showed that these three items represented one factor, explaining 64.1% to 74.7% of the variance (factor loadings ranging from .76 to .89). For each wave, the average of these three items was used as a scale for peer-perceived prosocial behavior. Cronbach's alphas of the resultant scale were  $\alpha_{T1} = .72$ ,  $\alpha_{T2} = .79$ , and  $\alpha_{T3} = .83$ , respectively, indicating sufficient and good internal consistency.

**Popularity.** Peer-nominated popularity was assessed by asking participants “Who is the most popular?” and “Who is least popular?” The score for least popular was subtracted from the score for most popular to obtain a single continuum of popularity for each student (e.g., Lease, Kennedy, & Axelrod, 2002).

**Popularity hierarchy.** The strength of popularity hierarchy was based on the standard deviation of individual popularity scores in the classroom. The shape of the hierarchy was measured by subtracting for each classroom the median score from the mean of individual popularity scores (see Table 7.1 for descriptive results). Both hierarchy constructs were relatively normally distributed. Correlations between the two types of hierarchy were small and nonsignificant across waves (Table 7.2), indicating that these two measures tap into distinct constructs of popularity hierarchy.

**Popularity norms.** Popularity norms for aggression and prosocial behavior for all time points were calculated for each classroom as the correlation between peer-nominated aggressive behavior and popularity, and peer-nominated prosocial behavior and popularity, respectively (Dijkstra & Gest, 2015).

**Demographic variables.** Grade, educational level, classroom size and sex proportion at the baseline were included as predictors of popularity norms and popularity hierarchy at T1. Grade varied from 1 to 3. Educational level consisted of six categories: pre-vocational education with a practically oriented pathway (and extra support) (LWOO or VMBO-bg; 17.5% of the respondents), pre-vocational education with a theoretically oriented pathway (VMBO-th; 22.5% of the respondents), and three levels of pre-university/senior general secondary education (HAVO, HAVO/VWO and/or VWO; 60% of the respondents). Sex proportion was calculated as the percentage of boys in a classroom.

#### 7.4 Analytic Strategy

Cross-lagged panel analysis was performed on three data waves with structural equation modeling (SEM) in *Mplus* version 8 (Muthén & Muthén, 2011). In this way, relationships of popularity hierarchy on popularity norms were analyzed with about three months lag time, while controlling for reverse relationships. This design was chosen as it provides information on bi-directional relationships and the temporal order of these relationships. We used maximum likelihood estimations with robust standard errors (MLR; Byrne, 1998). Model fit precision was examined using the chi-square statistic ( $\chi^2$ ), comparative fit index (CFI), Tucker-Lewin Index (TLI), root-mean-square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). The

$\chi^2$  test assesses the discrepancy of fit between the observed and hypothesized models; a nonsignificant  $\chi^2$  value indicates a good fit to the data, but it should be noted that this test is overly sensitive to sample size and model complexity. The CFI and TLI estimates compare the specified model with a model in which all variables are assumed to be uncorrelated; values of .95 or greater specify an excellent fit to the data, and values of .90 – .94 indicate an adequate fit. The RMSEA index adjusts for model complexity and favors the most parsimonious model. RMSEA and SRMR values of .05 or less indicate excellent fit to the data, and values of .06 – .08 indicate adequate model fit (Kline, 2011).

## 7.5 Results

### 7.5.1 Descriptive results

Table 7.1 and Table 7.2 display descriptive results of all class-level variables. There are large variations between classrooms in both prosocial and aggressive popularity norms. The decrease in prosocial popularity norms is significant over time ( $F(2,1) = 5.11; p = .007$ ) whereas aggressive popularity norms do not significantly increase over time ( $F(2,1) = 2.16; p = .144$ ). Classroom size and educational level largely correlate with each other, which was expected as at lower educational levels, there are some relatively small classrooms as students need extra support for academic tasks.

Table 7.1

*Description of Popularity Norms and Popularity Hierarchy and Structure*

	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>SD</i>
Prosocial popularity norm T1	-.14	.93	.42 <sup>a</sup>	.24
Prosocial popularity norm T2	-.43	.86	.39 <sup>ab</sup>	.24
Prosocial popularity norm T3	-.33	.87	.36 <sup>b</sup>	.23
Aggressive popularity norm T1	-.52	.81	.36 <sup>a</sup>	.28
Aggressive popularity norm T2	-.47	.89	.36 <sup>a</sup>	.30
Aggressive popularity norm T3	-.31	.90	.39 <sup>a</sup>	.24
Strength popularity hierarchy T1	.10	.44	.28 <sup>a</sup>	.07
Strength popularity hierarchy T2	.10	.47	.29 <sup>a</sup>	.08
Strength popularity hierarchy T3	.09	.47	.29 <sup>a</sup>	.08
Popularity pyramid structure T1	-.16	.13	-.01 <sup>a</sup>	.05
Popularity pyramid structure T2	-.16	.17	.002 <sup>a</sup>	.06
Popularity pyramid structure T3	-.18	.15	.01 <sup>a</sup>	.06

Note. Means with different superscripts change significantly over time.

Table 7.2  
*Correlations between Popularity norms and Strength and Pyramid Structure of Popularity hierarchy, Grade, Sex proportion, Classroom size and Educational level*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Prosocial popularity norm T1															
2. Prosocial popularity norm T2	.55***														
3. Prosocial popularity norm T3	.57***	.62***													
4. Aggressive popularity norm T1	-.28**	-.42***	-.30**												
5. Aggressive popularity norm T2	-.18*	-.43***	-.24**	.66*											
6. Aggressive popularity norm T3	-.09	-.26**	-.26**	.50*	.47*										
7. Strength popularity hierarchy T1	.12	.10	.10	.21*	.19*	.25**									
8. Strength popularity hierarchy T2	.16	.20*	.17	.10	.13	.20*	.72***								
9. Strength popularity hierarchy T3	.25**	.17	.26**	.04	.004	.27**	.54***	.68***							
10. Pyramid structure hierarchy T1	-.07	-.12	-.25**	.17	.31**	.14	.06	.04	-.02						
11. Pyramid structure hierarchy T2	.003	-.19*	-.22*	.10	.21*	.05	.11	.08	.05	.49***					
12. Pyramid structure hierarchy T3	.01	-.09	-.23*	.18*	.13	.15	.14	.16	.15	.22*	.49*				
13. Grade	-.30**	-.16	-.14	.16	.12	.11	.25**	.10	-.01	.21*	.33***	.15			
14. Educational level	-.16	-.07	-.16	.17	.12	-.08	-.10	-.15	-.21*	-.20*	-.26**	-.04	.17		
15. Classroom size	-.19*	-.17	-.20*	.21*	.20*	-.05	.18*	-.27**	-.32***	.11	.16	-.07	.10	.67***	
16. Sex proportion	.03	.03	.11	.07	.14	.06	.05	-.01	-.01	-.09	-.03	-.08	-.07	-.10	-.17

Note. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

### 7.5.2 The coevolution of popularity hierarchy and popularity norms

Model fit of cross-lagged panel analysis at the classroom-level was good, with RMSEA = .053, CFI = .967, TLI = .919, SRMR = .050 and  $\chi^2(46) = 61.66, p = .061$ . Significant prospective results are depicted in Figure 7.2, and a complete overview of concurrent and prospective results – including nonsignificant ones – can be found in Appendix [7A], in Table S7.1 and Table S7.2. Both types of popularity hierarchy and popularity norms were stable across time. *Popularity hierarchy structure* at T1 positively predicted aggressive popularity norms at T2, indicating that a strong pyramid-structure with only few individuals at the top of the popularity hierarchy was predictive of a relative increase in aggressive popularity norms at T2 (in line with Hypothesis 7.1a). This effect was not present from T2 to T3. The *strength of popularity hierarchy* did not predict popularity norms at T1, but at T2 it was predictive of a relative increase in aggressive popularity norms at T3, indicating that classrooms with high asymmetries in individual's popularity at T2 were characterized by a relative increase in aggressive popularity norms at T3 (in contrast to Hypothesis 7.1b). Next, while controlling for prior popularity hierarchy structure and popularity norms, popularity hierarchy structure at T2 predicted a relative decrease in the prosocial popularity norm at T3, indicating that classrooms that were characterized by a pyramid-shaped hierarchy, had lower prosocial popularity norms over time (in contrast to Hypothesis 7.1b as well).

With regard to the reversed temporal direction, neither the strength nor the structure of popularity hierarchy were predicted by initial popularity norms. In other words, popularity norms did not predict a relative increase or decrease in popularity hierarchy (in contrast to Hypothesis 7.2). Grade at T0 was predictive of both types of popularity hierarchy at T1. The higher the grade, the higher the variability in individual-level popularity within the classroom ( $B = .030, SE = .010, p = .003$ ) and the more a classroom was shaped as a pyramid ( $B = .013, SE = .006, p = .039$ ). Also, classrooms in higher grades were characterized by less prosocial popularity norms ( $B = -.105, SE = .028, p < .001$ ). Educational level, classroom size, and sex proportion did not predict popularity hierarchy, nor popularity norms.

**Supplemental analyses.** In order to explore potential interactive effects of our two types of hierarchy in predicting popularity norms, we centered our popularity hierarchy variables and computed interaction terms. We conducted four multiple linear hierarchical regression analyses where we examined whether the two types of hierarchy would interact in predicting the popularity norm, while controlling for popularity norms at an earlier time point. No interaction effects emerged, indicating that both types of

popularity contributed to the popularity norm independently from each other (in line with Hypothesis 7.1c). Results of these extra analyses are available upon request.

**Sensitivity analyses.** Due to power issues, we were not able to compare the coevolution between popularity hierarchy and popularity norms across different grades. Therefore, we included grade as control variable. Also, we conducted sensitivity analyses by performing all analyses without the 11 third grade classrooms (as these classrooms were all from the same school). Results remained largely the same. The only difference was that in the analyses with only first- and second grade classrooms, the effect of the popularity hierarchy structure at T2 on prosocial popularity norms at T3 became marginally significant with  $p = .073$ ; though it was initially significant with  $p = .027$  in the model containing all grades. Additionally, we tested whether results would remain the same if we ran separate models for each type of popularity hierarchy separately. Results were comparable to the models where both types of hierarchy were included. Results of sensitivity analyses are available upon request by the first author.

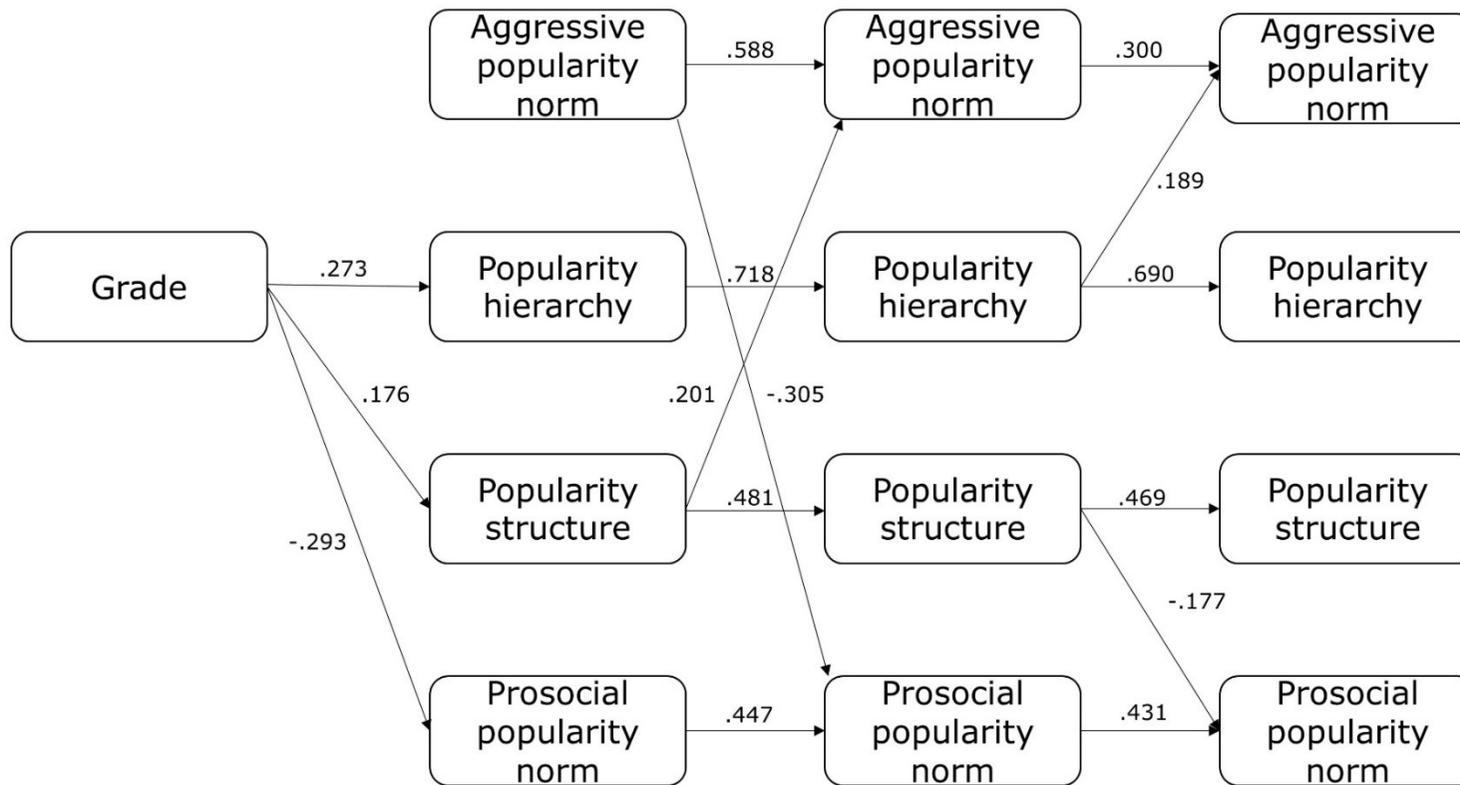


Figure 7.2. Standardized coefficients for significant prospective relations between popularity norms, strength of popularity hierarchy and popularity structure in classrooms ( $N = 120$ ). The higher the popularity structure, the more a classroom hierarchy is shaped as a pyramid.

## **7.6 Discussion**

The aim of this study was to examine the coevolution of popularity hierarchy and popularity norms. Our findings indicate a temporal precedence of popularity hierarchy over popularity norms, rather than vice versa. More specifically, our findings are consistent with balance of power approach (Garandeau et al., 2014). Even though effects did not consistently occur at each time point, we found that classrooms with a strong popularity hierarchy and a pyramid-shaped hierarchy structure were characterized by a relative increase in aggressive popularity norms. Also, classrooms with a pyramid-shaped hierarchy structure were characterized by a relative decrease in prosocial popularity norms. This may indicate that a high popularity hierarchy elicits more competition for the coveted positions at the top of the popularity ladder, as benefits associated with popularity are not equally available to everyone. In such a competitive context, high aggressive and low prosocial behaviors may be seen as valuable means to gain popularity. Our results highlight the importance of having a shared balance of power in classrooms, as in such a situation, prosocial rather than aggressive behaviors are valued and rewarded with popularity.

### **7.6.1 Popularity hierarchy as predictor of popularity norms**

Across the school year, the pyramid shape (from T1 to T2) and strength (from T2 to T3) of popularity hierarchy predicted a relative increase in aggressive popularity norms. Additionally, at the end of the school year (T2 to T3), classrooms with a pyramid-shaped hierarchy were characterized by a relative decrease in prosocial popularity norms. Therefore, the detrimental effects of a popularity hierarchy were not temporary, as hypothesized, but persist across the school year and become even stronger over time by affecting multiple behavioral domains. Our findings do not support the functionalist perspective according to which a strong popularity hierarchy would diminish competition, stabilize relationships and in turn, would make aggression less rewarding. Instead, our findings support the balance of power approach, in which popularity asymmetries elicit power battles where the more powerful ones (i.e., high in popularity) are more aggressive and less prosocial.

Popularity norms may emerge as a defensive response of popular peers to competition that is triggered by the popularity hierarchy. The finding that popularity hierarchy predicts high aggressive or low prosocial popularity norms may also be due to changes in leaders' mindset (Anderson & Brown, 2010). For instance, a strong hierarchy may lead popular leaders to look down on lower-status individuals and see them as

unworthy or invaluable (Adler & Adler, 1998). Indeed, previous work demonstrated that holding a position of power has a disinhibiting effect on social behaviors (Keltner, Gruenfeld, & Anderson, 2003) and can result in a sense of elitism among adolescents (Berger & Dijkstra, 2013; Sandstrom & Cillessen, 2006), which may lead higher-positioned individuals to objectify lower-status individuals (Gruenfeld, Inesi, Magee, & Galinsky, 2008) and to be less responsive emotionally to the suffering of individuals (Van Kleef et al., 2008). These effects of power could promote high aggressive and low prosocial behaviors of highly popular peers, particularly in contexts where they have much more power compared to other individuals. Future studies should examine the underlying mechanisms that explain *why* popularity hierarchy would result in higher aggressive and lower prosocial popularity norms over time.

The reason why the present study, along with several other studies, found support for the balance of power approach whereas some other studies found support for the functionalist approach may boil down to differences in the definition of 'status' (hierarchies). In studies where findings were consistent with the functionalist approach, status was generally operationalized as social preference, by asking adolescents who they liked most and liked least (e.g., Barbarro et al., 2017). Importantly, aggressive behaviors are associated with lower acceptance among peers (e.g., Hopmeyer Gorman, Schwartz, Nakamoto, & Mayeux, 2011), and this may be particularly true in contexts where adolescents are more selective in who they like or not – that is, in environments with a strong social preference hierarchy. In contrast, most studies that found support for the balance of power approach, operationalized social status as *perceived popularity* ('who is most popular' minus 'who is least popular'). Variations in perceived popularity, rather than social preference, more closely resemble the dominance hierarchies in humans and nonhuman primates (Coie et al., 1982; Pettit, Bakshi, Dodge, & Coie, 1990), as perceived popularity reflects power, dominance and visibility among peers (Cillessen & Marks, 2011). Moreover, popularity is generally associated with higher levels of aggression (Cillessen & Mayeux, 2004), and this may be particularly true in classrooms where competition for popularity is enhanced due to a strong popularity hierarchy (Garandeau et al., 2011). Therefore, the construct of perceived popularity may be most useful to capture a power imbalance and its potential adverse effects.

We demonstrated that both the strength and the pyramid structure of popularity hierarchy predicted popularity norms, even when controlling for each other and when controlling for previous popularity norms. In general, associations between the two types of hierarchy were low and nonsignificant across time-points, indicating that they capture

empirically distinct constructs: whereas the *strength* of popularity hierarchy allows us to compare strongly hierarchical classrooms with egalitarian ones, the *structure* of popularity hierarchy allows us to compare classrooms with many popular peers enjoying benefits and resources associated with that position with classrooms where popularity is a privilege. In additional analyses we explored whether the two types of hierarchy would interact in predicting popularity norms, but this was not the case. Therefore, these constructs seem psychometrically distinct and provide complementary conceptual approaches to measuring hierarchy.

### **7.6.2 Popularity norms as predictor of popularity hierarchy**

We found no evidence that popularity norms predicted relative change in popularity hierarchy over time. Thus, the extent to which aggressive or prosocial behaviors are rewarded with high popularity in certain classrooms may not predict changes in the classrooms' hierarchical organization. One explanation for this finding may be related to our measurement of popularity hierarchy. That is, we were only able to test (due to our classroom-level questions and analyses) the *strength* and the general *structure* of the popularity hierarchy. We do not know, for instance, whether the rank order of individuals within this hierarchy remains the same. Nevertheless, as adolescents' social status is a relatively stable construct (Cillessen & Borch, 2006), it is possible that the classroom rank order remains stable, and that this rank order does not depend on aggressive or prosocial popularity norms either.

Our findings raise the following question: If popularity hierarchy predicts the emergence of popularity norms, and the behaviors of popular peers do not predict future levels of popularity hierarchy, which factors may then explain why a popularity hierarchy emerges in some classrooms but not in others? Our analyses indicate that in higher grades, differences in popularity become stronger and popularity becomes more of a privilege, whereas educational level, sex proportion or classroom size do not play a role. It could be that as adolescents get older (i.e., with every grade), they become more likely to organize their peer groups in structures that are mostly found in the adult-world (Anderson & Brown, 2010). Also, this effect may have occurred because adolescents have known each other (and each other's reputation) longer in later grades: Even though classroom composition may change, adolescents may know each other from interacting during lunch breaks or other school activities. This may contribute to the increased strength and stability of hierarchy every year. Future research should identify other features of the classroom context, such as teacher characteristics, that may contribute

to the shape or strength of classroom hierarchies (Gest & Rodkin, 2011). Furthermore, social status in classrooms is likely to be related to students' social status in the broader society and to whether students belong to the classroom numerical majority or minority in terms of socioeconomic status or ethnicity (Adler & Adler, 1998). Consequently, within-classroom differences in students' socioeconomic status or ethnicity may contribute to popularity hierarchies or popularity norms (Kornbluh & Neal, 2016). We encourage future studies to take within-classroom differences in socioeconomic status and ethnicity into account.

### **7.6.3 Strengths, limitations and future directions**

Our study has several strengths. Whereas previous studies considered the *consequences* of popularity norms, we shed light on factors that *predict* popularity norms in the first place. As two prominent theoretical perspectives argue that popularity hierarchy relates to competition for popularity in classrooms, we chose to examine the role of popularity hierarchy in popularity norms. However, we did not directly measure whether popular adolescents indeed experienced more competition with regard to their position in classrooms with a strong or pyramid-shaped hierarchy. It may be valuable for future studies to also consider adolescents' desire or goal to be popular, as this may enhance perceived competition (Dawes & Xie, 2014). A second strength is our longitudinal approach, which not only enabled us to capture potential changes in the role of popularity hierarchy in popularity norms across a whole school year, but also to examine the coevolution between hierarchy and norms. Third, we operationalized hierarchy so as to capture both its strength and its structure, providing a more complete picture of how differences in popularity within classrooms may enhance the valence of high aggressive and low prosocial behavior.

A limitation is that we included first-, second- and third-year classrooms in our analyses; as our reasoning that potential destructive effects of popularity hierarchy would be temporarily might be particularly true in a situation where youth do initially not know their classmates and where relationships still have to be established. This is mainly the case in the first year of secondary education in the Netherlands. Nevertheless, in our schools, classrooms do still change in their composition from the first to second grade and from the second to third grade, due to changes in educational track or other re-organizations. Still, even when the composition of these second- and third-year classrooms is subject to change, adolescents may already be more familiar with their new classmates due to lunch breaks or other school activities. Therefore, different

processes may drive the emergence of hierarchies in such a situation than when youth meet each other for the first time. We expect that if our sample would have consisted of first-year participants only, our findings would have been even stronger, as the negative effects of a popularity hierarchy may occur primarily when a hierarchy is not yet stabilized, and competition is enhanced (Hawley, 2003).

Second, we measured the popularity norm by calculating the within-classroom correlation between popularity (most minus least popular) and prosocial and aggressive behavior. Even though this is the most frequently used approach (Dijkstra & Gest, 2015; Laninga-Wijnen et al., 2018a; Rambaran, Dijkstra, & Stark, 2013), studies are needed to establish whether this statistical calculation indeed captures how adolescents perceive the norm in their classroom. This is particularly important to consider as the popularity norm measure is based on peer nominations, but it has not been investigated whether nominations for a student as aggressive and as popular came from the same participants.

Third, due to power limitations, we were not able to examine the coevolution of popularity hierarchy and popularity norms in same-sex groups within classrooms. Analyzing a model with all potential paths between boys' and girls' norms and hierarchy (which is needed as boys and girls within the same classroom are interdependent) results in non-convergence as it requires more parameters than data. From the point of view that status is beneficial by providing access to resources, competition for status is most likely to occur among same-sex peers, as – unlike other-sex peers – they generally target similar resources (Pellegrini & Long, 2002; Zwaan et al., 2013). Therefore, the role of popularity hierarchy in popularity norms may be even stronger in same-sex groups. Moreover, aggression is more prevalent and more important for a social reputation among boys (Hartup, 1996), and boys are more sensitive than girls to hierarchical structures and status-related social cues (Ahn & Rodkin, 2014; Maccoby, 1998). Therefore, the role of popularity hierarchy may be stronger for boys' groups. The examination of the coevolution between popularity hierarchy and popularity norms in sex-specific groups, using a larger number of classrooms will be an important step for future research.

A fourth limitation of our study is that we examined peer reported aggression as a unified construct, without consideration for its different forms (i.e., physical vs. relational) and functions (i.e., reactive vs. proactive). Most of our items assessed relational forms of aggression. Also, one of our items assessed aggression against *others*, whereas the other three items were about aggression directed against the nominator. Nevertheless, all items loaded on one factor and the scale we created was shown to be

reliable across all waves. Whether the valence of these different types of aggression within a classroom varies as a function of the popularity hierarchy remains to be investigated.

Finally, the data used in the current study stemmed from peer nominations only, which might result in shared method variance (Vaillancourt & Hymel, 2006). However, these peer nomination measures were aggregated across multiple nominators, enhancing the validity and reliability of our data (Bukowski, Gauze, Hoza, & Newcomb, 1993; Bukowski & Hoza, 1989). Moreover, the respondents were allowed to nominate an unlimited number of peers, thereby preventing a ceiling effect in which respondents tend to nominate a fixed maximum number of peers.

#### **7.6.4 Practical implications**

Our study is a first step in explaining the emergence of prosocial and aggressive popularity norms by showing the adverse consequences of classroom popularity hierarchies. This suggests that teachers may promote healthier classroom peer ecologies by facilitating status equality in their classrooms. According to a study of teaching practices, teachers themselves can directly affect the social dynamics of their classrooms among children (grade 1, 3, and 5; Gest & Rodkin 2011): Classrooms are more egalitarian with regard to popularity when teachers encourage new friendships by creating small student groups and managing seating charts. Also, teachers' efforts at providing higher levels of instructional support and creating academically diverse groups may diminish hierarchies. It remains unknown whether similar effects of teacher practices would occur in adolescent classrooms at secondary education; particularly in the Netherlands where adolescents may have up to 15 teachers for all different subjects. Nevertheless, studies with larger samples may attempt to address teacher factors as predictors of norms and hierarchies.

Furthermore, it may be useful to examine classroom composition effects on popularity hierarchy and popularity norms by investigating what types of students are put together. For instance, it may be worthwhile to investigate resource control theory (Hawley, 1999) by testing whether children who engage in both prosocial and aggressive behaviors (referred to as bi-strategics) are the ones occupying the top positions of the hierarchy, and to examine whether bi-strategic children contribute to set the popularity norm more than children who are solely prosocial or solely aggressive. The variability in academic behaviors (GPA, attendance) within and across classrooms may also provide important information on the driving forces behind popularity hierarchies and norms

(Gest & Rodkin, 2011). Further insight into these issues may shed light on how to prevent an undesirable classroom environment where high aggressive and low prosocial behaviors are rewarded with popularity.

### **7.7 Conclusion**

Our study demonstrates the potentially maladaptive function of classroom popularity hierarchies, as they may be the driving force beyond the emergence of high aggressive and low prosocial popularity norms. High aggressive popularity norms may create undesirable environments by promoting aggressive behaviors (Laninga-Wijnen, Harakeh, Steglich, Dijkstra, Veenstra & Vollebergh, 2017), whereas high prosocial popularity norms may encourage prosocial behaviors (Laninga-Wijnen et al., 2018a). Therefore, classrooms with high aggressive and low prosocial popularity norms may provide an unsafe environment to adolescents, which may distract them from learning, decrease their wellbeing at school, and hamper their social-emotional development due to higher levels of peer rejection and victimization (Dijkstra & Gest, 2015). Our study provides indication that promoting a shared balance of power among classmates seems to be a promising way to decrease the valence of aggression while increasing the rewards of prosocial behavior, which may be beneficial for all students in the classroom.

## Appendix (7A)

Table S7.1

*Standardized and Non-standardized Coefficients of Prospective Relations in Cross-lagged Panel Analyses*

<i>Predictors</i>	Aggressive popularity norm T1			Prosocial popularity norm T1			Strength popularity hierarchy T1			Pyramid-structure hierarchy T1		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
Educational Level T0	0.008	0.023	0.041	0.006	0.015	0.041	-0.001	0.006	-0.015	0.006	0.004	0.203
Grade T0	0.049	0.037	0.115	-0.105***	0.028	-0.293	0.030**	0.010	0.273	0.013*	0.006	0.176
Classroom size T0	0.013	0.008	0.210	-0.008	0.005	-0.155	-0.003	0.002	-0.190	-0.001	0.001	-0.055
Sex proportion T0	0.248	0.225	0.108	-0.094	0.193	-0.049	0.020	0.061	0.033	-0.025	0.031	-0.064
	Aggressive popularity norm T2			Prosocial popularity norm T2			Strength popularity hierarchy T2			Pyramid-structure hierarchy T2		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
Aggressive popularity norm T1	0.626***	0.078	0.588	-0.257***	0.064	-0.305	-0.010	0.019	-0.034	0.002	0.018	0.011
Prosocial popularity norm T1	-0.010	0.093	-0.008	0.451***	0.085	0.447	0.022	0.024	0.064	0.008	0.023	0.032
Strength Popularity Hierarchy T1	0.244	0.297	0.059	0.349	0.319	0.107	0.809***	0.072	0.718	0.062	0.069	0.078
Pyramid-structure T1	1.259**	0.413	0.201	-0.205	0.315	-0.041	0.025	0.107	0.015	0.585***	0.094	0.481
	Aggressive popularity norm T3			Prosocial popularity norm T3			Strength popularity hierarchy T3			Pyramid-structure hierarchy T3		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
Aggressive popularity norm T2	0.242*	0.097	0.300	-0.014	0.050	-0.018	-0.024	0.024	-0.087	0.001	0.022	0.007
Prosocial popularity norm T2	-0.112	0.091	-0.110	0.413***	0.095	0.431	0.000	0.030	0.000	-0.006	0.019	-0.025
Strength Popularity Hierarchy T2	0.557*	0.252	0.189	0.250	0.206	0.090	0.683***	0.067	0.690	0.093	0.064	0.130
Pyramid-structure T2	-0.200	0.329	-0.048	-0.693*	0.313	-0.177	0.021	0.097	0.015	0.473***	0.093	0.469

Table S7.2

*Standardized and Non-standardized Coefficients of Concurrent Relations in Cross-lagged Panel Analyses*

<i>Predictors</i>	Aggressive popularity norm T1			Prosocial popularity norm T1			Strength popularity hierarchy T1		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
Prosocial popularity norm T1	-0.011*	0.004	-0.183	-	-	-	-	-	-
Strength Popularity Hierarchy T1	0.004*	0.002	0.215	0.003	0.001	0.183	-	-	-
Pyramid-structure T1	0.002	0.001	0.124	0.000	0.001	0.041	0.000	0.000	0.027
	Aggressive popularity norm T2			Prosocial popularity norm T2			Strength popularity hierarchy T2		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
Prosocial popularity norm T2	-0.012*	0.004	-0.279	-	-	-	-	-	-
Strength Popularity Hierarchy T2	0.000	0.001	0.038	0.002	0.001	0.152	-	-	-
Pyramid-structure T2	0.001	0.001	0.078	-0.002	0.001	-0.227	0.000	0.000	-0.006
	Aggressive popularity norm T3			Prosocial popularity norm T3			Strength popularity hierarchy T3		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
Prosocial popularity norm T3	-0.006*	0.003	-0.169	-	-	-	-	-	-
Strength Popularity Hierarchy T3	0.003*	0.001	0.244	0.002*	0.001	0.168	-	-	-
Pyramid-structure T3	0.001	0.001	0.067	-0.002*	0.001	-0.213	0.000	0.000	0.070

*Note.* Concurrent relations between demographic variables were nonsignificant, except for educational level and grade ( $B = .173$ ,  $SE = .086$ ,  $p = .045$ ) and educational level and classroom size ( $B = 4.720$ ,  $SE = .847$ ,  $p < .001$ ).

**Chapter****8**

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Who Sets the Aggressive Popularity Norm in Classrooms?  
It's the Number and Strength of Aggressive, Prosocial, and  
Bi-Strategic Adolescents

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**This chapter is based on:**

Laninga-Wijnen, L., Harakeh, Z., Dijkstra, J. K., Veenstra, R., & Vollebergh, W. A. M. (2019). Who sets the aggressive popularity norm in classrooms? It's the number and strength of aggressive, prosocial, and bi-strategic adolescents. *Journal of Abnormal Child Psychology*, advanced online publication. <https://doi.org/10.1007/s10802-019-00571-0>

**Author Contributions:**

L.L.-W. conceived of this study, participated in its design and data-collection, conducted and interpreted statistical analyses and drafted the manuscript; Z.H., J.K.D., W.V. and R.V. designed the SNARE project where this study is part of, and helped to draft the manuscript.

Previous work has shown that during adolescence, classrooms vary greatly in the extent to which aggression is rewarded with popularity (the “popularity norm”). Aggressive popularity norms may promote the proliferation of aggression and negatively affect the classroom climate. It is, however, unknown how these norms emerge in the first place. This longitudinal study therefore investigated whether aggressive popularity norms can be predicted by the classroom composition of students. We examined whether the prevalence of six student types – socially and non-socially dominant prosocial, aggressive, and bi-strategic adolescents (adolescents who are both highly prosocial and aggressive) – contributed to the norm by establishing a popularity hierarchy: strong classroom asymmetries in popularity. We collected peer-nominated data at three secondary schools in the Netherlands (SNARE-study;  $N_{\text{students}} = 2,843$ ;  $N_{\text{classrooms}} = 120$ ; 51.4% girls;  $M_{\text{age}} = 13.2$ ). Classroom-level regression analyses suggest that the classroom percentage of socially dominant aggressive and bi-strategic students predicted higher aggressive popularity norms, both directly and by enhancing the classrooms’ popularity hierarchy. Instead, the presence of non-socially dominant aggressive students and socially dominant prosocial students contributed to *lower* aggressive popularity norms. Socially dominant prosocial students also buffered against the role of socially dominant aggressive adolescents in the aggressive popularity norm (moderation), but not against bi-strategic adolescents’ role. Our findings indicate that interventions aimed at reducing aggressive popularity norms should first and foremost take the composition of classrooms at the start of the school year into account; and should not only encourage prosocial behavior, but also actively discourage aggression.

## 8.1 Introduction

Ushered in with pubertal and social changes, adolescents increasingly attach value to being popular among their peers (Steinberg, 2007; Koski, Xie, & Olson, 2015; LaFontana & Cillessen, 2010). Behaviors that are rewarded with popularity can be seen as salient and valuable tools to gain or maintain a high position in the peer group (Hartup, 1996), and may therefore form an important norm for adolescents: a guideline prescribing how they should behave in order to fit in with expectations of the peer group and to prevent being a social misfit (Wright, Giammarino, & Parad, 1986). Previous work has shown that classrooms vary in the extent to which aggression is associated with popularity (e.g. the

popularity norm). Aggressive popularity norms have been shown to emerge rapidly in classrooms and to be quite persistent, remaining relatively stable across the school year (Laninga-Wijnen, Harakeh, Dijkstra, Veenstra, & Vollebergh, 2018a). Aggressive norms enhance conditions for the proliferation of aggression (Laninga-Wijnen, Harakeh, Steglich, Dijkstra, Veenstra, & Vollebergh, 2017), which may have an adverse impact on the classroom environment. Indeed, classrooms with aggressive popularity norms were found to be characterized by higher levels of peer rejection and victimization as well as lower academic performance and less positive feelings about school among students (Dijkstra & Gest, 2015). Whereas previous research has focused mainly on the consequences of popularity norms, little is known about the origins of these norms. In order to prevent these norms from emerging, schools may benefit from a better understanding of which factors are associated with the development of these norms at the start of the school year. As popularity norms are established so quickly, it may be that they are related to the presence of particular types of students in a certain class from the moment the class is formed. If so, classroom composition may be an important factor in the formation of classroom norms.

Different types of students can be identified based on the extent to which they endorse aggressive or prosocial behavior, or a combination of both (bi-strategics; see Resource Control Theory, Hawley, 1999; McDonald, Benish-Weisman, O'Brien, & Ungvary, 2015; 2015). Based on social impact theory (SIT, Latané, 1981), the formation of norms may be a function of 1) the *number of people* endorsing certain behaviors; 2) the *social dominance* (strength) of those enacting these behaviors, referring to power-related characteristics such as leadership qualities or resource control; and 3) the *immediacy* of these people, i.e. the closeness in space or time (Latané & Wolf, 1981). Adolescents spend much of their time at school in the immediate proximity of their classmates (closeness of people); we will therefore focus on norm formation in the classroom context, by examining whether aggressive popularity norms are predicted by the number (percentage) and strength (social dominance) of prosocial, aggressive, and bi-strategic students in a particular class. Additionally, we will examine in what ways the presence of these student types may contribute to the popularity norm (mediation). We will investigate whether certain types of students would strengthen the formation of a strong popularity hierarchy (asymmetries in popularity within a classroom), which – following a balance of power perspective

(Garandau, Lee, & Salmivalli, 2014; Laninga-Wijnen, Harakeh, Dijkstra, Veenstra, & Vollebergh, 2019) – may enhance the valence of aggression in classrooms (higher aggressive popularity norms; Ahn, Garandau, & Rodkin, 2010).

### **8.1.1 The number and strength of aggressive, prosocial, and bi-strategic adolescents**

Several social psychological theories – including SIT – suggest that *numbers* and influence on norms go hand in hand (for a review, see Bond, 2005). These theories almost exclusively focus on the influence of numerical *majorities*: the more people who endorse a certain behavior, the more influence they will exert over which behaviors are considered appropriate and normative (Latané, 1981). Numerical majorities have more resources to reward conformers and punish deviants (resulting in compliance), and a greater capacity to provide information about reality (resulting in conformity; Bond, 2005; Deutsch & Gerrard, 1955).

However, according to Moscovici and Faucheux (1972), even a numerical *minority* of people can exert influence over what behaviors are considered valuable and normative, for instance when individuals constituting this minority are *consistent in behavior* (e.g. show high levels of a certain behavior, or show this behavior towards multiple peers), as this demonstrates that this small group of individuals is confident and committed to enacting this behavior (Moscovici & Faucheux, 1972; Moscovici & Nemeth, 1974; Wood, Lundgren, Ouellette, Busceme, & Blackstone, 1994). In reply to Moskovici's work (1971), Latané and Wolf (1981) stressed that SIT can also be applied to numerical minorities; hence the extent to which behavior is seen as salient and normative may, in this case, depend on the *number* of people constituting a minority.

Latané and Wolf (1981) additionally emphasized the importance of a numerical minority's *strength*: people may only contribute to the norm when they combine their behavior with social dominance, which refers – among other things – to centrality and leadership features (Latané, 1981; Hawley, 1999). First, social dominance can be seen as an evolutionary adaptive characteristic (Berry, 2000; Hawley, 1999) which invokes respect and admiration; as a consequence, behaviors of socially dominant adolescents are seen in a positive light and may become a norm (Dijkstra, Lindenberg, Verhulst, Ormel, & Veenstra, 2009). Second, socially dominant adolescents may portray themselves as leaders and

role models (Ellis & Zarbatany, 2007; Waasdorp, Paskewich, Baker, Leff, & Leff, 2013). Their behaviors acquire valence as conforming to these behaviors may prevent rejection by peers and enhance the chance of leaders' approval (Farmer et al., 2003). Importantly, SIT is mainly about *same*-behavior processes, suggesting that the formation of norms related to a certain behavior (e.g. aggression) depends on the number and social dominance of individuals displaying that particular kind of behavior (aggression). Yet not *all* adolescents who are aggressive may score highly on social dominance. For instance, earlier research on seventh and eighth grade students identified two types of aggressive youth: a first group contained non-socially prominent aggressors relegated to peripheral positions in the peer group; a second group contained highly central, aggressive leaders (Troubled versus Toughs; Farmer, Estell, Bishop, O'Neal & Cairns, 2003). Based on SIT (Latané, 1981) and Moscovici's theory on numerical minorities (1974), it might therefore be expected that classrooms with relatively more socially dominant, consistently aggressive individuals would be characterized by higher aggressive popularity norms. If consistently aggressive individuals (Moskovič, 1972) lack social dominance (Latané & Wolf, 1981), they may lack the power to contribute to the norm.

Although SIT (Latané, 1981) is mainly concerned with same-behavior processes, it can be reasoned that *cross*-behavior processes may occur as well. More specifically, individuals displaying *related* behaviors such as prosocial behavior (Obsuth, Eisner, Malti, & Ribeaud, 2015) may also play a role in aggressive popularity norms (Laninga-Wijnen et al., 2019a); and the extent to which they have the power to do this may also depend on their social dominance (Latané & Wolf, 1981). Prosocial behavior by students may either decrease or increase the valence of aggression, depending on the type of student (e.g. bi-strategic *or* prosocial individuals) using it. For example, the prosocial behavior of socially dominant *bi-strategic* individuals may increase rather than decrease the valence of aggression, as these well-adapted "Machiavellians" are assumed to deliberately use their prosocial behavior to mitigate the negative consequences of their aggression and to hide it from teachers (Hawley, 2003), making aggression more attractive. As a result, a higher number of socially dominant bi-strategic individuals in classrooms may be associated with higher aggressive popularity norms. In contrast, socially dominant, solely prosocial adolescents ("models"; Berger et al., 2015) may contribute to a safe, friendly, harmonious classroom

environment (Jennings & Greenberg, 2009) where aggression is perceived as non-adaptive (Chang, 2004), resulting in lower aggressive popularity norms. In addition, socially dominant prosocial individuals may provide a *buffer against* the role of socially dominant aggressive or bi-strategic individuals in aggressive popularity norms (moderation effect), as they may provide a counterweight to aggression (Obsuth et al., 2015) and model a valuable alternative – being (solely) prosocial – to gain access to valuable social or material resources (Berger et al., 2015; Ellis, Volk, Gonzalez, & Embry, 2016; Hawley, 1999;). By contrast, *non-socially dominant* prosocial and bi-strategic students may not be important for the popularity norm, even when their number is high; as they lack the strength to contribute to the classroom environment (Latané & Wolf, 1981).

### **8.1.2 Popularity hierarchy as underlying mechanism for how different types of students contribute to aggressive popularity norms**

One way in which socially dominant aggressive and bi-strategic individuals may contribute to higher aggressive popularity norms is by enhancing the classrooms' popularity hierarchy (e.g. classroom asymmetries in popularity). Socially dominant aggressive and bi-strategic students are thought to use their aggression in a strategic, manipulative way (Farmer et al., 2003, Hawley, 2003), allowing them to gain a higher status in the peer group *at the expense of* the status of others. This may enhance status discrepancies in the classroom. A higher number of these socially dominant aggressive and bi-strategic individuals may therefore be related to higher within-classroom variation in individuals' status such as popularity, also referred to as a "strong popularity hierarchy" (typically measured as the standard deviation of students' popularity within classrooms; Zwaan et al., 2013; Garandeau, Ahn, & Rodkin, 2011). According to a *balance of power perspective* (Garandeau et al., 2014; Juvonen, Nishin, & Graham, 2006), strong asymmetries in popularity induce a *power imbalance*, which facilitates abuse of power through aggression on the part of popular peers. Moreover, when the benefits associated with popular status are not equally available (Hawley, 2003), adolescents may compete for popularity more strongly, and aggression may be seen as a valuable means of gaining or maintaining popularity (Garandeau et al., 2011). In line with this reasoning, one previous study (Laninga-Wijnen et al., 2019a) demonstrated that a strong popularity hierarchy predicted higher aggressive popularity norms over time. Nevertheless, to date it is unknown what

types of students contribute to the popularity hierarchy, and whether popularity hierarchy can be seen as an explanatory mechanism (e.g. mediator) for the association between classroom percentages of student types and the popularity norm. We would expect classrooms with more socially dominant aggressive and bi-strategic individuals to be characterized by stronger popularity hierarchies, and hence, higher aggressive popularity norms. Instead, classrooms with more socially dominant prosocial individuals may represent relatively democratic environments with a shared balance of power, as these prosocial leaders may set a norm for showing behaviors *benefitting others* rather than lowering others' status (Eisenberg et al., 2006). A higher number of socially dominant prosocial individuals may therefore be associated with a less strong popularity hierarchy (e.g. more egalitarian classrooms), which in turn may relate to lower aggressive popularity norms. We did not have clear expectations regarding how the number of non-socially dominant individuals may contribute to the popularity hierarchy, and we therefore explored their potential role.

### **8.1.3 Classroom demographic characteristics and aggressive popularity norms**

In addition to the role of the number and strength of aggressive, prosocial and bi-strategic students, general demographic classroom characteristics – sex proportion, classroom size, school year and education level – could also contribute to the formation of aggressive popularity norms. As aggression is more prevalent among boys than among girls, and is generally described as a reputationally salient characteristic of boys (Hartup, 1996), a higher proportion of boys in the classroom may predict higher aggressive popularity norms. Classroom size predicted lower aggressive popularity norms in one study (Garandau et al., 2011), but was unrelated to aggressive popularity norms in another study (Gest & Rodkin, 2011); hence we explored the role of classroom size in popularity norms. As aggression becomes a more important associate of popularity during early adolescence (Cillessen & Mayeux, 2004), partly due to the “maturity gap” (Moffitt, 1993), we expected that the aggressive popularity norm would increase with advancing school year (higher grades). We also expected that aggressive popularity norms would be less likely to emerge at higher education levels, as attitudes towards achievement are more likely to be positive and therefore hardly

compatible with aggression, which should decrease the valence of aggression in these contexts (Garandeau et al., 2011).

## **8.2 Present Study**

This study aims to examine whether and how the *number* of six types of students – that is, socially and non-socially dominant aggressive, prosocial, and bi-strategic students – contributes to the aggressive popularity norm. Based on SIT (Latané & Wolf, 1981), we expect the role of these student types to be dependent on the number and strength of these students. Only socially dominant students – but *not* non-socially dominant students – may have the power to set the norm: a higher number of socially dominant aggressive and bi-strategic adolescents may enhance aggressive popularity norms, whereas a higher number of socially dominant prosocial adolescents may be associated with lower aggressive popularity norms. Moreover, we expect socially dominant prosocial adolescents to provide a buffer against the role of socially dominant aggressive or bi-strategic individuals in predicting the aggressive popularity norms (moderation effects). We will predict popularity norms at the start of the school year (T1), and at the end of the school year (T3; after controlling for norms at T1). As popularity norms have been found to emerge quickly (Laninga-Wijnen et al., 2018a), we also examine whether the number of different student types contributes *indirectly* to popularity norms at T3, via their role in popularity norms at T1. In addition, we examine whether popularity hierarchy can be a mediating factor: We expect the number of socially dominant aggressive and bi-strategic individuals to enhance a classroom's popularity hierarchy and, in turn, to contribute to higher aggressive popularity norms, whereas the number of socially dominant prosocial individuals may be related to more egalitarian classrooms and consequently result in lower aggressive popularity norms.

## **8.3 Methods**

### **8.3.1 Participants and procedure**

We approached all first and second-year students at two secondary schools in the Netherlands (comparable to Grade 7 – 8 in the U.S.) to participate in the SNARE project at the start of the 2011-2012 school year (Cohort 1). For the next school year, 2012-2013, a second cohort of first-year students entering these

secondary schools was asked to participate in the project (Cohort 2). A third cohort of first, second and third-year students was approached at another school in the 2016-2017 school year. Data were collected at three points during one school year: in the autumn, winter, and spring. In this study, data were used from the first and third measurement wave (T1 and T3). Before data collection started, students and their parents received an information letter explaining the goal of the study and offering the possibility to decline participation. Parents who did not wish their children to participate in the study were asked to indicate this, and students were told that they could opt out of their participation at any time. The survey was completed in the classroom under the supervision of a research assistant, using the Bright Answer socio-software (SNARE software, 2011). The study was approved by the Ethical Internal Review Board of one of the participating universities (Utrecht University), and the privacy and confidentiality of students' data were guaranteed.

Of the 2,914 students approached, 71 (2.4%) declined to participate for several reasons (e.g. the student was dyslectic, or parents considered the questionnaire too time-consuming). The final sample comprised 2,843 participants from 120 classrooms, with 12-30 participants per classroom ( $M = 23.69$ ). Around 54% of the participants were first-year students (grade 7), 37% were second-year students (grade 8) and 9% were third-year students (grade 9). Participants' ages ranged from 11 to 17 years ( $M = 13.17$ ,  $SD = 0.80$ ); 51.4% were girls. About 40% were in lower secondary education (i.e. preparatory secondary school for technical and vocational training); 60% were in higher secondary education (including senior secondary vocational and pre-university education). The majority of the sample (approximately 85%) were native Dutch.

### 8.3.2 Measures

All measures were based on peer nominations, assessed by asking participants questions about their classmates. Participants could nominate an unlimited number of same-sex and cross-sex peers. They also had the option of not selecting anyone for an item. For all items, the total number of nominations received was divided by the number of nominators, so that scores represented the proportion of classmates who had nominated an individual adolescent.

**Aggressive behavior.** Peer-perceived aggressive behavior was assessed using four within-classroom peer nominations concerning aggressive behavior:

“Who quarrels and/or initiates fights with you?”; “Who sometimes spreads rumors or gossip about you?”; “Who makes fun of others?”; and “Who bullies you?”. Principal component factor analyses showed that these four items loaded on one factor, explaining 61.6% of the variance at T1 (factor loadings varying from .74 to .83) and 64.1% of the variance at T3 (factor loadings ranging from .78 to .83). These four items were therefore averaged to create a scale for aggressive behavior at both T1 and T3. This scale represented the average proportion of peers who nominated a particular adolescent as aggressive using the four items, which could vary from 0 (nominated by nobody on the four items) to 1 (nominated by everyone on all four items). Cronbach’s alphas were  $\alpha_{T1} = .72$ , and  $\alpha_{T3} = .73$ , indicating the scale to be internally consistent.

**Prosocial behavior.** Peer-perceived prosocial behavior was assessed using three items (see also Laninga-Wijnen et al., 2018a): “Who gives others the feeling that they belong to the group?”; “Who helps others by giving good advice?”; and “Who help you with problems (e.g. with homework, repairing a flat tire, or when you feel down)?” Principal component factor analysis showed that these three items represented one factor, explaining 64.1% of the variance (factor loadings ranging from .75 to .88) at T1 and 74.7% of the variance at T3 (factor loadings ranging from .84 to .86). The average of these three items was used as a scale for peer-perceived prosocial behavior, both at T1 and T3. This scale represented the average proportion of peers who nominated a particular adolescent as prosocial using the three items, which could vary from 0 (nominated by nobody on the three items) to 1 (nominated by everyone on all three items). Cronbach’s alphas of the resultant scale were  $\alpha_{T1} = .72$ , and  $\alpha_{T3} = .83$ , indicating the scale to be internally consistent.

**Social dominance.** In order to measure social dominance, three peer-nominated items were used: “Who makes others follow their plans?” “Who gets attention from others?” and “Who do others choose to lead the group?” Principal component factor analysis indicated that these three items represented one factor explaining 72.6% of the variance (factor loadings ranging from .84 to .87). We calculated the average of these three items at T1 as a scale for peer-perceived social dominance. This scale represented the average proportion of peers who nominated a particular adolescent as socially dominant using the three items, which could vary from 0 (nominated by nobody on the three items) to 1

(nominated by everyone on all three items). Cronbach's alpha of this scale was  $\alpha_{T1} = .75$ .

**Construction of student types.** Our analyses were carried out at classroom level, as our aim was to predict classroom-level outcomes. As we were interested in combinations of social dominance and behaviors *within persons*, our first step was to group our participants based on these combinations *within persons*. In order to identify the six types of students –socially dominant aggressive, prosocial and bi-strategic individuals, and *non*-socially dominant aggressive, prosocial and bi-strategic individuals – we needed a cut-off to define high aggression, prosocial behavior or social dominance. As Resource Control Theory inspired our study, we initially aimed at replicating the cut-off presented by Hawley (1999), who divided her sample into thirds in order to distinguish between aggressive, prosocial and bi-strategic controllers (see McDonald et al., for a similar approach). However, when we applied this criterion to our data, adolescents who were nominated only once on one aggression item would still be regarded as highly aggressive. As the work of Moscovici (1974) emphasizes the importance of a certain degree of consistency in behavior, we aimed at categorizing adolescents as aggressive, prosocial or socially dominant when they were chosen at least twice on items belonging to these scales (i.e. nominated by at least two classmates, or on at least two items). In order to meet this “consistency” criterion, we decided to use the 75<sup>th</sup> percentile as a cut-off for defining high levels of aggression, prosocial behavior and social dominance; hence introducing a somewhat stricter criterion than Hawley (1999).

For aggression, prosocial behavior and social dominance scores, students were assigned a '1' if they scored above the 75<sup>th</sup> percentile and a '0' if they scored below this 75<sup>th</sup> percentile. Based on these three binary variables, six types of students at T1 were distinguished across the whole sample. For instance, socially dominant bi-strategic students scored a '1' on all binary variables (i.e. scored above the 75<sup>th</sup> percentile for prosocial behavior, aggression *and* social dominance). By contrast, non-socially dominant bi-strategic students scored above the 75<sup>th</sup> percentile for aggression and prosocial behavior, but not above the 75<sup>th</sup> percentile for social dominance. Figure 8.1 presents the behavioral and social dominance characteristics of these six types of students, and Table 8.1 provides information on how they varied by composition.

### **Class-level variables.**

**Demographic variables.** We included four demographic variables to control for their potential effect on the aggressive popularity norm, in line with previous work (Laniga-Wijnen et al., 2019a): class size, educational level, grade, and sex proportion. Class size was measured as the total number of participating adolescents in a classroom. Education level was included as a binary variable, with '0' referring to lower education levels (including preparatory secondary school for technical and vocational training) and '1' referring to higher education levels (senior secondary vocational and pre-university education). For a more detailed description of the tracked education system in the Netherlands, see Gremmen et al. (2017). Secondary school year varied from first to third year. Sex proportion was calculated as the percentage of boys within a class, by dividing the number of participating boys by the total number of participants.

**Aggressive popularity norms.** Peer-nominated popularity was assessed by asking participants "Who is most popular?" and "Who is least popular?" For each student, the proportion of peer nominations received for "least popular" was subtracted from the proportion of peer nominations received for "most popular", to obtain a single continuum of popularity (Lease et al., 2002; Cillessen & Rose, 2005). Popularity norms for aggression at T1 and T3 were calculated for each classroom as the correlation between peer-nominated aggressive behavior and popularity (Henry et al., 2000; Laniga-Wijnen et al., 2017). We transformed these variables into Fisher  $z$ -scores in order to obtain a relatively normally distributed measure, with the formula:  $z' = .5[\ln(1+r) - \ln(1-r)]$  (Fisher, 1925).

**Popularity hierarchy.** The popularity hierarchy at T1 was based on the standard deviation of individual popularity scores within the classroom. A high score reflects a strong classroom hierarchy, whereas a low score reflects a relatively egalitarian classroom.

**Number of (non-)socially dominant aggressive, prosocial, and bi-strategic students.** For each classroom, we calculated how many socially and non-socially dominant aggressive, bi-strategic and prosocial adolescents were present, and based on these numbers we calculated *percentages* of different types of students within each classroom (Table 8.2), in order to take classroom size into account.

## 8.4 Analytic Strategy

### 8.4.1 Attrition analyses

As some students joined the school a year later, or left the school halfway through the year, there were some missing values in peer nominations ( $N = 29$  at T1 and  $N = 27$  at T3). Students with missing data at T1 were on lower educational tracks [ $F(1) = 5.42, p = .020$ ] but did not differ with respect to age and sex. Students missing on T3 were a bit older [ $F(1) = 8.43, p = .004$ ] but did not differ with respect to sex or educational track.

### 8.4.2 Comparison between schools

Moreover, our sample consisted of participants from three schools, which we had to combine in order to have sufficient power for our classroom-level analyses. Before doing so, we checked whether the schools were similar in terms of study variables. This was the case, except that one school was characterized by lower levels of peer-perceived aggression and a lower percentage of non-socially dominant aggressive adolescents compared to both other schools, and a lower percentage of non-socially dominant bi-strategic students compared to one of the other schools. The other two schools did not differ from each other. In addition, correlations between our main variables were transformed into z-scores and compared across different schools, and showed no differences. We therefore considered it justified to collapse the various groups for our analyses.

### 8.4.3 Classroom-level analyses

To examine the role of the percentage of socially and non-socially dominant aggressive, bi-strategic, and prosocial adolescents in the aggressive popularity norm, we conducted a longitudinal classroom-level linear regression analysis in *Mplus* using maximum likelihood estimation (ML; Byrne, 1998), and using the BC-Bootstrap procedure to estimate indirect effects. Residuals were relatively normally distributed, there was no multicollinearity (Tolerance  $> .43$  and VIF  $< 2.33$ ), nor were there any serious outliers. We centered our student-type predictor variables and computed two interaction terms to examine potential moderating effects (percentage of socially dominant prosocial adolescents \* percentage of socially dominant aggressive adolescents; and percentage of socially dominant prosocial adolescents \* percentage of bi-strategic adolescents). Nonsignificant

interaction effects were excluded from the final model. The percentage of different types of students, interaction terms and control variables at T1 were included as predictors of popularity norms at T1 and popularity norms at T3. We used indirect effects to test whether percentages of different student types *indirectly* predicted popularity norms at T3, via their effect on norms at T1. We also examined the potential mediating role of popularity hierarchy at T1 in predicting popularity norms at T3.

Model fit precision was examined using the chi-square statistic ( $\chi^2$ ), comparative fit index (CFI), Tucker-Lewin Index (TLI), Root-Mean-Square Error of Approximation (RMSEA), and the Standardized Root-Mean-square Residual (SRMR). The  $\chi^2$  test assesses the discrepancy of fit between the observed and hypothesized models; a nonsignificant  $\chi^2$  value indicates a good fit to the data, but it should be noted that this test is overly sensitive to sample size and model complexity. The CFI and TLI estimates compare the specified model with a model in which all variables are assumed to be uncorrelated; values of .95 or greater reflect an excellent fit to the data, and values of .90 – .94 indicate an adequate fit. The RMSEA index adjusts for model complexity and favors the most parsimonious model. RMSEA and SRMR values of .05 or less indicate an excellent fit to the data, and values of .06 – .08 indicate an adequate model fit.

## 8.5 Results

Individual-level correlations between aggression and prosocial behavior were significantly negative ( $r = -.10$ ), whereas correlations of social dominance with aggression and prosocial behavior were significantly positive, with  $r = .45$  and  $r = .27$ , respectively. Based on z-standardized scores of these three variables (aggression, prosocial behavior, and social dominance), we identified six types of students, which are represented in Figure 8.1. We tested differences in unstandardized aggression, prosocial behavior and social dominance between the six student types; see Table 8.1. Table 8.2 provides information on how the six student types were distributed at classroom level. Most classrooms contained at least two of the different types of students, resulting in a large variety of possible combinations of students within classrooms. For the sake of parsimony, we did not report all possible combinations of student types within classrooms (available on request from the first author).

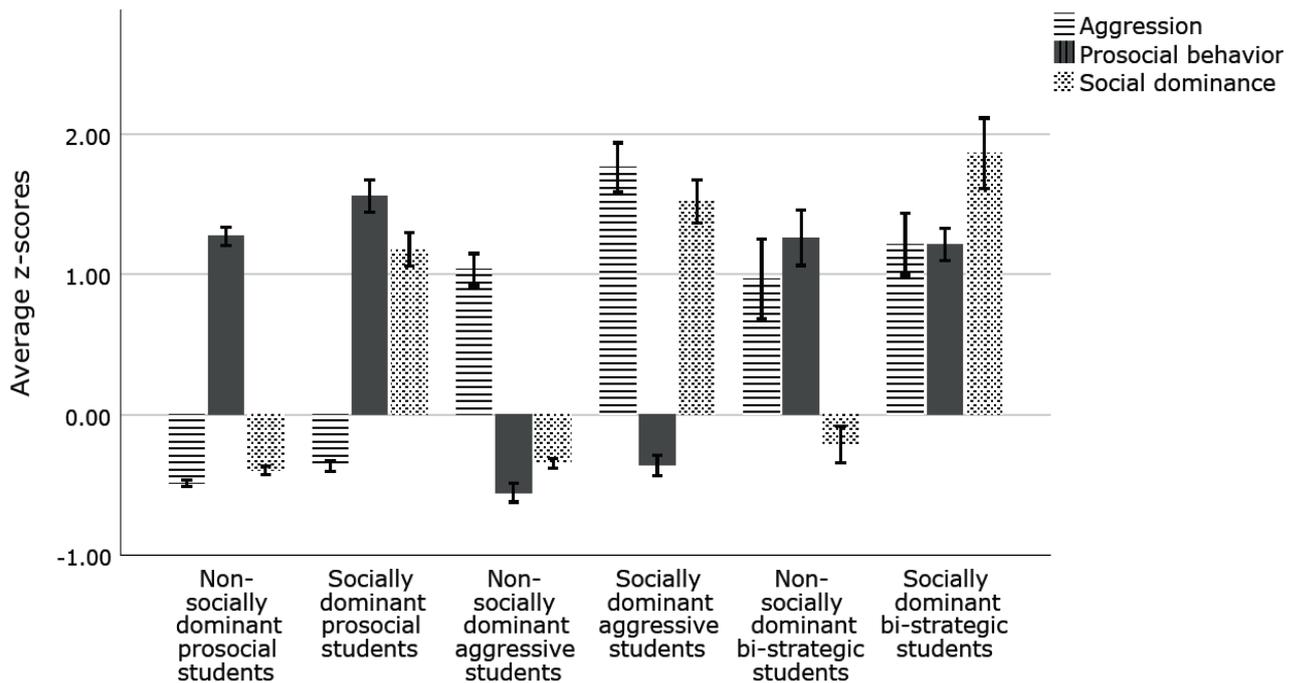


Figure 8.1. Behavioral profiles of six student types based on the 75th percentile of z-standardized aggression, prosocial behavior, and social dominance scores.

Table 8.1

*ANOVA Test of Differences in Aggression, Prosocial Behavior, and Social Dominance at the Baseline (T1) between the Six Student Types*

	Socially dominant aggressive students (N=251)	Socially dominant bi-strategic students (N = 104)	Socially dominant prosocial students (N=195)	Non-socially dominant aggressive students (N=315)	Non-socially dominant bi-strategic students (N=36)	Non-socially dominant prosocial students (N=388)
	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)
Aggression	.10 (.06) <sup>c</sup>	.08 (.05) <sup>b</sup>	.01 (.01) <sup>a</sup>	.07 (.04) <sup>b</sup>	.07 (.03) <sup>b</sup>	.01 (.01) <sup>a</sup>
Prosocial behavior	.09 (.04) <sup>c</sup>	.19 (.04) <sup>b</sup>	.22 (.05) <sup>a</sup>	.08 (.04) <sup>d</sup>	.20 (.04) <sup>ab</sup>	.20 (.04) <sup>b</sup>
Social dominance	.16 (.08) <sup>c</sup>	.18 (.09) <sup>d</sup>	.13 (.06) <sup>b</sup>	.03 (.02) <sup>a</sup>	.04 (.03) <sup>a</sup>	.03 (.02) <sup>a</sup>
Boy	68.5%	46.2%	34.4%	67.0%	33.3%	18.0%
% Western	79.3%	88.5%	86.7%	78.7%	88.9%	86.9%
Age (years)	13.35 (.89) <sup>b</sup>	13.17 (.70) <sup>abc</sup>	13.07 (.76) <sup>a</sup>	13.08 (.71) <sup>c</sup>	13.15 (.74) <sup>abc</sup>	13.28 (.81) <sup>ab</sup>

### **8.5.1 The role of socially and non-socially dominant aggressive, prosocial and bi-strategic adolescents in popularity norms and popularity hierarchy**

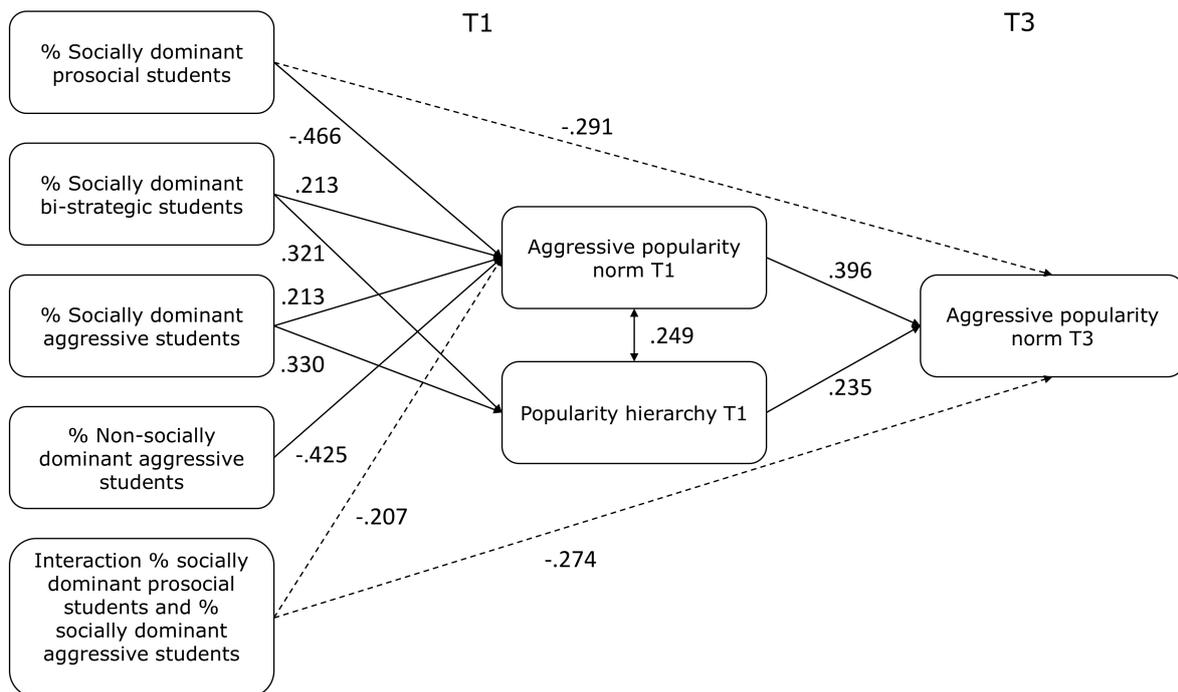
In order to examine whether percentages of socially- and non-socially dominant aggressive, bi-strategic and prosocial adolescents were associated with aggressive popularity norms at T1 and T3, we conducted class-level linear regression analyses in *Mplus*. As the interaction effect 'percentage of socially dominant prosocial adolescents \* percentage of bi-strategic adolescents' was nonsignificant (in predicting norms at both T1 and T3) and contributed to a worse model fit [ $\Delta RMSEA = .06$ ;  $\Delta CFI = .04$ ;  $\Delta TLI = .26$ ;  $\Delta SRMR = .01$ ], we excluded this effect from our model. The fit of the resultant final model was good [ $\chi^2(5) = 5.47$ ,  $p = .36$ ;  $RMSEA = .03$ ,  $CFI = .996$ ;  $TLI = .973$ ;  $SRMR = .016$ ]. Figure 8.2 depicts significant standardized coefficients. Appendix (8A; Table S8.1) provides a complete overview of the results.

**Popularity norms at T1.** As hypothesized, we found that higher percentages of socially dominant aggressive and socially dominant bi-strategic adolescents in a classroom were significantly associated with relatively higher aggressive popularity norms at T1, whereas a higher percentage of socially dominant prosocial adolescents was significantly associated with relatively lower aggressive popularity norms at T1. The percentage of non-socially dominant prosocial and bi-strategic students did not significantly predict aggressive popularity norms at T1. Contrary to our expectation, non-socially dominant aggressive students did contribute to the popularity norm, but in a reverse direction: a higher percentage of these students predicted *lower* aggressive popularity norms. The effect of the role of these non-socially dominant aggressive individuals was almost twice as great as the effect of socially dominant aggressive individuals.

The percentage of socially dominant prosocial adolescents moderated the association between the percentage of socially dominant aggressive adolescents and the popularity norm at T1. Simple slope analysis showed that the aggressive popularity norm was highest in classrooms with a relatively high percentage of socially dominant aggressive adolescents and classrooms with a relatively low percentage (or even no) socially dominant prosocial adolescents present (Figure 8.3). In total, 37.1% of the variance in aggressive popularity norms at T1 was explained by our model.

Table 8.2  
*Description of the student types and norms ( $N_{classrooms} = 120$ )*

	<i>M</i>	<i>SD</i>	Min	Max	Number of classrooms with this type of students
% Socially dominant highly aggressive students	8.9	7.1	0	33.3	99
% Non-socially dominant highly aggressive students	11.7	13.0	0	76.9	94
% Non-socially dominant bi-strategic students	1.5	4.4	0	30.8	22
% Socially dominant bi-strategic students	4.1	5.8	0	29.4	55
% Socially dominant highly prosocial students	7.0	9.5	0	52.9	72
% Non-socially dominant highly prosocial students	14.1	14.3	0	66.7	89
Aggressive popularity norm (correlation) T1	0.36	0.28	-0.52	0.81	
Aggressive popularity norm (Fisher z-score) T1	0.41	0.34	-0.58	1.14	
Aggressive popularity norm (correlation) T3	0.39	0.24	-0.31	0.90	
Aggressive popularity norm (Fisher z-score) T3	0.45	0.31	-0.32	1.45	
Popularity Hierarchy T1	0.28	0.07	0.10	0.44	

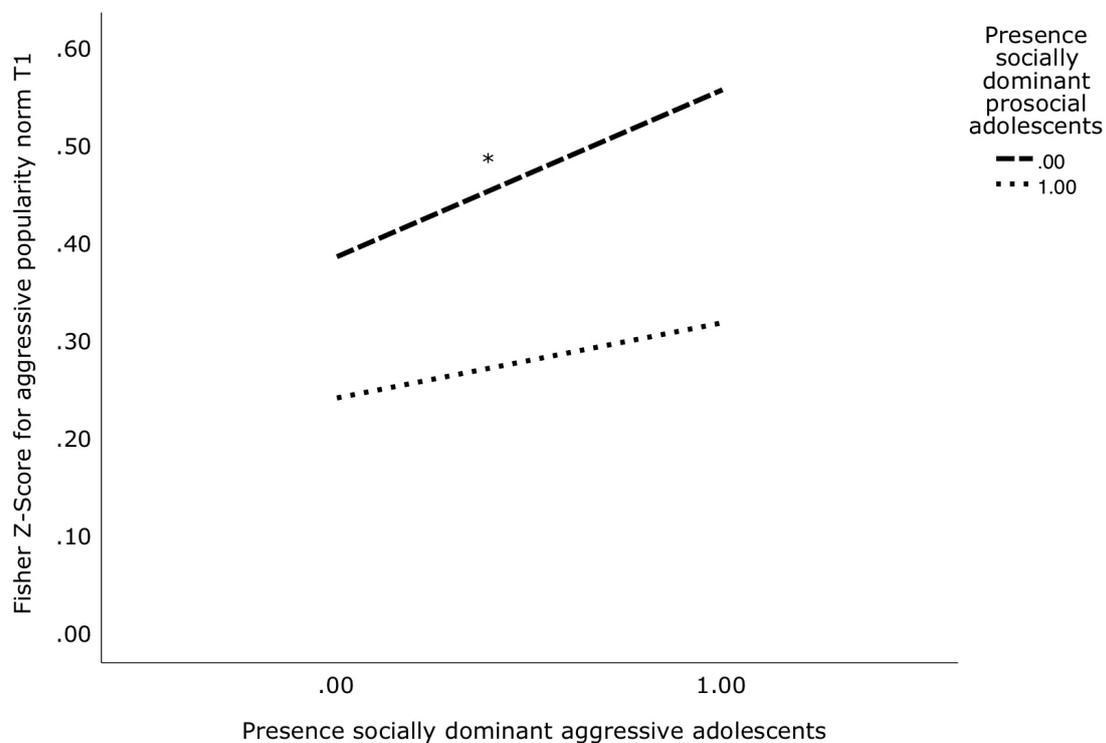


*Figure 8.2.* Significant standardized coefficients of class-level mediational regression analyses predicting aggressive popularity norms. Demographic variables and % of non-socially prosocial and bi-strategic adolescents were not visualized in this model. Significant direct effects are indicated with dotted lines, significant indirect effects are indicated with solid lines.

**Popularity hierarchy at T1.** A higher percentage of socially dominant aggressive and socially dominant bi-strategic individuals was associated with a higher aggressive popularity hierarchy, whereas no relationship was found between the percentage of socially dominant prosocial individuals and the popularity hierarchy. None of the non-socially dominant student types contributed to the popularity hierarchy (Table S8.1, Appendix). In total, 28.1% of the variance in popularity hierarchy was explained by our model.

**Popularity norms at T3.** After controlling for the popularity norm and popularity hierarchy at T1, most student types did not add to popularity norms at T3, except for a significantly negative main effect of the percentage of socially dominant prosocial individuals [ $B = -.010$ ;  $SE = .004$ ;  $p = .02$ ], and a significant interaction effect (percentage of socially dominant prosocial adolescents at T1 \* percentage of socially dominant aggressive adolescents at T1). Simple slope

analysis revealed that classrooms with a relatively higher percentage of socially dominant aggressive adolescents were characterized mainly by higher aggressive popularity norms, if there were relatively fewer (or even no) socially dominant prosocial adolescents present (Figure 8.4). Finally, we found that popularity norms were highly stable and that a stronger popularity hierarchy at T1 predicted higher aggressive popularity norms at T3. In total, 37.2% of the variance in aggressive popularity norms at T3 was explained by our model.



*Figure 8.3.* Interaction effect of the presence of socially dominant prosocial and aggressive adolescents in predicting aggressive popularity norms at T1 ( $N_{\text{classrooms}} = 120$ ). *Note.* 0 = classrooms with <10.0% of socially dominant prosocial and aggressive students; 1 = classrooms with  $\geq 10.0\%$  of socially dominant prosocial and aggressive students.  $*p < .05$ .

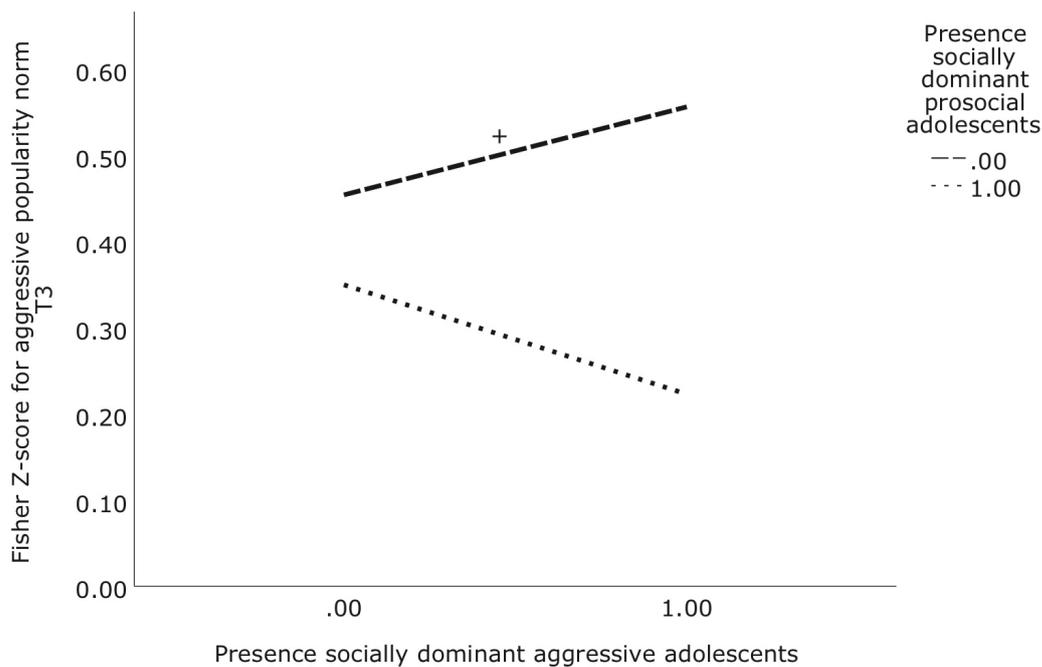


Figure 8.4. Interaction effect of the presence of socially dominant prosocial and aggressive adolescents in predicting popularity norms at T3 ( $N_{\text{classrooms}} = 120$ ). Note. 0 = classrooms with <math><10.0\%</math> of socially dominant prosocial and aggressive students; 1 = classrooms with  $\geq 10.0\%$  of socially dominant prosocial and aggressive students. +  $p \approx .05$ .

**Indirect effects.** In the indirect part of our model, we tested whether the percentage of socially and non-socially dominant prosocial, aggressive, and bi-strategic individuals would contribute *indirectly* to popularity norms at the end of the school year (T3), by setting the popularity norm at the start of the school year (T1). In addition, we examined potential mediating effects of popularity hierarchy. We found six significant *indirect effects* (shown by solid arrows in Figure 8.2). A higher percentage of socially dominant aggressive individuals indirectly predicted higher aggressive popularity norms at T3 by contributing to higher aggressive popularity norms at T1 [ $B = .004$ ,  $CI_{\text{bcbootstrap}} = .001, .008$ ;  $\beta = .085$ ]. We found a similar indirect effect for the percentage of socially dominant bi-strategic individuals [ $B = .005$ ,  $CI_{\text{bcbootstrap}} = .001, .012$ ;  $\beta = .084$ ]. Moreover, the percentage of socially dominant prosocial and non-socially dominant aggressive individuals indirectly predicted lower aggressive popularity norms at T3 by contributing to lower aggressive popularity norms at T1 [ $B = -.006$ ,  $CI_{\text{bcbootstrap}} = -.012, -.002$ ;  $\beta = -.185$ ;  $B = -.004$ ,  $CI_{\text{bcbootstrap}} = -.008, -.001$ ;  $\beta = -.168$ ]. This indicates that different student types contribute to the popularity norm at the start

of the school year, and that their effect persisted due to the self-sustainability of norms.

Next, a higher percentage of socially dominant aggressive and bi-strategic individuals indirectly predicted higher aggressive popularity norms at T3 by contributing to a stronger popularity hierarchy at T1 [ $B = .003$ ,  $CI_{bcbootstrap} = .001, .008$ ;  $\beta = .077$ ;  $B = .004$ ,  $CI_{bcbootstrap} = .001, .011$ ;  $\beta = .075$ ]. Other effects reflecting the mediating role of popularity hierarchy were nonsignificant.

**Classroom demographic characteristics.** None of the classroom demographics were predictive of popularity norms or popularity hierarchy, except that higher school years were characterized by a stronger popularity hierarchy [ $B = .027$ ,  $\beta = .241$ ].

### 8.5.2 Sensitivity analysis

We performed several sensitivity analyses. First, as the group of non-socially dominant bi-strategic adolescents was relatively small ( $N_{students} = 36$ , distributed across 22 classrooms), we analyzed our models with *and* without the percentage of this student type, and all results remained the same. Accordingly, we chose the model including all student types as the final model. Second, we explored whether non-socially dominant aggressive students might moderate the role of socially dominant aggressive and bi-strategic students in the popularity norm (at both T1 and T3), but these interaction effects were nonsignificant and were therefore excluded from the final model. Third, we tested whether the results would be similar when controlling for the school or cohort, and this proved to be the case. The results of our sensitivity analyses are available on request.

## 8.6 Discussion

This study examined whether the classroom student composition matters for the aggressive popularity norm. We found that a higher percentage of aggressive students predicted higher aggressive popularity norms, but only when these aggressive students were socially dominant. By contrast, non-socially dominant aggressive students contributed to *lower* aggressive popularity norms. Despite their highly prosocial behavior, socially dominant bi-strategic students enhanced the aggressive popularity norm; and only the socially dominant prosocial students who *abstained from aggression* lowered the aggressive popularity norm. Moreover, these socially dominant, solely prosocial students

acted as a buffer against the role of socially dominant aggressive adolescents in the aggressive popularity norm (moderation), but not against the role of socially dominant bi-strategic adolescents. Finally, one way in which socially dominant aggressive and socially dominant bi-strategic individuals strengthen the aggressive popularity norm is by enhancing a classroom's popularity hierarchy; these asymmetries in popularity may result in higher aggressive popularity norms, possibly due to enhanced competition for high status (Garandeau et al., 2014).

### **8.6.1 The number and strength of aggressive, prosocial, and bi-strategic individuals**

In line with Moscovici's theory on minorities (1974), our findings indicate that a numerical *minority* of students can determine the popularity norm in a classroom. However, somewhat counter to SIT (Latané & Wolf, 1981), we found that it is not only *socially dominant* adolescents who may have the power to shape classroom-level aggressive popularity norms: Even when highly aggressive adolescents *lack* strength (social dominance), they contributed to the norm. That is, they *lowered* the aggressive popularity norm, with effect sizes that were almost twice as large as the effect of socially dominant aggressive individuals. Non-socially dominant aggressive students are at the periphery of the peer group and may be less attractive to their classmates, resulting in active rejection of their aggression (Chang, 2003; Farmer et al., 2003; Sijtsema, Lindenberg & Veenstra, 2010a). They may also use their aggression in a less strategic and instrumental way compared to socially dominant aggressive individuals. Non-socially dominant aggressive students have been shown to experience more victimization (Hopmeyer Gorman et al., 2011; Farmer et al., 2003). In response, they may display aggression in a *reactive* rather than in a proactive way, which may be less attractive to others (Farmer et al., 2003; Prinstein & Cillessen, 2003). Consequently, non-socially dominant students may provide a role model for how *not* to behave, and hence they may mitigate the value of aggression in the classroom context, resulting in lower aggressive popularity norms.

Next, we found support for *cross-behavior* processes: students' endorsement of prosocial behavior predicted aggressive popularity norms; however, the role of this prosocial behavior depended on the kind of student using it. First, we identified a group of socially dominant bi-strategic individuals, who –

compared to other student types – constituted the smallest minority in the classrooms. This numerical minority nevertheless seemed to be powerful: they contributed to the aggressive popularity norm over and above the role of socially dominant aggressive adolescents. Being prosocial in addition to being aggressive and socially dominant may thus provide *additional* power to enhance the aggressive popularity norm. The social skills of socially dominant bi-strategic adolescents may enable them to respond adeptly to social cues, ‘read’ their effect on peers, and create successful alliances (Hawley, 2003). Rather than a voluntary act aimed at benefiting others (Eisenberg, Vaughan, & Hofer, 2009), therefore, the prosocial behaviors of these “well-adapted Machiavellians” may be a self-serving strategy that secures their position and enhances their power to establish a norm for aggression (Hawley, 2003).

In addition to these bi-strategic students, we identified a group of socially dominant prosocial adolescents who abstained from aggression, and hence were *solely* prosocial. The number of these solely prosocial students contributed to lower aggressive popularity norms. Classrooms with relatively more socially dominant prosocial individuals may represent a safe, harmonious environment (Jennings & Greenberg, 2009) where behaviors serving the good of others may have valence and where aggression is perceived as inappropriate or non-adaptive (Chang, 2004). This may decrease the salience and valence of aggression (Ellis et al., 2016). Moreover, the percentage of socially dominant prosocial adolescents in a classroom acted as a buffer against the role of socially dominant aggressive adolescents in the aggressive popularity norm (moderation). It might be that these socially dominant prosocial adolescents decrease the valence of aggression by showing that prosocial behavior can also be an effective means of gaining access to valuable material and social resources (Hawley, 2003; Ellis et al., 2016). Socially dominant prosocial adolescents could not provide a buffer against the role of socially dominant bi-strategic adolescents in the aggressive popularity norm. One reason for this finding could be that bi-strategic individuals may indicate that being aggressive does not preclude being prosocial, and that the combination of behaviors may be the most effective for gaining access to resources (Ellis et al., 2016; Hawley, 2009).

As hypothesized, *no* relationship was found between the number of non-socially dominant prosocial and bi-strategic adolescents and the aggressive popularity norm. This is in line with social impact theory (Latané & Wolf, 1981),

which posits that individuals may only have the power to contribute to a norm if their number and strength are relatively high. It should nevertheless be noted that power issues may have prevented us from detecting significant results for the small group of non-socially dominant bi-strategic students ( $N = 36$ ).

The number and strength of different types of students mattered particularly at the start of the school year. After controlling for popularity norms at T1, most student types did not add to variance in popularity norms at the end of the school year (T3) – except for the direct role of the percentage of socially dominant prosocial students and their moderating role in reducing the effect of socially dominant aggressive students on norms. Nevertheless, the role of socially dominant prosocial, aggressive, and bi-strategic, and non-socially dominant aggressive student types in popularity norms at T3 appears to be *indirect*: these students set the norm at the start of the school year, and their effect persists due to the stability of the norms (Laninga-Wijnen et al., 2018a).

### **8.6.2 Popularity hierarchy as underlying mechanism for how different types of students contribute to aggressive popularity norms**

We found that one way in which socially dominant aggressive and socially dominant bi-strategic individuals contribute to higher aggressive popularity norms is by enhancing the classrooms' *popularity hierarchy*, probably because they use their aggression in a strategic, manipulative way, which allows them to gain a higher status in the peer group *at the expense of others'* status. In line with the balance of power perspective (Garandeau et al., 2014), we found that these strong popularity asymmetries in turn predict higher aggressive popularity norms. Popularity asymmetries may evoke a power imbalance, which facilitates abuse of power through aggression among popular peers (Garandeau et al., 2011). Moreover, when all the benefits associated with being popular are not equally available to everyone (Hawley, 2003), this may trigger competition for popularity. In a competitive context, aggression may be seen as a valuable tool for gaining or maintaining popularity (Laninga-Wijnen et al., 2019a). Importantly, we found no relationship between other types of students and popularity hierarchy, which partly contradicts our hypotheses as we initially expected a higher number of socially dominant prosocial individuals to contribute to a lower popularity hierarchy. Apparently, prosocial behaviors, even when displayed by socially dominant adolescents, may have no effect on classroom popularity asymmetries,

most likely because these behaviors are aimed at benefitting others and therefore more important to dyadic, liking relationships, rather than to reputation-based constructs such as popularity or popularity hierarchy (Hopmeyer et al., 2011).

### **8.6.3 Classroom demographic characteristics**

We found no evidence that classroom demographics predict aggressive popularity norms, which was somewhat counter to our hypotheses; the aggressive popularity norm does not depend directly on classroom size, sex proportion, educational level, or school year. This suggests that in order to prevent the emergence of aggressive popularity norms, schools may need to look beyond demographics such as classroom size or sex proportion, and focus instead on the type of individuals making up a class. This may be most important in the most senior school years, which are more likely to be characterized by a strong popularity hierarchy, which in turn is associated with higher aggressive popularity norms.

## **8.7 Strengths, limitations and future directions**

Our study has several strengths. First, whereas previous studies have focused on the *consequences* of aggressive popularity norms (Laniga-Wijnen et al., 2018a), we examined which factors may *predict* aggressive popularity norms in the first place. Second, our study sheds new light on Social Impact Theory and Resource Control Theory. We demonstrated that aggressive students who *lack* strength may still matter for the aggressive popularity norm, and that *cross*-behavior processes may occur: the endorsement of certain behaviors (prosocial behavior) may affect the norms regarding *other*, related behaviors (aggression). Importantly, our generalized measures of prosocial and aggressive behaviors only allowed us to test aspects of resource control theory indirectly, as we did not directly assess the *function* of these behaviors (e.g. the instrumentality; Hawley & Bower, 2018; p. 106). Third, we identified the popularity hierarchy as a mechanism explaining *why* socially dominant aggressive and bi-strategic individuals may have the power to set the norm. Accordingly, this study not only provides information on the types of students that matter for the aggressive popularity norms, but also on *why* they may have the power to set the norm.

Some limitations of the present study need to be acknowledged. First, the data used in the current study stem from peer nominations only, which might lead to

problems with shared method variance (Vaillancourt & Hymel, 2006); to counter this, measures were aggregated across multiple nominators, enhancing the validity and reliability (Bukowski, Gauze, Hoza, & Newcomb, 1993; Bukowski & Hoza, 1989). Second, we examined peer-reported aggression as a unified construct, without consideration for its different forms (i.e. physical vs. relational) and functions (i.e. reactive vs. proactive). Nonetheless, the four items we used loaded reliably on one factor. We would encourage researchers to disentangle different types of aggression. Third, we cannot make any statements about causality. It might also be the case that, due to the presence of aggressive popularity norms at T1, highly prosocial students are less often seen as a leader at T1, whereas highly aggressive adolescents may attain social dominance. Fourth, we collapsed three different schools in order to obtain sufficient power for our classroom-level analyses. One school differed somewhat from the other two schools, but additional analyses indicated that these differences did not affect our results. Nevertheless, we would advocate further research involving more schools and classes to replicate our analyses in order to determine whether similar results are obtained, and to examine potential moderating effects of classroom demographic characteristics. Fifth, in line with some other studies (Hawley, 1999; McDonald et al., 2015) we relied heavily on theory to identify our six student types, rather than using a data-driven approach such as Latent Profile Analyses. We would encourage future research to examine the use of these types of adolescents further by comparing it to outcomes of more data-driven approaches.

### **8.8 Conclusions and implications**

Our findings have important implications for theory and practice, as they provide a first step in examining predictors of aggressive popularity norms by focusing on classroom composition. First, schools could use the insights generated by this study to *prevent* the emergence of aggressive norms, perhaps starting with decision-making on classroom composition. In other words, schools could base classroom composition more actively on the combination of student types within classrooms. Schools might obtain information on students' behavior or social dominance from primary schools or from observations in previous years at secondary school, and this information could help them organize classrooms in such a way that the percentage of socially dominant aggressive adolescents and

socially dominant bi-strategic students is kept to a minimum, while the percentage of socially dominant prosocial students is maximized across classrooms.

Second, the knowledge gained in this study can be used to propose solid research-based intervention strategies designed to *change* aggressive popularity norms. Some interventions, such as the Meaningful Roles Intervention (Ellis et al., 2016) or Roots Intervention (Paluck, Shepherd, & Aronow, 2016), are aimed at reducing aggressive (bullying) norms by rewarding prosocial behavior, for example by assigning prosocial leaders in a classroom and exchanging compliment cards. Our study may provide preliminary theoretical evidence for the potential effectiveness of such interventions, as well as suggestions for improvement. For instance, in line with the reasoning of the Meaningful Roles Intervention, we confirmed that socially dominant prosocial students have the power to diminish the detrimental role of socially dominant aggressive individuals. However, we also found indications that it may be important to provide additional strategies to actively discourage aggressive behavior: our study shows that adolescents who combine prosocial behavior with aggression still contribute to higher aggressive popularity norms. Also, when aggression goes together with being *non*-socially dominant, this may diminish the value of aggression in a given context, resulting in a lower aggressive popularity norm. Future research should examine what means may be most effective in discouraging aggression in appropriate ways. In addition, future researchers are encouraged to examine how socially dominant bi-strategic students may be constrained in setting an aggressive popularity norm, as their effect was not buffered by socially dominant prosocial adolescents. Future studies might also examine the origins of prosocial popularity norms, as it has been suggested that these norms yield more desirable classroom environments. This would enable more insights to be gained into how the classroom composition may contribute to environments that appropriately foster early adolescents' social-emotional and academic adjustment.

**Appendix (8A)**

Table S8.1

*Results of Longitudinal Class-level Regression Analysis Predicting Aggressive Popularity Norms at T1 and T3 and Popularity Hierarchy at T1 ( $N_{classrooms} = 120$ )*

	Aggressive popularity norms T1			Popularity hierarchy T1			Aggressive popularity norms T3		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
Percentage socially dominant aggressive students	0.010*	0.004	0.213	0.003***	0.001	0.330	-0.006	0.004	-0.139
Percentage socially dominant bi-strategic students	0.012*	0.006	0.213	0.004**	0.002	0.321	-0.001	0.005	-0.019
Percentage socially dominant prosocial students	-0.017***	0.004	-0.466	0.000	0.001	0.045	-0.010**	0.004	-0.291
Percentage non-socially dominant aggressive students	-0.011***	0.003	-0.425	0.000	0.001	0.012	-0.002	0.002	-0.084
Percentage non-socially dominant bi-strategic students	0.004	0.007	0.049	0.001	0.001	0.072	0.006	0.008	0.086
Percentage non-socially dominant prosocial students	-0.003	0.003	-0.134	0.001	0.001	0.098	-0.002	0.002	-0.099
Interaction socially dominant aggressive * socially dominant prosocial students	-0.001*	0.000	-0.207	-	-	-	-0.001**	0.000	-0.274
Popularity hierarchy T1	0.004*	0.002	0.249	-	-	-	1.014**	0.405	0.235
Aggressive popularity norm T1	-	-	-	0.004*	0.002	0.249	0.369**	0.124	0.396
Class size	0.010	0.008	0.145	-0.001	0.002	-0.082	-	-	-
Sex proportion	0.142	0.215	0.052	0.006	0.058	0.011	-	-	-
Educational level	0.103	0.072	0.150	0.001	0.014	0.007	-	-	-
Grade	-0.009	0.043	-0.018	0.027*	0.011	0.241	-	-	-

**Chapter**

**9**

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General Discussion

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## 9.1 Introduction

The onset of adolescence presents a turbulent period in life, in which youth face a myriad of social-emotional, cognitive, and biological changes (Steinberg & Morris, 2001). Adolescents seek autonomy from authority figures, such as parents or teachers, while peer relationships gain increasing significance and valence (Allen & Land, 1999; Berndt, 1982; Larson & Richards, 1991). At the same time, adolescents transition to secondary education, where they are organized in (relatively) new classrooms. In these classrooms, adolescents may start and keep affiliating with peers who are similar to them in certain behaviors (friendship selection and maintenance), and friends may also influence adolescents' behavioral development over time (influence). The interplay of these friendship processes may enhance similarities in behaviors among friends, and may contribute to the proliferation of behavior in classrooms, which can be desirable when pertaining to prosocial behavior or high academic achievement, but undesirable when pertaining to aggression.

Classroom peer norms may affect the extent to which certain behaviors are important in adolescent friendship processes. Whereas descriptive norms reflect the average perceived behaviors in a classroom, popularity norms refer to the extent to which behaviors are rewarded with popularity. Peer norms provide important rules on how adolescents should behave in order to fit in with the expectations of the peer group and to prevent being seen as a 'social misfit' (social misfit theory; Wright et al., 1986). As such, peer norms may affect adolescent peer preferences (such as whom they prefer as friends) and the extent to which they tend to conform to the behavior of their peers over time. According to the reputational salience hypothesis, particularly behaviors that are rewarded with popularity ("popularity norms") may affect these peer- and behavior dynamics. This dissertation aimed to examine the consequences of aggressive, prosocial, and academic popularity norms in the coevolution between adolescent friendship formation and behavioral development, as well as the antecedents of popularity norms. In this closing chapter I summarize the main findings emerging from the seven chapters of this dissertation, and relate these findings to the current state of the peer norm literature. Specific attention is given to the integration and interpretation of the findings of the studies, and its practical implications. Moreover, I will reflect on new directions for future research arising from the findings in this dissertation.

## 9.2 Summary of Main Findings

This dissertation comprises seven empirical studies that examined the consequences and antecedents of popularity norms in adolescent classrooms. I took a *social-contextual approach* (Chang, 2004), by considering classrooms as proximate, social contexts (or 'mini-societies'; Rodkin & Ryan, 2012), with distinct peer cultures characterized by members' shared experiences, norms, and values (Hamm, Farmer, Lambert, & Gravelle, 2014); while integrating it with a *social network framework*, focusing on the dynamic, interrelated, and reciprocal nature of the development of peer relationships and behaviors (Veenstra, Dijkstra, & Kreager, 2018). With regard to consequences, I examined the role of popularity norms in the (co-)evolution of adolescents' friendships and behavioral development. This was done by focusing on popularity norms: (1) compared to other (in particular *descriptive*) norms; (2) in peer selection, maintenance, and influence processes; and (3) across multiple behavioral domains (academic, aggressive, and prosocial behavior). With regard to the antecedents, I focused on classroom composition and hierarchical structure as predictors of aggressive and prosocial popularity norms.

The main findings are summarized in Table 9.1. This dissertation indicated that popularity norms (within-classroom correlation between popularity and behavior) rather than descriptive norms (average perceived behavior in classroom) enhanced friendship processes based on aggression, prosocial behavior, and achievement in adolescent classrooms. Popularity norms mattered in particular for similarity-based friendship selection. Popularity norms also played a role for some maintenance and influence processes, but the consequences of popularity norms in selection processes were most robust and consistent across behavioral domains. Prosocial and aggressive popularity norms formed constellations in classrooms, which not only affected same-behavior friendship processes, but also cross-behavior friendship processes. For instance, having aggressive friends diminished adolescents' prosocial behavior in classrooms with high aggressive and low prosocial popularity norms. Popular peers' aggressive norms overpowered their prosocial norms: prosocial popularity norms could only buffer against aggressive friendship processes and encourage prosocial friendship processes when aggressive popularity norms were not present. For academic behaviors, popular peers' *objective achievement* (Grade Point Average; GPA) only affected similarity-based friendship selection (and not influence) for achievement.

## Discussion

However, when further examining popular peers' *goals* underlying their achievement, it was found that not only friendship selection, but also maintenance and influence processes were affected by popular peers' performance goals (outperforming others) or mastery goals (mastering academic tasks). Together, these findings demonstrate that popularity norms may enhance the conditions for the proliferation of aggressive, prosocial, and academic behaviors via adolescents' friendship processes.

How do popularity norms emerge in the first place? This dissertation indicates that the development of popularity norms depends on the classroom composition of students and the structure of peer relationships. The more a classroom contains socially dominant prosocial students and non-socially dominant aggressive students at the start of the school year, the *lower* the aggressive popularity norm; but the more a classroom contains socially dominant aggressive and socially dominant bi-strategic students, the *higher* the aggressive popularity norm. Socially dominant aggressive and socially dominant bi-strategic students contributed to the popularity norm directly, but also by establishing a strong popularity hierarchy (asymmetries in students' popularity within classrooms). A popularity hierarchy, in turn, enhanced aggressive popularity norms and lowered prosocial popularity norms across the school year. Plausibly, asymmetries in popularity elicit a power imbalance that facilitates the abuse of power by those at the top of the popularity ladder, and increase competition for popularity as resources associated with this position are not available for everyone. In such a context, high aggression and low prosocial behavior may be seen as valuable tools that can be rewarded with popularity.

Table 9.1 Summary of main findings

	Chapter 2	Chapter 3	Chapter 4	Chapter 5	Chapter 6	Chapter 7	Chapter 8
Questions	Do popularity norms and descriptive norms strengthen friendship selection, maintenance, and influence related to aggression?	How do combinations of prosocial and aggressive peer norms develop across a school year and how do they relate to individual-level behavioral trajectories?	Do combinations of prosocial and aggressive popularity norms affect prosocial and aggressive same-behavior and cross-behavior friendship processes?	Do academic acceptance-, rejection-, popularity-, and unpopularity norms affect the strength and direction of achievement-based friendship processes?	Do achievement goal popularity norms predict friendship selection, maintenance and influence processes based on achievement?	Does the strength and structure of a classrooms' popularity hierarchy predict prosocial and aggressive popularity norms?	Does the classroom composition contribute to the development of aggressive popularity norms?
Method	Longitudinal social network analysis using RSIENA	Latent Class Analyses, Latent Transition Analyses and Multi-Level Latent Growth Curve Analyses in Mplus	Longitudinal multi-group social network analyses in RSIENA with Bayesian inference	Longitudinal social network analyses using RSIENA; meta-analyses using metafor	Longitudinal multi-group social network analyses using RSIENA	Cross-lagged panel models in Mplus	Classroom-level mediation and moderation analyses in Mplus
Main findings	Popularity norms strengthened friendship selection and influence (but not maintenance) related to aggression. Descriptive norms played no role.	Three types of popularity norm constellations in classrooms: prosocial, aggressive, and mixed. Mostly stable across school year, but also some changes. Most classrooms ended up in aggressive or mixed profile at end of school year. Popularity norms affected individuals' prosocial behavior development.	In prosocial classrooms (low aggressive and high prosocial popularity norms), friendship maintenance based on similarity in prosocial behavior was enhanced, whereas aggressive friendship processes were largely mitigated. Instead, when aggressive popularity norms were equally strong or even stronger than prosocial norms (mixed and aggressive classrooms, respectively), aggression was more important for adolescent friendship processes than prosocial behavior.	Classroom unpopularity- and popularity norms moderated the strength and direction of friendship selection processes (but not of influence processes) for academic achievement. When high achievement related to unpopularity, low-achieving adolescents selected each other as friends, whereas high-achieving adolescents were unattractive friendship partners. When achievement related to popularity, adolescents selected their friends based on similarity, both in high- and low achievement. Acceptance-, rejection-, and descriptive norms did not affect these friendship processes.	Achievement goal popularity norms played a role in achievement-based friendship processes, rather than achievement goal descriptive norms. Specifically, adolescents formed friendships with similarly achieving peers in classrooms with high performance goal popularity norms, but these friendships were less likely to hold. Friendship influence on achievement took place in classrooms with high mastery goal popularity norms, but not in classrooms with low mastery goal popularity norms.	Classrooms with few highly popular and many unpopular students increased in aggressive popularity norms at the beginning of the school year and decreased in prosocial popularity norms at the end of the year. Also, strong within-classroom asymmetries in popularity predicted relatively higher aggressive popularity norms.	The classroom percentage of socially dominant aggressive and bi-strategic students predicted higher aggressive popularity norms, both directly and by enhancing the classrooms' popularity hierarchy. Instead, non-socially dominant aggressive students and socially dominant prosocial students contributed to lower aggressive popularity norms. Socially dominant prosocial students also buffered against the role of socially dominant aggressive adolescents in the aggressive popularity norm (moderation), but not against bi-strategic adolescents' role.
Conclusion	Friendship selection and influence based on aggression only takes place in classrooms where valence of aggression is high due to its association with popularity.	Classrooms vary in their constellation of prosocial and aggressive popularity norms and some classrooms change toward a mixed constellation. The development of popularity norms (rather than of descriptive norms) related to individuals' prosocial behavior development.	The prosocial behavior of popular peers may only buffer against aggressive friendship processes and stimulate prosocial friendship processes if these popular peers (or other popular peers in the classroom) also abstain from aggression.	Adolescents' preference for similarly achieving friends was strongest in classrooms where achievement was a salient and important characteristic because of its associations with either popularity or unpopularity, indicating the importance of reputation-based constructs (particularly sanctions) over preference-based constructs regarding academic peer norms.	The strength and direction of achievement-based friendship selection, maintenance, and influence are dependent on which achievement goals are made salient by virtue of their association with popularity in classrooms.	A strong popularity hierarchy seems to elicit competition for popularity, as its benefits are not equally available to everyone. In such a competitive context, high aggressive and low prosocial behaviors may be seen as valuable means rewarded with popularity.	Socially dominant aggressive and bi-strategic students have the power to establish a 'pecking order' that facilitates the development of aggressive popularity norms. Socially dominant prosocial students can buffer against the role of socially dominant aggressive students, but not against the role of socially dominant bi-strategic students.

### **9.3 Elaboration of the Main Findings**

Based on the combined findings of the seven chapters, five main conclusions can be provided. I will discuss these one by one below.

#### **9.3.1. Popularity norms rather than descriptive norms matter**

Throughout this dissertation, I found that popularity norms rather than descriptive norms affected the coevolution between adolescents' friendships and behavioral development. Specifically, in Chapter 2, friendship selection and influence related to aggression were amplified in classrooms with higher aggressive popularity norms, whereas descriptive norms did *not* affect these processes. Chapter 4 showed that classroom constellations of prosocial and aggressive popularity norms were more strongly linked to individual prosocial behavior trajectories than constellations of prosocial and aggressive descriptive norms. In Chapter 5, when achievement was made reputationally salient in a positive way (because of its association with popularity) or negative way (because of its association with unpopularity), it was important for the strength and direction of friendship selection processes. Other types of norms (descriptive-, acceptance-, and rejection norms) did not affect these achievement-based friendship processes. Last, Chapter 6 demonstrates that achievement goal descriptive norms did *not* predict achievement-based friendship processes. Strong performance goal popularity norms significantly increased similarity-based selection and decreased maintenance related to achievement, whereas strong mastery goal popularity norms enhanced friendship influence on achievement.

In sum, the findings of this dissertation indicate that behaviors rewarded with the highly valued goal of popularity become increasingly relevant and significant to adolescents. They may use these behaviors as a selection criteria for whom they prefer or keep as friends and may be particularly susceptible to be influenced by their friends in those behaviors. The most important reason why popularity norms rather than descriptive norms matter for adolescents' friendship- and behavior dynamics, is that biological and social changes make adolescents increasingly sensitive to hierarchical power structures (Dawes & Xie, 2014; Ojanen & Findley-Van Nostrand, 2014). Popular peers are at the top of the hierarchy, have many affiliations, enjoy admiration and attention, and are highly influential (Adler & Adler, 1998; Cillessen & Marks, 2011). Therefore, popular peers' behaviors are more visible to students (enhancing conformation). Furthermore, popular peers

may be perceived as having more power to sanction deviation from this perceived norm. Consequently, many adolescents look up to these popular peers and carefully check out their behaviors to get information on what is expected and appropriate in a given setting. Next to adolescents' heightened awareness of power structures, their motivation to elevate their own popularity is enhanced (LaFontana & Cillessen, 2010) – perhaps because popularity provides access to valuable social and material resources (Hawley & Bower, 2018). Adolescents may actively try to gain popularity (or bask in reflected glory; Dijkstra et al., 2009) via affiliation with peers who display reputationally salient behaviors, and by adapting their friends' behaviors if associated with popularity (Dijkstra et al., 2013). Of note, some researchers have rightly pointed out that not *every* adolescent may actively strive for popularity (Brechwald & Prinstein, 2011; Li & Wright, 2013). Nevertheless, most adolescents may *avoid unpopularity*, as this would put them at risk of exclusion or victimization (Hopmeyer Gorman et al., 2011). Adolescents' fear of unpopularity may not only drive their attention to unpopular peers to get information on how they should *not* behave (Cohen & Prinstein, 2006; see also Chapter 5), but also to popular peers to find out how they should behave instead.

The finding that popularity norms rather than descriptive norms have an impact in adolescent classrooms is in line with prior empirical work, which indicated that popularity norms rather than descriptive norms affected friendship influence on risk attitudes (Rambaran et al., 2013), and the acceptance of prosocial and aggressive behaviors, and academic achievement (Dijkstra & Gest, 2015; Dijkstra et al., 2008; Jackson, Cappella, & Neal, 2015). It is also in line with the reputational salience hypothesis (Hartup, 1996) which states that the behaviors of high-status peers are viewed as "*reputationally salient*": an important tool or strategy to gain popularity oneself. Moreover, my findings match with the theoretical prototype willingness model (Gibbons & Gerrard, 1995; Gibbons, Gerrard, Blanton, & Russell, 1998), which postulates that individuals are motivated to engage in behaviors that approach their estimates of a favorable prototype's behavior (such as a popular peer) in order to maintain a favorable self-image (Helms et al., 2014). As such, popularity norms may provide an important social reference framework to inform adolescents on what important others (e.g., popular peers) typically do, and in turn, regulate individuals' behavioral decisions (social norm theory, Cialdini & Trost, 1998).

## Discussion

An important question that may arise, then, is why descriptive norms were found to be irrelevant for adolescents' friendship processes and were only modestly related to higher initial levels of adolescents' aggressive and prosocial behavior (Chapter 3). First, descriptive norms only represent the extent to which a certain behavior is perceived to be present, and do not contain information on potential rewards or sanctions associated with these behaviors – which actually is a key element of norms (Veenstra et al., 2018). Moreover, the variance around these average perceived behaviors was not accounted for in my measure, although this may be informative on the extent to which a behavior is actually a norm. That is, even when the descriptive norm is – on average – high, there may be large variations between individuals in the extent to which they display certain behavior which may rather indicate norm ambiguity. At last, the descriptive norm approach considers every individual to be equally influential, which may be unlikely given the heightened centrality, power, and influence of popular peers (Adler & Adler, 1998). Concordantly, I found popularity norms rather than descriptive norms to matter in adolescent classrooms.

### **9.3.2 Selection processes most strongly drive friends' similarity in normative behaviors**

Whereas most norm theories (e.g., prototype willingness model; social norm theory), assume friends' homogeneity in normative behaviors to stem from influence processes, I took a social network approach to disentangle three mechanisms that potentially underlie this similarity: selection, maintenance, and influence processes. I found that popularity norms quite consistently enhanced similarity-based friendship *selection* processes (Chapter 2 for aggression, Chapter 5 for academic achievement, Chapter 4 for prosocial behavior); and to some extent strengthened similarity-based friendship *maintenance* (Chapter 4 for prosocial behavior) and friendship *influence* processes (Chapter 2 and 4, for aggression). Thus, this dissertation points out that the regularly overlooked and underexamined *selection processes* may be the first – and probably foremost – mechanism explaining similarity among friends in normative behaviors. Apparently, popularity norms not only function as a reference framework guiding behavioral decisions (Cialdini & Trost, 1998), but also – and even in particular – drive relational decisions (Hartup, 1996; Van den Bongardt et al., 2015). In other

words, norms design adolescents' social landscape: they define whom adolescents view as attractive friendship partners or not.

The finding that popularity norms shape adolescents' friendship selection processes is in line with social misfit theory (Wright et al., 1986), which argues that peer norms shape adolescents' peer preferences (acceptance) and affiliations. Whereas peers showing behaviors that conform to the popularity norm may view each other as attractive friendship partners, those who deviate from the norm are considered as 'social misfits' and may end up with each other – for instance through default selection ("stuck with what they can get"; Deptula & Cohen, 2004; Sijtsema et al., 2010a). As such, this finding extends upon the similarity attraction hypothesis (Byrne, 1971) which states that, in general, people prefer being similar to their friends, as this enhances mutual trust, predictability, and understanding. This dissertation indicates that there are *contextual variations* in adolescents' attraction to similar friends. That is, adolescents select friends based on similarity in behaviors that are rewarded with popularity in their classroom. Instead, similarity-based selection is uncommon for behaviors that are unrelated – or negatively related – to popularity in the classroom. As a result, adolescents are not similar to their friends in *all* behaviors, but particularly in those behaviors that help them to obtain a popular position in the peer group, which is in line with the reputational salience hypothesis (Hartup, 1996).

I found that homogeneity among friends in normative behaviors was only modestly explained by enhanced similarity-based *maintenance* processes (Chapter 4, for prosocial behavior). The modest role of norms in maintenance processes can be explained as follows: once adolescents have established a best friendship, its maintenance is merely due to its internal positive features, such as high levels of intimacy, self-disclosure, and support (Berndt, 2002), rather than due to external factors (e.g., the popularity norm). Whereas children would describe a friend as 'someone you can play nicely with', for adolescents, a friendship increasingly reflects an intimate, reciprocal, trustful, and affectionate connection or bond, that strongly affects adolescents' adjustment and well-being (Bagwell & Bukowski, 2018; Hiatt et al., 2015; Holder & Coleman, 2015; Maunder & Monks, 2019). Therefore, maintaining this bond may be highly important to adolescents, irrespective of the popularity norm.

I also found some evidence for *influence* processes underlying friends' similarity in normative behaviors – that is, for aggressive friendship processes

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(Chapter 2 and 4). In classrooms with strong aggressive popularity norms, adolescents became increasingly similar to their friends in (high) aggression (Laniga-Wijnen et al., 2017) whereas these processes did *not* take place in classrooms without aggressive popularity norms. Apparently, popular peers' aggression can become a salient feature within a classroom, which in turn provides guidelines on how to behave for adolescents (Hartup, 1996; Cialdini & Trost, 1998).

Interestingly, popularity norms for prosocial behavior and achievement did *not* enhance friendship influence on prosocial behaviors and achievement. Affiliating with certain peers may be an easier way to gain higher status than changing one's behavior – or changing classmates' perceptions of one's behavior. Behavioral changes may also take more time than forming friendships. For instance, changing a GPA is not easily achieved and may require students to score consistently higher on multiple tests or exams. This may explain why the role of academic popularity norms was only present for achievement-based selection processes. At last, following the social skills model (Stormshak et al., 1999), the development of prosocial behavior may not depend on whether it is rewarded with popularity or not, as prosocial behavior is positive and *valuable in and of itself* within peer relationships. Indeed, I found that across all types of classrooms, adolescents were influenced toward higher prosocial behavior if they had relatively more friends – irrespective of the prosocial behavior of their friends (as indicated by the “*behavioral indegree effect*”, presented in Chapter 4). This suggests that prosocial behavior increases as a function of adolescents' opportunities to practice their social skills (e.g., dividing attention among friends, getting along with varying personalities), irrespective of how ‘cool’ it is to behave prosocially.

The finding that selection processes are the foremost drivers of friends' similarity in normative behaviors provides a compelling takeaway that adds to our understanding on how norms may exert influence on adolescents' lives. Popularity norms define adolescents' social landscape; hence determine the proximity of primary socialization sources (friends). In turn, these friends may influence adolescents in certain behaviors over time, and this influence may sometimes even be magnified in the presence of popularity norms, too (in particular for aggression).

### 9.3.3 Aggressive popularity norms are stronger than prosocial popularity norms

Whereas prior work mainly focused on popular peers as a risk factor for adolescent development in classrooms (for aggression, Dijkstra et al., 2008; for risk attitudes, Rambaran et al., 2013), I examined popular peers as a potential protective factor by testing whether they can be a role model for prosocial behaviors: voluntary behaviors intended to benefit others (Jennings & Greenberg, 2009). This may create an example for adolescents to abstain from aggression and to behave in ways benefitting others' well-being in the classroom instead.

Prosocial and aggressive behavior are defined as partly interrelated, constructs (Card et al., 2008), but these behaviors may also co-occur if they serve the same goal (such as achieving popularity; Hawley & Bower, 2018). This may imply that prosocial and aggressive popularity norms would coexist within some classrooms. Therefore, a first step in unraveling popular peers' protective role was to examine how prosocial and aggressive popularity norms are *combined* within classrooms and how this develops over time. Both Chapter 3 and 4 indicated that three classroom types can be distinguished: *mixed classrooms* with high prosocial and high aggressive popularity norms, *prosocial classrooms* with high prosocial and low aggressive popularity norms, and *aggressive classrooms* with high aggressive and relatively low prosocial norms. Chapter 3 demonstrated that the prevalence of classrooms in the prosocial popularity norm profile *decreased* over time. Most classrooms were characterized by an aggressive or mixed profile, and the number of classrooms in the latter profile even kept increasing across the school year. Apparently, aggressive popularity norms were consistently present, or could emerge despite the presence of strong prosocial popularity norms. Thus, over time, most classrooms ended up attaching value *either* to aggression only, or to a combination of aggression and prosocial behavior. This could indicate that aggressive popularity norms are more prevalent than prosocial popularity norms with most classrooms containing at least some popular aggressive role models.

The prevailing role of aggressive popularity norms over prosocial popularity norms was further evidenced by findings on the consequences of these popularity norm combinations. Chapter 3 showed that students were more likely to increase in prosocial behavior in classrooms that had a *prosocial norm trajectory* (classrooms that were stable in a prosocial popularity norm profile or transitioned toward this profile across the school year) than in classrooms with a mixed

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trajectory (classrooms stable in a mixed popularity norm profile) or aggressive norm trajectory (classrooms stable in an aggressive popularity norm profile). As such, the presence of aggressive popularity norms seemed to prevent adolescents' increase in prosocial behavior, despite the simultaneous presence of prosocial popularity norms. Chapter 4 also indicated that popular peers' aggressive norms overpowered their prosocial norms. In mixed and aggressive classrooms, friends' aggression strongly influenced adolescents' aggression. Moreover, there was a decline in adolescents' prosocial behavior. In mixed classrooms this occurred through *same-behavior* friendship influence: adolescents adopted lower prosocial behaviors when their friends were lower on prosocial behavior. In aggressive classrooms this occurred through *cross-behavior* friendship influence: adolescents with relatively more aggressive friends were more likely to decline in prosocial behavior. These processes were not present in prosocial classrooms (high prosocial and low aggressive popularity norms); instead, in these classrooms adolescents maintained highly prosocial peers as friends. This demonstrates that prosocial popularity norms *can* buffer against aggressive processes and encourage prosocial friendship processes – but *only* if aggressive popularity norms are not present.

The finding that aggressive popularity norms overpower prosocial popularity norms is in line with prior work on the relative impact of aggression and prosocial behavior. Aggression is commonly considered a fundamentally more overruling, visible, and impactful behavior than prosocial behavior. Several reviews have shown that, possibly because of innate predispositions and past experiences, people tend to give greater weight to negative entities (negative peers or behaviors) than to positive ones (Baumeister et al., 2001; Rozin & Royzman, 2001). Specific to aggression and prosocial behavior of *popular peers*, an experimental study found that adolescents' visual attention toward popular peers was stronger after a negative than a positive prime, indicating that popular peers' negative rather than their positive behaviors evoke the attention they get from adolescents (Lansu & Troop-Gordon, 2017). Why do negative acts such as aggression receive more attention in the peer group than prosocial acts? Exposure to aggression activates adolescents' defense mechanisms, turning adolescents' body into a state of alertness, as an acute response toward potential threats may be required (Giletta, Slavich, Rudolph, Hastings, Nock, & Prinstein, 2018). The processing of fear signals is prioritized over the processing of positive (prosocial)

signals – until vigilance for potential threat is over (Williams, Palmer, Liddell, Song, & Gordon, 2006). Aggression may not only gain more attention due to heightened fear or alertness. It may also create awe or admiration, particularly in adolescents, as opposing adult values and breaking adult-enforced rules may be a way to bridge the maturity gap and assert independence and increased autonomy (Moffitt, 1993; Bukowski et al., 2000). Therefore, more attention is drawn to the aggressive side than to prosocial side of popular peers. As attention is a prerequisite for influence, adolescents may be more strongly influenced by aggressive popularity norms than by prosocial popularity norms.

In sum, findings of this dissertation show that popular peers can be both a protective and a risk factor for friendship processes related to social behaviors, but their aggressive side attracts more attention and as a result, overpowers their prosocial side. Consequently, adolescents may use popular peers' aggressive norms rather than popular peers' prosocial norms as a reference framework guiding their social and behavioral decisions.

#### **9.3.4. Not popular peers' achievement, but their achievement *goals* are important**

Popular peers' GPA only played a modest role in enhancing the importance of achievement for similarity-based friendship selection, and no role in friendship influence (Chapter 5). Popular peers' GPA may not pose a powerful norm to adolescents, perhaps because it is a relatively subtle and invisible individual characteristic and does not indicate the underlying goals and motivational behaviors that students may endorse. Depending on the *academic achievement goals* that popular students endorse, academic achievement may be either perceived as a social strategy to become better than others (performance goal) *or* a reflection of students' motivation to master academic tasks (mastery goal). In Chapter 6, I found that popular peers' achievement goals *did* serve as reference framework for adolescents' social (friendship selection, maintenance) and behavioral decisions (friendship influence).

Popular peers' *performance goals* (outperforming others) provided a reference framework for adolescents' *social* landscape. When performance goals were the popularity norm, adolescents selected each other based on similarity in achievement, but these friendships were less likely to last in the longer run. This finding is consistent with the social interdependence theory (Johnson & Johnson,

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1989). *Performance goals* are assumed to provoke a *negative interdependence* (Deutsch, 1949; 1962; Elliot et al., 2016) or *competitive goal structure* in classrooms, where students only reach their goal when other students do *not* (Poortvliet & Darnon, 2010). In such a competitive setting, adolescents may use social comparison to ensure that they did better – or not worse – than others regarding their achievement (Brophy, 2005). Differences in achievement to a friend can be threatening because of the emphasis on social comparison and achievement as validating one's sense of self-worth (Elliot, Murayama, & Pekrun, 2011). When levels of achievement are similar, comparisons would be less threatening for self-worth, resulting in the selection of similarly achieving peers as friends. However, in the longer term, these friendships among similarly achieving peers are less likely to last in classrooms with salient performance goals. Due to increased proximity, minor differences in academic functioning among adolescents and their friends become more visible and threatening. Prior work also showed that a negative interdependence enhances negative interactions among students (e.g., obstructing others' goal achievement efforts, hiding information, and acting in distrustful ways; Roseth et al., 2008), even among friends (Darnon & Poortvliet, 2012; Levy-Tossman et al., 2007). This could reduce friendship quality and trust, resulting in the dissolution of friendships. This may also limit opportunities of adolescents to learn from their friends, which is illustrated by the absence of friendship influence in classrooms with high performance goal popularity norms.

Popular peers' *mastery goals* (mastering academic tasks) provided a reference framework for adolescents' *behavioral* development: stronger mastery goal popularity norms elevated friendship influence on achievement. This can be explained as follows: mastery goals are assumed to yield a *cooperative goal structure* and *positive interdependence* in classrooms, where adolescents view each other as helpers to jointly achieve the salient goal of gaining knowledge and mastering academic tasks (Elliot et al., 2016; Roussel et al., 2011; Ryan & Shim, 2012). Plausibly, this relates to useful, reciprocal exchange of academic information and elaborated problem-solving discussions (Harris, Yuill, & Luckin, 2008) that elevate *friendship influence* on achievement. Importantly, I found that this enhanced friendship influence can be beneficial (toward higher achievement) as well as detrimental (toward lower achievement). This illustrates the need for

teachers to guide discussions and help-seeking among students, even in the context of salient mastery goals.

To conclude, when performance goals relate to popularity, academic achievement may not be an invisible personal characteristic, but rather a social *strategy*: a way to gain higher status at others' expense (as outperforming others is reputationally salient). Such a focus on achievement as prestige-object creates competition where being similar in achievement to friends may seem "safe", but in the longer run these friendships may not hold – perhaps because they obstruct each other's' goal attainment, which also diminishes the opportunities to learn from friends. Instead, when the focus is on *learning* and helping each other to jointly master academic tasks, a safe, cooperative environment is created, which is a necessary condition to actually learn from friends and increase one's academic functioning.

### **9.3.5 Classroom composition and popularity hierarchy predict popularity norms**

The current dissertation demonstrated that the development of popularity norms depends on classrooms' popularity hierarchy and student composition. In Chapter 7, I found that classrooms with a strong popularity hierarchy (strong asymmetries in popularity) and pyramid-shaped hierarchy structure (more unpopular than popular peers) showed a relative increase in aggressive popularity norms across the school year. Classrooms with a pyramid-shaped hierarchy showed also a relative decrease in prosocial popularity norms at the end of the school year. A first explanation for these findings is that a popularity hierarchy enhances *competition*: when resources are unequally divided among classmates, they may fight for a spot on the popularity ladder (Anderson & Brown, 2011), making high aggression or low prosocial behavior a valuable tool to earn a higher status. The position of popular peers is also vulnerable in a competitive context, forcing them to endorse high aggression and low prosocial behavior to emphasize and keep their dominant position (Garandeau, Lee, & Salmivalli, 2014). A second explanation could be that a strong hierarchy induces *abuse of power* of those at the top of the popularity ladder, because of changes in these popular leaders' mindset (Anderson & Brown, 2010). Indeed, prior work demonstrated that holding a position of power has a disinhibiting effect on social behaviors (Keltner et al., 2003) and elevates feelings of 'elitism' (Berger & Dijkstra, 2013), which may lead

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higher-positioned individuals to objectify lower-status individuals (Gruenfeld et al., 2008) and to be less empathically concerned about individuals' suffering (Van Kleef et al., 2008). These effects of power promote high aggressive and low prosocial behaviors of highly popular peers, particularly in a context where they have significantly more power than others.

But how does a popularity hierarchy emerge in the first place, and does the classroom composition of students play a role in the development of popularity norms? According to social impact theory (Latané, 1981) the formation of norms depends on the *number* and *strength* (referring to social dominance) of peers displaying a certain behavior, even when these peers may constitute a minority in classrooms (Moskovič, 1972). In Chapter 8, I therefore examined how the classroom composition of six types of students contributes to the emergence of aggressive popularity norms, directly and by enhancing a popularity hierarchy. The six types of students under investigation were socially dominant prosocial, aggressive, and bi-strategic (those who combine high aggression and prosocial behavior) students and non-socially dominant prosocial, aggressive, and bi-strategic students. Findings indicate that socially dominant aggressive and socially dominant bi-strategic students contributed to higher aggressive popularity norms, both directly and by enhancing the classrooms' popularity hierarchy. These students may enhance status discrepancies because they use their aggression in a strategic, manipulative way, which is instrumental for gaining a higher status in the peer group *at the expense of others'* status (Garandean et al., 2014).

Chapter 8 showed that some students can also *buffer* against aggressive popularity norms. First, classrooms with relatively more *non-socially* dominant aggressive students were characterized by *lower* aggressive popularity norms. As such, even when aggressive students *lack* strength (social dominance; social impact theory, Latané, 1981), they may contribute to the norm, by making their behaviors *unattractive* for others. Prior work found non-socially dominant aggressive students to be at the periphery of the peer group and disregarded by classmates (Farmer et al., 2003; Sijtsema, Lindenberg, & Veenstra, 2010a). Consequently, non-socially dominant aggressive students may be a role model for how *not* to behave, hence mitigate the valence of aggression in classrooms. Moreover, socially dominant prosocial students *weakened* aggressive popularity norms, both directly and by buffering against the role of socially dominant aggressive adolescents in the aggressive popularity norm (moderation). It could

be that these prosocial leaders decrease the valence of aggression by showing that prosocial behavior can also be an effective means to gain access to valuable material and social resources (Hawley, 2003; Ellis et al., 2016). They were not able to buffer against the role of socially dominant bi-strategic students, perhaps because bi-strategic students signal that prosocial and aggressive behaviors are not necessarily mutually exclusive and may – when strategically combined – be highly effective in getting access to valuable resources (Hartl et al., 2019).

In sum, Chapter 8 indicates that the presence of certain types of students (based on their behaviors and social dominance) may contribute to the popularity norm. Some of them may do this by defining the structure of peer relationships (hierarchy) of a classroom. In turn, this hierarchy may elicit a power imbalance that facilitates the abuse of power of those at the top of the popularity ladder, and that enhances competition: a war for resources. In such a context, high aggression and low prosocial behavior may be rewarded with popularity (Chapter 7 and Chapter 8). Therefore, the development of popularity norms depends on the types of students present in a classroom at the start of the school year, and on the extent to which these students establish a ‘pecking order’: a popularity hierarchy.

#### **9.4 Strengths**

A first strength of this dissertation is the use of peer-nominated data, which not only allowed the examination of adolescents’ shared perceptions on what is normative (reflecting a certain level of “consensus”, which is key to measuring norms; Veenstra et al., 2018), but also at capturing the social network dynamics and development of peer relationships within a classroom. A second strength of this dissertation is the reliance on social network techniques, which make it possible to examine contextual variations in selection, maintenance, and influence processes, in order to understand how peer norms affect classroom friendship and behavior dynamics. The presented studies made use of recent advancements in social network research by being the first to test differences in the *direction* of friendship selection (Chapter 5), using the “five-factor model” (Snijders & Lomi, 2019) in relation to multiple behaviors simultaneously (Chapter 4), disentangling selection- and maintenance effects (Chapter 2, 4, and 6), and analyzing evaluation and endowment effects for cross-behavior friendship processes (Chapter 4). A third strength is the focus on the role of popularity norms in friendship processes for *multiple behavioral domains*, providing important insights in the

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generalizability of popular peers' power in friendship processes across varying behaviors. Fourth, this dissertation contributed to the field by unraveling the antecedents of aggressive and prosocial popularity norms, providing unique insights in the role of classroom composition and peers' power-related structure. Fifth, I was able to examine the formation of peer norms and peer relationships after the transition to a new school. In the Netherlands and many other European countries, this reflects a major transition accompanied by a large influx of new peers, which necessitates the formation of a new social system. This provides unique insights in the coevolution of friendships and behaviors in a new peer context. Moreover, that data was collected three times a year allowed at narrowly monitoring changes in friendships and behaviors across an entire school year.

### 9.5 Limitations

Despite these strengths, the present dissertation has several limitations. First, statistical power issues hindered a more thorough examination of dynamics that may be present at the *norm*-level. In most chapters, I ran models for descriptive norms and popularity norms *separately*, as I did not have enough power to categorize classrooms based on the within-classroom combination of popularity norms *and* descriptive norms. Even though some prior studies (but not all, see Dijkstra et al., 2008) indicate that popularity norms and descriptive norms can be seen as empirically distinct constructs (Dijkstra & Gest, 2015; Gest & Rodkin, 2011), it is important to examine whether these norms may cumulatively predict adolescent outcomes, or for instance, interact with each other. Moreover, most chapters treated popularity norms as rather 'static' constructs by assessing them at only one period and then relate them to certain outcomes. Chapter 3 illustrates that, although popularity norms are relatively stable, some classrooms change over time; mostly toward mixed popularity norm constellations. Power issues hindered me from analyzing the role of popularity norm trajectories in friendship processes, which therefore remains a direction for future studies.

Second, this dissertation mostly compared popularity norms with descriptive norms, but classrooms can be characterized by many other norms, such as other types of norm salience (Henry et al., 2000). Only in Chapter 5, I was able to compare the relative impact of four types of norm salience in achievement-based friendship processes. I found that for friendship selection based on achievement, the unpopularity norm seemed to matter even more than

the popularity norm, whereas acceptance- and rejection norms did not play a role. This suggests that reputation-based constructs (and in particular reputation-based *sanctions*) may matter more to adolescents than preference-based constructs. However, it is unknown to which extent this finding can be generalized across behavioral domains. I was not able to compare the relative impact of various types of norm salience for *social behaviors*; this would have required more power given the co-existence and interplay of aggression and prosocial behavior. Nevertheless, this remains a valuable direction for further research as it may yield more insights in other potential role models for prosocial behavior – given that popular peers’ options for being a prosocial model may be somewhat limited as their aggressive norms overpower their prosocial norms. For instance, highly *accepted* adolescents are well-known for their prosocial behavior and are less likely to combine this with aggression (Hopmeyer Gorman et al., 2011). Consequently, it would be interesting to compare the norms of popular peers to the norms of other-status peers (especially acceptance norms) in relation to *social behaviors* with larger samples.

Third, the finding that popularity norms matter more for selection than for influence in normative behaviors should be interpreted with some caution. In RSIENA models, the statistical power to observe selection effects (related to social ties) is higher than for social influence effects (related to behavior), which could make it easier to detect differences between classrooms in selection than in influence processes. Nevertheless, a recent simulation study has shown that (pooled) networks of 120 or more actors are likely to have sufficient statistical power to estimate both selection and influence effects (Stadtfeld et al., 2017). In my dissertation, all studies included at least 120 actors per (pooled) network hence it is likely that I had enough power to detect differences in both effects. Another point to consider is that adolescents may not necessarily select each other based on reputationally salient *behaviors*, but rather on *reputation* itself. Similarity in behaviors that are the popularity norm would then be a by-product of adolescents’ preference for similarly popular peers (Logis et al., 2013). In my models, confounding issues (because of inclusion of *popularity norms*) hindered accounting for popularity as a feature based on which adolescents could seek out their friends. Nevertheless, regardless of whether the popularity or the behavior is the driving force underlying these selection effects, results still imply that adolescents and their friends are similar in normative behaviors. This behavioral similarity may kickstart peer influence processes and can result in vicious cycles

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where – for instance – low-achieving students even further dampen each other's' achievement, or where deviant students mutually reinforce each other's' antisocial behavior (deviancy training; Dishion & Tipsord, 2011).

Fourth, friendships were measured using unlimited peer nominations in response to the question, "Who are your best friends in class", and I considered both asymmetrical and reciprocal friendships as "friendships". Strictly speaking, this rather presents an index of "friendship preference" or "attraction", than "real friendship", given that friendship reciprocity is important in defining a friendship (Bukowski & Hoza, 1989; Furman, 1996; Degirmencioglu, Urberg, Tolson, & Richard, 1998). However, from a social network perspective, both asymmetrical and reciprocal friendships are important social ties that may affect adolescents' behavior. Even when friendship ties are non-reciprocal, adolescents may become similar to the peers they perceive to be their best friends. For instance, adolescents may be particularly motivated to behave in the same way as their perceived best friend, to receive a friendship nomination back (Bot, Engels, & Knibbe, 2005). Nevertheless, it would be possible that popularity norms work out differently for asymmetric friendships than for reciprocal ones. For instance, popularity norms may particularly strengthen asymmetric friendships among students who are *dissimilar* in normative behaviors (e.g., those who do not conform to the norm are still attracted to those conforming to the norm, but do not receive a friendship nomination back), and reciprocal friendships among students who are *similar* in normative behaviors. Moreover, some studies suggest that influence within a friendship is mostly unilateral and unidirectional (Sijtsema & Lindenberg, 2018), implying that only one member of the dyad changes to resemble the other, with the direction of change dictated by the more influential friend. It could be that in a situation of asymmetric friendships, adolescents who do not receive a friendship nomination back may be particularly inclined to adopt the normative behaviors of their perceived best friends. It was not feasible to examine this in my relatively small samples that sometimes consisted of only eight classrooms, making it a valuable direction for further research.

### **9.6 Directions for Future Studies**

Whereas popularity norms used to be a relatively understudied phenomenon at the start of this dissertation project, more and more researchers are taking a "norm salience approach" to examine the role of status norms (in

particular popularity norms) in adolescent classroom experiences. Researchers have adopted several terms to refer to the extent to which behaviors are rewarded with popularity in a certain context, such as prestige norms (Berger & Caravita, 2016; Peets et al., 2015; Pouwels, Van Noorden, & Caravita, 2019), (injunctive) norm salience (Correia, Brendgen, & Vitaro, 2019; Dijkstra & Gest, 2015; Zhang, Ren, Li, Liu, & Luo, 2019), popularity norms (Dijkstra et al., 2008; Garandeau et al., in press) or social values (Galván, Spatzier, & Juvonen, 2010; Engels et al., 2016). Despite variations in terminology, operationalization of popularity norms, and behaviors under study, researchers relatively consistently indicate that in early adolescence, popularity norms matter for social and behavioral outcomes in adolescent classrooms. This dissertation adds to this growing body of literature by illustrating that popularity norms affect the coevolution of friendships and behaviors within classrooms and by unraveling the antecedents of these norms. I will provide some future directions that may help to better understand *why* and *for whom* popularity norms matter, *what it means* for students' well-being and the classroom climate to have strong aggressive popularity norms (how risky are aggressive popularity norms?), and to examine whether other contexts (school, teachers, parents) may contribute to the development of norms or interact with the role of norms in adolescents' classroom experiences. In this way, studies may provide a deeper (mechanisms, moderations) and broader (other adolescent outcomes, other contexts) understanding of the role of popularity norms in adolescence.

### **9.6.1 Why do popularity norms play a role?**

This dissertation has illustrated that popularity norms affect which behaviors are important for friendship selection and influence. A vital question is *why* popularity norms matter for these processes. In this dissertation, I provided several potential explanations: popular peers may be more visible and central than other peers (enhancing conformity), more powerful to provide vicarious reinforcement or sanction deviation (enhancing compliance), and adolescents themselves may proactively try to fulfill their increasing desire for popularity or avoid unpopularity. However, I was not able to directly test these potential mechanisms. Future studies may attempt at unraveling the reasons *why* the norms of popular peers are important in adolescents' behavioral conformation

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processes or friendship choices, by focusing on adolescents' status goals or on underlying mechanisms of peer selection and influence.

**Status goals.** From a goal-framing perspective (Lindenberg, 2012), it may be interesting to examine whether adolescents' tendency to conform to norms occurs as a function of the type of goal that is activated in response to perceiving a certain popularity norm. Three overarching goals can be distinguished: normative goals (behaving conform accepted norms, such as being prosocial), instrumental goals (improving one's resources), and hedonic goals (improving the way one feels, such as having fun). Cues from the environment (such as popularity norms) may activate certain goals in adolescents, which in turn steer their friendship and behavioral preferences. One assumption of goal-framing theory is that people are more likely to give into instrumental or hedonic goals in a context where pro-environmental values (such as prosocial behavior) are weakened. As such, in a context with high aggressive popularity norms, adolescents' desire for status (or fear of unpopularity) may become more pronounced. Therefore, they may be more inclined to behave aggressively themselves or attracted to aggressive friends. As such, future studies may examine whether enhanced status goals mediate the link between peer norms and friendship dynamics.

**Conformity or compliance.** Even when adolescents are not preoccupied with earning status, they may conform to the behaviors of popular peers because these behaviors are more visible or because popular peers actively encourage them to do so. Experiments are highly suitable for comparing various types of peer influence (e.g., Harakeh & Vollebergh, 2012). Most experiments examining the role of various types of peer influence did not distinguish the role between popular, regular or non-popular peers (for an exception, see Cohen & Prinstein, 2006; Teunissen et al., 2012). Moreover, no experiments have yet examined the potential mechanisms underlying friendship selection processes, such as similarity attraction (Byrne, 1971) versus the desire to bask in reflected glory (Dijkstra et al., 2010). Together, experiments may provide insight in the underlying mechanisms for friendship selection and influence in the context of popularity norms.

### 9.6.2 *For whom do popularity norms matter?*

Following the social-ecological perspective of Bronfenbrenner (1979), it is important to examine the interaction between individuals and the context that

they are embedded in. Although I examined contextual variations in adolescents' friendships and behavioral development, the inclusion of individual-level factors as potential moderators amplifying or mitigating the effects of popularity norms on these processes remains a direction for future studies. First, *personality factors* may make adolescents susceptible to normative influence. For instance, adolescents with lower self-control may be more prone to conform to norms or to end up with deviant friends (Franken et al., 2015), particularly in a setting where these behaviors relate to popularity. Moreover, one study found that students with Machiavellian traits were more likely to bully in classrooms where relational aggression was rewarded with popularity (being perceived as cool; Berger & Caravita, 2016). Second, adolescents' own *social status* may determine their proclivity to conform to the popularity norm. If adolescents have much to win (because of their low status) they may be more inclined to behave according to the popularity norm. Future studies may examine which types of students are more susceptible for norms, and what characteristics (i.e., strong self-determination, Ryan & Deci, 2000) may make adolescents less prone to conform.

Another important question for future research is in *which developmental period* popularity norms matter. The findings of this dissertation pertain to early adolescents and are not generalizable to how social dynamics may operate in later stages of adolescence or young adulthood. The steep increase in early adolescents' social-emotional network – against a backdrop of their still maturing prefrontal cognitive control system (Steinberg, 2007) – may strongly direct their attention toward (popular) peers and increase reward sensitivity of conformation (Chein et al., 2011). With further maturation (increasing age), the social-emotional system becomes less reactive whereas the cognitive control system becomes stronger and more efficient, potentially diminishing adolescents' reactivity to status dynamics over time (Schreuders et al., 2018). Concordantly, a longitudinal study on adolescents' status goals found that adolescents particularly increased in their goal for popularity after the transition to middle school, but declined in this goal in later school years (Dawes & Xie, 2014). Therefore, it is important to examine to whether popularity norms would matter predominantly in early adolescence.

### **9.6.3 How “risky” are aggressive popularity norms?**

This dissertation has indicated that popular peers' aggressive norms overpower their prosocial norms. It is tempting to conclude that popular peers can

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therefore be merely seen as risk factor as they may contribute to the spread of aggression and decline of prosocial behavior through status-based friendship processes. However, some nuances are necessary. First, aggression is not necessarily *negative* or risky. Channeled in the proper direction, aggression can be a positive, adaptive force, enabling students to be self-assertive, dominant, and independent in a healthy way (Roim & Itskowitz, 1990; Liu, 2004). Examples of such 'positive aggressive behaviors' are self-protection, standing up in the face of negation, and defending against harm (Jack, 1999). This dissertation examined aggression as a unified construct, without disentangling its' different functions (reactive or proactive) or forms (physical or relational), and without considering potential positive forms of aggression. Future work may profit from more narrow investigation of different types of aggressive popularity norms to provide a more thorough understanding on the *types* of aggression of popular peers that may be risky.

Moreover, it is unknown to which extent aggressive popularity norms are risky or harmful for the classroom climate or for students' well-being – and, if so, for whom. To date, one cross-sectional study found that classrooms with high aggressive popularity norms were characterized by more rejection and victimization, lower academic performance and less positive feelings about school among secondary school students (Dijkstra & Gest, 2015). Future studies are encouraged to longitudinally examine the role of aggressive popularity norms in adolescents' perceptions of the classroom climate and adolescents' school adjustment (e.g., academic functioning, self-esteem, well-being, or truancy). These studies may take a social-ecological perspective (Bronfenbrenner, 1979) by examining whether norms work out the same for all individuals in a classroom. For instance, the role of norms in adolescents' adjustment or classroom climate perceptions may depend on students' own social reputation or behavior (Laninga-Wijnen, Van den Berg, Mainhard, & Cillessen, in preparation). Researchers are also encouraged to compare characteristics of friendships among aggressive peers (which are more common in classrooms with aggressive popularity norms) with those among non-aggressive peers, for instance by examining reciprocity, friendship quality, shared activities, or degree of conflict (Maunder & Monks, 2018). Again, these studies should incorporate the extent to which aggression relates to popularity in the context where friendships are formed, as popularity also plays a vital role in friendship quality (Brendgen et al., 2000; Dijkstra et al.,

2010; Meuwese et al., 2015). Together, such studies may provide valuable insights into the extent to which adolescents' friendship selection and influence processes elicited by aggressive popularity norms may harm broader indicators of classroom or student adjustment.

#### **9.6.4 The role of school, teachers, and parents**

In this dissertation, I have only focused on classrooms – and specifically, peer norms – as context for adolescents' friendships and behavioral development. This is a logical choice, given that in the Netherlands, secondary school students follow all lessons together within their classroom, and classrooms remain intact across a school year. Even though the focus on the classroom context provides an important new step in filling the 'context-gap' that used to be present in the peer relationships literature, it is important to acknowledge that adolescents are embedded in multiple, interacting contexts, that may all work in upon their available pool of friends, friendship preferences, and susceptibility for adopting behaviors from peers. Though not exhaustive, I think that a broader focus on school-level factors and significant adults (parents, teachers) provides an important direction for future research to better understand the emergence of peer norms and adolescents' susceptibility for these norms.

**Schools.** Schools may strongly vary in their general atmosphere, ethnic configuration, location (social-economic status, neighborhood), tools to support teachers and students, and intervention methods. It would be valuable if future studies could identify school factors that are most critical in shaping school-based peer cultures (Galván et al., 2011), which in turn may predict classroom norms.

**Teachers.** The *invisible hand* metaphor was introduced several years ago to refer to the understudied role of teachers in the classroom peer ecology (Farmer et al., 2011). Nowadays, the metaphor has evolved to indicate that teachers have the potential to unobtrusively manage the classroom social context in ways that can promote a positive classroom culture for all students (Audley-Piotrowski et al., 2015). In particular teachers' relationship with students may matter in this respect. Prior work indicated that teachers' supportive relation with students related to denser and less hierarchical classrooms (Gest & Rodkin, 2011; Hendrickx et al., 2016), high prosocial behavior of students (Luckner & Pianta, 2011), and diminished influence of disruptive friends (Shin & Ryan, 2017). Future studies may examine whether a supportive relationship with teachers also

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contributes to high prosocial and low aggressive popularity norms, or interacts with these norms in friendship processes. An important point is that prior work predominantly focused on the role of teachers in primary classrooms. However, in adolescence, aggressive popularity norms may signal students attempting to bridge the maturity gap (Moffitt, 1993), by standing up against adult values. Adolescents who break adult-enforced rules may gain awe and adoration; they are viewed as brave and cool by others, creating an aggressive popularity norm. Therefore, it can be questioned whether adults such as teachers do have a voice in preventing the emergence of such adolescent norms, or in changing these norms towards more prosocial ones.

**Parents.** For parents, it may be hard to change classroom norms or peer- and behavior dynamics. In secondary school, most parents do not know (all of) their adolescents' classmates and they are dependent on their children's disclosure about daily life at school in order to get information on adolescents' classroom, friends, and other dynamics. Still, parents may play a role in shielding adolescents from harmful peer influences. First, parents may be a *role model*. If adolescents have a high-quality relationship with their parents, they are likely to seek out more prosocial friends (spill-over effects; De Goede, Branje, Delsing, & Meeus, 2009). Moreover, parental anti-violence messages have been found to buffer against the influence of aggressive descriptive classroom norms on adolescents' aggression (Farrell et al., 2011). Second, parents may serve as *managers or consultants* for adolescents' peer relationships (Mounts, 2000). Specifically, non-intrusive parental guidance in peer relationships, rather than direct prohibition (Keijsers et al., 2012) can effectively prevent the selection of deviant peers as friends (Tilton-Weaver et al., 2013). Future studies are encouraged to examine how parents can buffer against the role of aggressive popularity norms by preventing the *influence* of aggressive friends, or instead, *stimulate* the influence of prosocial or high-achieving friends.

It would be particularly relevant if studies consider the role of parental *status-based* peer management strategies in friendship dynamics. Parents may endorse various practices to ensure their children's interpersonal success, for instance by showing interest in adolescents' social lives and coaching them in endorsing certain goals. Some parents may encourage their adolescents to excel in certain characteristics (sports, academics) or may compare their adolescents' functioning to the functioning of their friends ("did you not get invited for that

party? What about your friend Alice, did she get invited?”). This may enhance social comparison processes where adolescents use other peers as the most important reference framework, and become more susceptible for peer influence processes. Instead, when parents provide self-referenced feedback to adolescents (“wow, you improved your GPA this last period”), adolescents may focus on self-improvement rather than on social comparison and may be less preoccupied with their social status in the classroom. Also, parents may allow their adolescents to engage in certain behaviors (such as going to a party, gaming, or having an alcoholic beverage) to prevent that their adolescents become a social misfit. The field may profit from more narrowly examining such parental status-based peer management strategies, how these strategies affect adolescents’ (goals for) interpersonal success (Prinstein, 2018), and what parental strategies may buffer against harmful peer influence or instead, stimulate prosocial socialization.

### **9.7 Practical implications**

In adolescence, popular peers are highly visible and powerful, and function as role models. Their behaviors may become attractive and valuable and pose a norm (“popularity norm”) to others. Popular peers therefore yield effective targets for classroom-based interventions to prevent aggression and instead, promote prosocial behavior and foster positive adjustment among adolescents.

In the United States, the Meaningful Roles intervention has been developed. This anti-bullying programs aims at preventing or reducing aggressive (bullying) norms by rewarding prosocial behavior and making it reputationally salient; for instance, by assigning social responsibilities to students in a classroom and by exchanging compliment cards among students. The intervention showed promising results in the United States, as it was accompanied by a drastic decline in aggressive conflicts between students (Ellis et al., 2016). Findings of this dissertation may add to the theoretical framework of this intervention and propose suggestions for its further development. For instance, this dissertation indicates that when prosocial behavior is reputationally salient, this does not necessarily imply that aggression is unrelated to popularity. Most classrooms in my sample were characterized by a *combination* of prosocial and aggressive popularity norms. Moreover, aggressive popularity norms overpowered the role of prosocial norms in these classrooms. That is, despite the presence of prosocial popularity norms, classrooms with a combination of prosocial and aggressive popularity norms were

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very similar to classrooms with aggressive popularity norms only. Accordingly, it seems that more is needed to overrule the dominating effects of aggressive popularity norms. This could be done by actively discouraging aggression (perhaps particularly among bi-strategic leaders). Future studies should examine what means may be most effective and appropriate for discouraging aggressive popularity norms (see Huitsing et al., 2019).

One recent intervention study (Roots Intervention, Paluck et al., 2016), showed that aggressive peer norms can change, resulting in a decline of aggression at school. In this intervention, “social referents” are encouraged to take a public stance against conflict (such as verbal and physical aggression) at school. These “social referents” are students who have many connections within the peer network: for instance (but not necessarily), due to their high popularity. This indicates that highly central peers – such as popular peers – can be an important target to foster prosocial behaviors and discourage aggression. Based on the findings of this dissertation, it can be reasoned that it is important to take the aggressive behavior of these popular peers themselves into account. In some classes, popular peers have earned their high status because they are very aggressive. It should be carefully monitored whether the behavior of popular peers themselves hinder them in taking a public stance against aggression. It could be that when highly aggressive popular adolescents are encouraged to take a public stance against aggression, they feel motivated to change their own aggressive behavior as well. However, it could also work counterproductively. This is particularly important, as aggression can be a way to oppose to adult values and to break adult-enforced rules. Therefore, it should be carefully considered what the role of significant adults (such as teachers) can be in such interventions.

Next, schools could use the insights generated by this study to *prevent* the emergence of aggressive norms, perhaps in their decision-making on classroom composition. Retrieving information about students’ social dominance and behavior from primary schools, may help secondary schools to organize classrooms in such a way that the percentage of socially dominant aggressive adolescents and socially dominant bi-strategic students is kept to a minimum, while the percentage of socially dominant prosocial students is maximized across classrooms. Also, certain teacher practices may facilitate status equality in classrooms. Primary school classrooms have been found to be more egalitarian with regard to popularity when teachers encourage new friendships by creating

small student groups and managing seating charts. Also, teachers' efforts at providing higher levels of instructional support and creating academically diverse groups may diminish hierarchies (Gest & Rodkin, 2011). It is unknown whether similar effects of teacher practices would occur in adolescent classrooms at secondary education; particularly in the Netherlands where adolescents may have up to fifteen teachers for all different subjects.

In the domain of *academic achievement*, this dissertation indicated that popular peers' achievement goals affected both adolescents' social- and behavioral decisions. Classrooms may profit from preventing performance goal popularity norms and instead, encouraging mastery goal popularity norms in conjunction with enhanced teacher support of academic discussions and collaborations. Future studies should examine whether popular leaders can be stimulated to enhance their mastery goals, and how this affects achievement-based friendship processes. Future studies should additionally examine whether it is important to also discourage performance goals. No benefits or drawbacks for students' *achievement* were found when students endorsed performance goals as long as they also endorsed mastery goals (Lee, Wormington, Linnenbrick-Garcia, & Roseth, 2017). However, performance goals seem to have negative effects on students' social interaction patterns (Darnon & Poortvliet, 2012), therefore it may be useful to examine whether the discouragement of performance goals may contribute to a safer and stimulating learning environment.

## **9.8 General conclusion**

The findings of this dissertation indicate that the behaviors of popular peers in the classroom can pose a powerful norm for adolescents. Behaviors rewarded with students' central goal of popularity become of high valence and significance to adolescents. Adolescents use these behaviors as selection criterion for whom they prefer as friends, but are also – in particular for aggression – inclined to adopt normative behaviors from their friends. Together, these selection and influence processes may contribute to the proliferation of behaviors in adolescents' classrooms. As popular peers seem to be the strongest role model for aggressive behavior, this can have worrying consequences for the classroom environment. Therefore, it is important to prevent that these aggressive popularity norms emerge in the first place. This dissertation indicates that the development of popularity norms depends on the classroom composition of students from the

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moment a classroom is formed, and that in particular socially dominant aggressive and socially dominant bi-strategic students contribute to aggressive popularity norms by establishing a popularity hierarchy. These findings provide important directions for practice, in particular for interventions that aim at attributing status to prosocial behaviors rather than to aggression. Future studies are encouraged to provide a deeper understanding of *why* and for *whom* popularity norms matter, and also by providing a broader understanding of the role of multiple interacting contexts (multiple norms, or other proximal contexts) in adolescents' peer dynamics. Popular peers are characterized by many positive characteristics: they can be prosocial, have strong leadership qualities and are highly talented in various respects. Teaching these popular peers to make use of these talents and skills may put a strong example for other students, creating more desirable classroom climates that foster students' adjustment and well-being.

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Summary in Dutch  
(Nederlandstalige samenvatting)

### **Introductie**

Tijdens de puberteit maken jongeren veel sociale, biologische en cognitieve veranderingen door. Ze maken zich los van hun ouders en besteden steeds meer tijd met leeftijdsgenoten. Vriendschappen worden van grote betekenis en jongeren zijn in toenemende mate bezig met hun sociale positie in de groep: ze willen graag bij de groep horen en hechten veel waarde aan wat leeftijdsgenoten van hen denken of vinden. Ook vangt er een "puberstrijd om populariteit" aan: jongeren proberen "cool" en stoer over te komen, en willen niet worden gezien als "het sulletje" van de klas. Te midden van deze ontwikkelingen vindt de overgang plaats van de basisschool naar het voortgezet onderwijs, waardoor jongeren in een klas komen met veelal nieuwe gezichten. Binnen deze klas zullen ze op zoek gaan naar nieuwe vriendschappen en naar manieren om hun positie in de groep te verwerven.

Opvallend is dat vrienden vaak op elkaar lijken qua gedrag. Er is vaak gedacht dat dit komt doordat vrienden elkaar beïnvloeden, maar hier kunnen verschillende processen aan ten grondslag liggen. Jongeren kunnen hun vrienden uitkiezen op basis van gelijkheid in gedrag (*selectie*), omdat deze raakvlakken zorgen voor wederzijds begrip, vertrouwen en voorspelbaarheid ("soort zoekt soort" hypothese; Byrne, 1971). Bovendien zijn vriendschappen tussen jongeren die op elkaar lijken in de regel stabiel (*behoud*) dan vriendschappen tussen jongeren die *niet* op elkaar lijken. Ten slotte kunnen vrienden elkaar versterken in bepaald gedrag (*invloed*), omdat ze veel met elkaar omgaan en (aangemoedigd worden om) elkaars gedrag overnemen (Bandura, 1977). Tezamen worden deze selectie-, behoud- en invloedprocessen ook wel *vriendschapsprocessen* genoemd. Deze vriendschapsprocessen kunnen zorgen dat gedragingen in sterkere mate voor gaan komen in de klas. Dit kan positief zijn als het gaat om gewenst gedrag, zoals hulpvaardig gedrag of het halen van hoge schoolcijfers. Het kan echter zorgwekkend zijn als jongeren elkaar kiezen en versterken met betrekking tot *negatief* gedrag, zoals agressie (of pesten, roddelen of een brutale houding naar leerkrachten). Het is dan ook van belang om na te gaan in hoeverre vriendschapsprocessen voor dergelijke gedragingen plaatsvinden in klassen.

Sociale-netwerkanalysetechnieken maken het mogelijk om op betrouwbare wijze na te gaan of gelijkheid in gedrag bij vrienden komt doordat ze elkaar selecteren of behouden op basis van gelijkheid in gedrag, of doordat ze elkaars gedrag over de tijd heen beïnvloeden. Inmiddels heeft een aantal studies deze

sociale-netwerkanalyses gebruikt om vriendschapsprocessen met betrekking tot agressie (Dijkstra e.a., 2011; Logis e. a., 2011), hulpvaardig of pro sociaal gedrag (Molano e.a., 2013; Logis e.a., 2011) en schoolprestaties (Flashman, 2012; Shin & Ryan, 2014a) in kaart te brengen. De bevindingen van deze studies zijn echter verre van consistent aangaande de mate waarin deze vriendschapsprocessen zouden plaatsvinden. Een mogelijke verklaring voor deze inconsistenties is dat er *contextuele variaties* zijn in deze processen. Wellicht vinden vriendschapsprocessen met name plaats voor gedragingen die binnen een bepaalde klas als *normatief* beschouwd worden (Veenstra & Dijkstra, 2011).

Klassen kunnen van elkaar verschillen in welk gedrag normaal gevonden wordt. Dit wordt ook wel de "*klassennorm*" van een klas genoemd: een zekere consensus over welk gedrag verwacht wordt of geaccepteerd wordt. Er kan hierbij een onderscheid worden gemaakt tussen beschrijvende normen en statusnormen. Beschrijvende normen representeren het gemiddelde, waargenomen gedrag binnen een bepaalde klas, bijvoorbeeld of er veel agressieve kinderen in een klas zitten. Statusnormen betreffen de mate waarin gedrag beloond wordt met een hogere sociale positie in de groep of juist afgestraft wordt met een lagere sociale positie. Bijvoorbeeld klassen waarin agressiviteit gezien wordt als cool en statusverhogend, of klassen waarin dat juist niet zo is en waar agressiviteit juist gezien wordt als een weinig aantrekkelijke eigenschap. Omdat jongeren steeds meer waarde hechten aan het verkrijgen van een *populaire* positie binnen de groep, zullen met name gedragingen die gerelateerd zijn aan populariteit (populariteitsnormen) als nastrevenswaardig en aantrekkelijk worden gezien. Zo kunnen normen bepalen welk gedrag *belangrijk* is in de klas, en kan dit een basis vormen voor vriendschapsprocessen.

Op basis van verscheidene theorieën kan worden verwacht dat beschrijvende normen en met name populariteitsnormen een rol spelen in sociale relaties en gedrag. Volgens de sociale-misfittheorie (Wright e. a., 1986) zullen jongeren die zich conformeren aan de klassennorm goed in de groep liggen en een aantrekkelijke vriend voor anderen zijn. Omdat jongeren graag bij de groep willen horen zullen ze proberen zich volgens de klassennorm te gedragen. Ze zullen dan eerder gedragingen van hun vrienden over te nemen die conform die norm zijn. Verder stelt de reputatie-belang-hypothese (Hartup 1993, 1996) dat gedrag dat populair maakt belangrijk kan zijn voor jongeren, omdat jongeren zelf ook populair kunnen worden als ze dit gedrag overnemen (Hartup 1996). Daarom

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zullen vriendschapsselectie, behoud en invloed met name plaatsvinden voor gedragingen die kunnen bijdragen aan populariteit (Hartup 1996; Haselager e.a., 1998).

Bij aanvang van dit proefschrift had – zover bekend – nog maar één studie onderzocht of *klassennormen* een rol spelen in vriendschapsprocessen (Rambaran e.a., 2013). Deze studie vond dat jongeren door hun vrienden werden beïnvloed in hoe leuk ze risicovol gedrag (spijbelen, roken, alcohol drinken) vonden. Deze invloedprocessen vonden vooral plaats in klassen waarin populaire jongeren het erg leuk vonden om risicovol gedrag te vertonen (de populariteitsnorm). De beschrijvende norm speelde geen rol in deze vriendschapsinvloed. Dit proefschrift bouwt op twee manieren voort op bestaande literatuur over klassennormen. Allereerst onderzoekt dit proefschrift de implicaties van beschrijvende en populariteits-normen voor vriendschapsprocessen met betrekking tot *sociaal* (agressief en prosociaal) gedrag en *schoolprestaties* (cijfers en leerdoelen). Ten tweede richt dit proefschrift zich op het onderscheiden van antecedenten van populariteitsnormen, om te verklaren waarom het in de ene klas 'cool' is om agressief gedrag te tonen, terwijl het in andere klassen 'cool' is om hulpvaardig te zijn.

### **Methodiek**

De zeven studies in dit proefschrift zijn, op één studie na, gebaseerd op data van het SNARE-project (*Social Network Analysis of Risk behavior in Early adolescence*). In totaal hebben tussen de 1100 en 2800 jongeren (eerste-, tweede- en derdejaars leerlingen) van drie middelbare scholen driemaal per schooljaar vragenlijsten ingevuld. De bevraagde groep jongeren bestond voor de helft uit meisjes, de gemiddelde leeftijd was 13 jaar en de meeste jongeren waren geboren in Nederland. Minder dan de helft van de jongeren zat op het VMBO en de rest zat op HAVO of het VWO.

Bij deze vragenlijsten hebben ze onder meer vragen over hun klasgenoten beantwoord. Ze kregen per vraag een lijst met klasgenoten gepresenteerd en konden onbeperkt klasgenoten nomineren die aan de beschrijving van de vraag voldeden. Op deze manier zijn de volledige vriendschapsnetwerken van jongeren binnen de klas in kaart gebracht. Tevens is voor alle leerlingen nagegaan hoeveel nominaties zij hadden ontvangen voor vragen over de sociale positie en het gedrag van jongeren, en dit aantal werd gedeeld door het aantal 'nominatoren' om tot

een proportie-score te komen. Deze proportie-score representeerde dan het percentage klasgenoten dat een jongere had genomineerd voor een vraag. Op deze manier werd data verkregen over de waargenomen sociale positie van jongeren (populariteit, acceptatie, onpopulariteit en afwijzing) en het waargenomen gedrag (prosociaal en agressief gedrag) van jongeren. Op basis van deze gegevens kon de klassennorm berekend worden. Voor beschrijvende normen is het klassengemiddelde van waargenomen gedrag meegenomen. Voor populariteitsnormen is per klas de correlatie tussen waargenomen populariteit en waargenomen gedrag berekend. Ten slotte hebben scholen de rapportcijfers van de jongeren doorgegeven, als objectieve maat voor schoolprestaties.

Eén hoofdstuk (Hoofdstuk 6) is gebaseerd op de CUTRAN data uit de Verenigde Staten (Michigan). Hier hebben bijna 1000 jongeren aan deelgenomen van verscheidene basisscholen en "middle schools" (voorgezet onderwijs in de Verenigde Staten; maar kinderen zijn qua leeftijd vergelijkbaar met groep 8 van de basisschool). Ook binnen deze studie is veel informatie middels nominatiemethoden verkregen, met name over de schoolse- en sociale ontwikkeling van jongeren.

### **Bevindingen per hoofdstuk**

In hoofdstuk 2, 3, en 4 heb ik me gericht op de rol van populariteitsnormen in vriendschapsprocessen voor *sociale* gedragingen. **Hoofdstuk 2** onderzocht of agressieve populariteitsnormen en beschrijvende normen een versterkende rol spelen in vriendschapselectie, behoud, en invloed met betrekking tot agressie in de brugklas. Longitudinale sociale-netwerkanalyses toonden aan dat agressieve populariteitsnormen vriendschapselectie en invloed voor agressief gedrag versterkten. Beschrijvende normen speelden geen rol in deze processen. Kortom, enkel in klassen waarin agressie als *waardevol* gezien werd (doordat het beloond werd met populariteit), kozen jongeren hun vrienden uit op basis van raakvlakken qua agressie en namen ze de agressieve gedragingen van hun vrienden over.

Hoofdstuk 3 en 4 borduurden voort op hoofdstuk 2 door niet alleen te focussen op de agressie van populaire jongeren, maar ook op meer gewenste, prosociale gedragingen. Agressie en sociaal gedrag kunnen gezien worden als twee tegengestelde gedragingen die elkaar kunnen uitsluiten, maar ze kunnen ook naast elkaar bestaan wanneer ze hetzelfde doel dienen (zoals het verkrijgen van een populaire positie; Hawley, 2003). Dit betekent dat agressieve en prosociale

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populariteitsnormen in bepaalde klassen naast elkaar kunnen bestaan. Daarom heb ik in **Hoofdstuk 3** een “profiel-benadering” genomen door constellaties (profielen) van prosociale en agressieve normen binnen brugklassen te onderzoeken. Tevens heb ik onderzocht in hoeverre klassen nog veranderen in hun normprofiel gedurende het schooljaar en in hoeverre deze veranderingen gerelateerd zijn aan de ontwikkeling van sociaal en agressief gedrag van leerlingen binnen die klassen. Ik heb dit voor zowel populariteitsnormen als beschrijvende normen onderzocht. Uit latente-klassenanalyses kwamen twee typen klassen naar voren voor beschrijvende normen: prosociale klassen (hoge prosociale en lage agressieve beschrijvende normen) en gemixte klassen (hoge prosociale en hoge agressieve beschrijvende normen). Voor populariteitsnormen kwamen drie typen klassen uit de latente-klassenanalyses naar voren: gemixte klassen (hoge prosociale en hoge agressieve populariteitsnormen), prosociale klassen (hoge prosociale en lage agressieve populariteitsnormen) en agressieve klassen (relatief lage prosociale en hoge agressieve populariteitsnormen). Resultaten van latente-transitieanalyses toonden aan dat descriptieve normen *stabiel* bleven gedurende het hele schooljaar. Geen enkele klas veranderde qua profiel van descriptieve normen. Populariteitsnormen waren wat meer dynamisch en konden veranderen over het schooljaar heen: aan het eind van het schooljaar werden de meeste klassen gekenmerkt door een agressief of gemixt profiel. Ten slotte toonden groeicurvemodellen aan dat populariteitsnormen een rol speelden in de *ontwikkeling* van sociaal gedrag: jongeren werden het meest sociaal in klassen waar sociaal gedrag cool was en agressief gedrag niet (prosociale klassen). Descriptieve normen speelden geen rol in de ontwikkeling van gedrag van jongeren. Deze studie liet zien dat normen al redelijk snel gevestigd zijn in klassen. *Als* er veranderingen optreden in normen is dit naar een meer agressief profiel (gemixt of agressief). Met name populariteitsnormen zijn gerelateerd aan veranderingen in individueel gedrag.

In **Hoofdstuk 4** heb ik voortgebouwd op Hoofdstuk 2 en 3 door te onderzoeken of de profielen van prosociale en agressieve populariteitsnormen een rol spelen in prosociale en agressieve vriendschapsprocessen. De resultaten tonen aan dat prosociale populariteitsnormen enkel een buffer kunnen zijn tegen agressieve vriendschapsprocessen en stimulerend kunnen zijn voor prosociale vriendschapsprocessen in klassen waar *geen* agressieve populariteitsnormen zijn (in prosociale klassen). Ondanks dat gemixte klassen óók gekenmerkt werden

door prosociale populariteitsnormen, leken ze op agressieve klassen: vrienden versterkten elkaar in agressief gedrag en werden beïnvloed richting minder sociaal gedrag. Dit wijst erop dat agressieve populariteitsnormen sterker zijn dan prosociale populariteitsnormen.

In Hoofdstuk 5 en 6 onderzocht ik de rol van klassennormen omtrent *schools functioneren* (cijfers en leerdoelen). **Hoofdstuk 5** onderzocht de invloed van vier typen statusnormen (op basis van acceptatie, afwijzing, populariteit en onpopulariteit) op de sterkte *en* de richting van vriendschapsprocessen met betrekking tot schoolcijfers. Multi-level longitudinale sociale-netwerkanalyses toonden aan dat de rapportcijfers van (on)populaire jongeren slechts een bescheiden rol spelen in het versterken van vriendschapsselectie op basis van gelijkheid in schoolcijfers en *geen* rol in vriendschapsinvloed. Wanneer hoge cijfers samengingen met onpopulariteit raakten laagpresteerders bevriend met elkaar. Indien hoge cijfers gerelateerd waren aan hoge populariteit, waren leerlingen met gelijke cijfers meer geneigd om vrienden te worden (zowel laag- als hoogpresteerders). Andere typen normen (acceptatie-, afwijzing- en beschrijvende normen) speelden geen rol in deze processen. Een mogelijke verklaring voor de bescheiden rol van normen in vriendschapsprocessen met betrekking tot schoolprestaties, is dat rapportcijfers wellicht niet altijd zichtbaar zijn, waardoor ze minder snel een normatieve invloed kunnen uitoefenen. Rapportcijfers zeggen ook niets over onderliggende leerdoelen en motivaties van leerlingen.

In **Hoofdstuk 6** heb ik me dan ook gericht op de *leerdoelen* van jongeren. Deze doelen weerspiegelen de mate waarin schoolprestaties 1) een strategie zijn om beter te presteren dan anderen (prestatiedoelen) *of* 2) een reflectie zijn van de motivatie om jezelf te verbeteren in schoolse vaardigheden (voortgangdoelen). De resultaten tonen aan dat beschrijvende normen voor leerdoelen geen rol speelden in vriendschapsprocessen, maar populariteitsnormen wel. Wanneer het nastreven van *prestatiedoelen* gerelateerd was aan populariteit, was er binnen klassen een sterkere voorkeur voor vrienden met gelijksoortige schoolprestaties – maar deze vriendschappen hielden niet lang stand en vrienden hadden *geen* invloed op elkaars' schoolprestaties. In klassen waar populaire jongeren een norm zetten voor *voortgangdoelen*, was wél sprake van invloed van vrienden op elkaars' schoolprestaties. Hoofdstuk 6 laat dan ook zien dat vriendschapsprocessen met betrekking tot academische prestaties afhangen van

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de mate waarin populaire jongeren een norm zetten voor het nastreven van prestatiedoelen of vooruitgangdoelen.

In Hoofdstuk 7 en 8 heb ik de antecedenten van prosociale en agressieve populariteitsnormen onderzocht. In **Hoofdstuk 7** heb ik twee contrasterende hypothesen getest over de rol van de populariteitshierarchie (de mate waarin populariteit ongelijk verdeeld is binnen een klas) in de ontwikkeling van prosociale en agressieve populariteitsnormen. Volgens een *functionele benadering* zou een populariteitshierarchie functioneel zijn in het scheppen van een ordelijke omgeving waar allen hun plek kennen en accepteren. In een dergelijke harmonieuze omgeving zou prosociaal gedrag en niet agressief gedrag gewaardeerd worden en beloond worden met populariteit (hoge prosociale populariteitsnormen en lage agressieve populariteitsnormen). Volgens de *machtsbalansbenadering* zouden sterke onderlinge verschillen in populariteit echter leiden tot hoge agressieve en lage prosociale populariteitsnormen. Dit zou komen door onevenwichtige machtsverhoudingen, waardoor degenen aan de top van de hiërarchie 'vrij spel' hebben om hun macht te misbruiken. Tevens kan een hiërarchie *competitie* om populariteit uitlokken, omdat de privileges die samengaan met deze positie niet voor iedereen beschikbaar zijn. Agressie kan dan een machtig wapen zijn om een plek op de populariteitsladder te veroveren. Resultaten van *cross-lagged* panel modellen toonden aan dat de populariteitshierarchie voorspellend was voor de populariteitsnormen, en niet andersom. Hierbij vond ik enkel ondersteuning voor de machtsbalansbenadering. Klassen met weinig populaire jongeren en veel onpopulaire jongeren stegen in agressieve populariteitsnormen op het begin van het schooljaar, en daalden in prosociale populariteitsnormen aan het eind van het schooljaar. Ook waren sterke onderlinge verschillen in populariteit gerelateerd aan stijgende agressieve populariteitsnormen. Een vraag die wordt opgeroepen binnen dit hoofdstuk, is welke factoren dan bijdragen aan een populariteitshierarchie.

In **Hoofdstuk 8** heb ik onderzocht of de ontwikkeling van agressieve populariteitsnormen afhangt van de aanwezigheid van bepaalde typen leerlingen binnen een klas en van de mate waarin deze leerlingen bijdragen aan de populariteitshierarchie binnen een klas (bouwt daarmee voort op Hoofdstuk 7). Volgens de sociale-impacttheorie (Latané, 1981) hangt het ontstaan van normen af van het *aantal* en de *sterkte* (sociale dominantie, zoals leiderschapskenmerken) van jongeren die een bepaald type gedrag vertonen. Gebaseerd op deze theorie

heb ik onderzocht hoe de klassensamenstelling van zes typen leerlingen bijdraagt aan de ontwikkeling van agressieve populariteitsnormen. Deze zes typen betreffen *sociaal dominante* agressieve, prosociale en bistrategische jongeren (dat zijn jongeren die hulpvaardig gedrag en agressief gedrag combineren) en *niet-sociaal dominante* agressieve, prosociale en bistrategische jongeren. Hoofdstuk 8 toont aan dat sociaal dominante agressieve en sociaal dominante bistrategische jongeren bijdragen aan sterkere agressieve populariteitsnormen, zowel op een directe manier als door het versterken van de populariteitshiërarchie. Verder bleken sociaal-dominante hulpvaardige jongeren een belangrijke tegenhanger: hoe meer hulpvaardige leiders in de klas, hoe kleiner de kans is dat een agressieve populariteitsnorm ontstaat. Tot slot wordt agressie niet zonder meer als aantrekkelijker gezien naarmate het meer voorkomt: in klassen waar meer niet-sociaal dominante agressieve jongeren zijn, is de agressieve populariteitsnorm lager.

## Conclusies

Op basis van de zeven hoofdstukken kunnen vijf hoofdconclusies gegenereerd worden. Een **eerste hoofdconclusie** is dat populariteitsnormen bepalen welk gedrag aantrekkelijk en nastrevenswaardig is binnen een bepaalde klas, waardoor andere jongeren elkaar uitkiezen als vriend op basis van dit gedrag en meer vatbaar zijn voor invloed van vrienden in dit gedrag. Dit kan tezamen ertoe leiden dat gedragingen steeds meer voor gaan komen in een klas (bijvoorbeeld, als invloed naar *hogere* niveaus van agressie optreedt). Dat populariteitsnormen (en *niet* beschrijvende normen) ertoe doen kan verschillende redenen hebben. Zo kunnen populaire jongeren meer opvallen, waardoor andere leerlingen meer aandacht schenken aan hun gedrag en dit makkelijker overnemen. Ook zien leerlingen dit populaire gedrag misschien als middel om zelf ook populair te worden – of om in ieder geval te vermijden dat ze buiten de boot vallen. Daarom kiezen ze hun vrienden hierop uit of nemen ze het gedrag over.

Een **tweede hoofdconclusie** is dat populariteitsnormen met name een rol spelen in selectieprocessen. Hoewel vroeger gedacht werd dat vrienden vooral op elkaar lijken door invloed, lijkt selectie dus nog wat belangrijker, en blijken populariteitsnormen deze selectie bovendien consistent te versterken. Populariteitsnormen versterkten ook invloedprocessen, maar voor selectie kwam het net wat consistentier naar voren. Blijkbaar bepalen populariteitsnormen in

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eerste instantie het sociale landschap van leerlingen. Gedrag wat beloond wordt met populariteit wordt erg belangrijk voor wie als aantrekkelijke vriendschapspartner gezien wordt.

Een **derde hoofdconclusie** is dat agressieve populariteitsnormen 'winnen' van prosociale populariteitsnormen. Alleen wanneer agressief gedrag *not done* is, kunnen prosociale populariteitsnormen prosociale vriendschappen (Hoofdstuk 4) of prosociaal gedrag (Hoofdstuk 3) aanmoedigen. Als agressie echter óók cool is binnen de klas, overwinnen deze agressieve populariteitsnormen en lijken prosociale populariteitsnormen niets meer te kunnen doen. Deze bevinding is in lijn met voorgaand werk dat agressief of onaardig gedrag als meer overheersend, zichtbaar en invloedrijk gedrag aanmerkt dan hulpvaardig of aardig gedrag. Een mogelijke verklaring hiervoor is dat agressie een zekere mate van angst oproept. Wanneer iemand agressie waarneemt, kan dit zijn of haar beschermingsmechanismen en immuunsysteem (over)-activeren. Het verwerken van angstsignalen krijgt in het menselijk brein voorrang op het verwerken van veilige, sociale signalen. Een andere mogelijke verklaring is dat agressie ook een zekere mate van respect en aanzien creëert, met name in de adolescentie waarin pubers willen breken met de kindertijd en dit kenbaar maken door zich af te zetten tegen wat volwassenen hen opdragen. De angst én adoratie die agressie kan oproepen leiden ertoe dat agressie meer aandacht krijgt dan hulpvaardig en aardig gedrag. Omdat aandacht een vereiste is voor invloed, worden jongeren daarom mogelijk in sterkere mate beïnvloed door agressieve populariteitsnormen dan door prosociale populariteitsnormen.

Een **vierde hoofdconclusie** is dat voor vriendschapsprocessen met betrekking tot cijfers het erom gaat welke onderliggende *leerdoelen* belangrijk zijn in een klas. Het nastreven van prestatiedoelen lijkt competitie op te leveren, waardoor jongeren in eerste instantie 'veilig' kiezen voor gelijk-presterende vrienden (maar deze vriendschappen ook weer beëindigen), en waardoor jongeren elkaar niet beïnvloeden in schoolse prestaties. Volgens de sociale afhankelijkheidstheorie leiden prestatiedoelen tot negatieve onderlinge afhankelijkheid in een klas, oftewel: competitie. Jongeren kunnen immers enkel hun doel van 'superieur presteren' behalen wanneer andere jongeren in de klas dat *niet* doen. Deze competitie kan sterke vergelijkingsprocessen uitlokken: de eigenwaarde van jongeren wordt bepaald door beter te zijn dan de rest in schoolprestaties. Het lijkt dan een veilige keuze om gelijk te zijn aan vrienden in

schoolprestaties, omdat vergelijking met gelijkpresteerders minder snel tot lagere eigenwaarde leidt. Tegelijkertijd lijken deze vriendschappen niet lang stand te houden. Mogelijk worden kleine verschillen in academisch functioneren meer zichtbaar door verhoogde nabijheid (een belangrijk kenmerk wat sociale vergelijking uitvergroet). Tevens kan een competitieve context negatieve interacties tussen leerlingen uitlokken, zoals spieken, onjuiste informatie doorspelen, of dingen expres verkeerd uitleggen zodat de ander het niet goed snapt. Deze processen blijken zelfs tussen vrienden plaats te vinden wanneer zij prestatiedoelen nastreven (Darnon & Poortvliet, 2012; Levy-Tossman et al., 2007). Deze negatieve interacties zijn mogelijkwijs niet bevorderlijk voor de kwaliteit van een vriendschap, waardoor vriendschappen worden beëindigd en waardoor vrienden elkaars' prestaties niet beïnvloeden. Het nastreven van vooruitgangdoelen lijkt daarentegen wél de invloed van vrienden op schoolse prestaties te stimuleren. Een verklaring hiervoor is dat – volgens de sociale afhankelijkheidstheorie – verbeteringsdoelen een positieve onderlinge afhankelijkheid (in plaats van competitie) creëren: in deze klassen zien jongeren elkaar als *helper* om hun doel te bereiken. Naar alle waarschijnlijkheid stimuleert dit goede samenwerkingen, leerzame discussies en het uitwisselen van waardevolle lesinformatie – allemaal factoren die de invloed van vrienden kunnen versterken. Belangrijk punt is dat mijn resultaten lieten zien dat die vriendschapsinvloed zowel positief (naar hogere prestaties) als negatief (naar lagere prestaties) kan uitpakken in klassen met sterke vooruitgangdoelen. Dit onderstreept de cruciale rol van de leerkracht in het nauwlettend monitoren van samenwerking tussen leerlingen en in het aanwijzen van juiste samenwerkingspartners.

De **vijfde hoofdconclusie** is dat het ontstaan van populariteitsnormen afhangt van welke jongeren er in een klas geplaatst worden en van de mate waarin die jongeren bijdragen aan de 'pikorde' van de klas: een populariteitshiërarchie (verschillen in populariteit tussen leerlingen binnen een klas). Hoe meer agressieve en bistrategische leiders, hoe sterker de agressieve populariteitsnorm, onder meer doordat ze de hiërarchie in een klas versterken. Prosociale leiders kunnen een tegengeluid bieden en een buffer zijn tegen agressieve leiders, maar niet tegen de bistrategische leiders. Volgens de machtsbalans benadering representeert een hiërarchie onevenredige machtsverhoudingen, waardoor degene(n) aan de top van de hiërarchie 'vrij spel' hebben om hun macht te

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misbruiken. Tevens zou een hiërarchie voor competitie zorgen, waarbinnen agressie een waardevol middel is om de felbegeerde plaatsen op de populariteitsladder te veroveren.

### **Implicaties**

De vijf hoofdconclusies van dit proefschrift zijn van grote betekenis voor het (verder) ontwikkelen van stevig gefundeerde interventiestrategieën die agressieve klassennormen kunnen ombuigen tot meer prosociale klassennormen, resulterend in een klassenomgeving die een adequate ontwikkeling van jongeren bevordert. Zo is in de Verenigde Staten de "Betekenisvolle Rollen" interventie ontwikkeld. Het doel van deze interventie is dat jongeren aanzien en populariteit verkrijgen door middel van positief gedrag, in plaats van negatief gedrag zoals agressie of pesten. Deze interventie stimuleert hulpvaardig gedrag en sociale verantwoordelijkheden door dit met complimenten en aandacht van leeftijdsgenoten te belonen. In de Verenigde Staten liet een verkennend onderzoek zien dat deze interventie samenging met een vermindering in het aantal agressieve conflicten tussen leerlingen (op "middle schools"; Ellis e.a., 2016). De bevindingen uit dit proefschrift hebben nieuwe inzichten geleverd voor het theoretisch kader van deze interventie, en bieden suggesties voor verdere ontwikkeling van dit programma. Zo laat dit proefschrift zien dat wanneer pro sociaal gedrag statusverhogend is in een klas, dit *niet* hoeft te betekenen dat jongeren agressief gedrag als 'not done' beschouwen. De meeste klassen in mijn steekproef werden gekenmerkt door een *combinatie* van prosociale én agressieve populariteitsnormen. Bovendien had de agressieve populariteitsnorm een sterkere rol dan de prosociale populariteitsnorm in deze klassen. Het is dan ook belangrijk dat er meer onderzoek gedaan wordt naar hoe agressief gedrag op adequate wijze ontmoedigd kan worden. Eén recente interventiestudie ("Roots Interventie", Paluck et al. 2016) heeft aangetoond dat agressieve peer-normen kunnen veranderen, waardoor agressief gedrag op school daadwerkelijk afneemt. In deze interventie worden "sociale referenten" aangemoedigd om zich publiekelijk tegen agressief gedrag te keren. Deze sociale referenten waren leerlingen die een centrale positie in het klassennetwerk bekleedden, bijvoorbeeld (maar niet per se) doordat ze populair waren. Dit laat zien dat invloedrijke, populaire jongeren een belangrijk target kunnen zijn om hulpvaardig gedrag te stimuleren en agressief gedrag de kop in te drukken. De bevindingen uit mijn proefschrift ondersteunen

de gedachte dat populaire jongeren inderdaad een sleutelrol spelen in welk gedrag belangrijk is. Echter, wat nu precies de werkzame elementen zijn van interventies die voortbouwen op deze gedachte, en welke aspecten nog verdere ontwikkeling behoeven blijft nog een vraag voor verder onderzoek. Soms hebben deze populaire jongeren namelijk juist hun status ontleend aan agressief gedrag en zullen ze dit gedrag niet zomaar willen loslaten. Juist omdat agressie een manier kan zijn om je af te zetten tegen volwassenen en om je nieuwe positie als puber te benadrukken, dient overwogen te worden wat de rol van volwassenen (zoals de leerkracht) kan zijn binnen interventies. Bovendien moet rekening gehouden worden met de bevinding dat klassen blijkbaar verschillen van elkaar. Kan een interventie wel geschikt zijn voor allerlei klassen, of dient per klas gekeken te worden wat passend en wenselijk is?

Daarnaast biedt dit proefschrift aanknopingspunten voor het *voorkomen* van agressieve populariteitsnormen. Scholen zouden in de klassensamenstelling aan het begin van het schooljaar rekening kunnen houden met de klassensamenstelling. Zo kunnen ze op basis van informatie van basisscholen proberen om het aantal agressieve leiders per klas te minimaliseren en het aantal pro sociale leiders per klas te maximaliseren. Tevens kunnen leerkrachten misschien proberen te voorkomen dat er sterke populariteitsverschillen ontstaan tussen leerlingen. Een voorgaande studie binnen het basisonderwijs gaf aan dat leerkrachten dit konden doen bijvoorbeeld door rekening te houden met wie waar komt te zitten in de klas en door vriendschappelijke relaties tussen bepaalde leerlingen te stimuleren (Gest & Rodkin, 2011). Toekomstig onderzoek zou moeten uitwijzen hoe leerkrachten dit op middelbare scholen zouden kunnen bewerkstelligen.

Tot slot komt uit dit proefschrift naar voren dat de leerdoelen van populaire jongeren een norm zetten voor hoe er tegen academische prestaties wordt aangekeken door hun klasgenoten. Vooral het nastreven van *verbeteringsdoelen* lijken stimulerend te zijn voor de schoolse ontwikkeling van studenten. Het is belangrijk dat leerkrachten de kwaliteit van samenwerking tussen studenten nauwlettend in de gaten houden, omdat jongeren elkaar niet alleen naar *hogere* maar ook naar *lagere* prestaties kunnen beïnvloeden wanneer verbeteringsdoelen als nastrevenswaardig gezien worden. Toekomstig onderzoek zal moeten uitwijzen hoe (populaire) leerlingen binnen het voortgezet onderwijs

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kunnen worden gestimuleerd om *verbeteringsdoelen* in plaats van *prestatiedoelen* na te streven.

De bevindingen van dit proefschrift hebben dan ook belangrijke implicaties voor zowel theorie als praktijk. Populariteit is een belangrijk construct tijdens de adolescentie: populaire jongeren kunnen gezien worden als rolmodel en hun gedrag wordt in een positief daglicht geplaatst. De normen van populaire jongeren kunnen een belangrijk doelwit zijn voor interventies om zo meer gewenste omgevingen te creëren, waar alle jongeren in de klas van kunnen profiteren

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The onset of adolescence presents a turbulent period in life, in which youth face a many social-emotional, cognitive, and biological changes (Steinberg & Morris, 2001). Adolescents seek autonomy from authority figures, such as parents or teachers, while peer relations – such as friendships – gain heightened significance and valence (Allen & Land, 1999; Berndt, 1982; Larson & Richards, 1991). At the same time, adolescents transition to secondary education, where they are organized in (relatively) new classrooms. In these classrooms, adolescents may start and keep affiliating with peers who are similar to them in certain behaviors (friendship selection and maintenance), and friends may also influence adolescent behavior development over time (influence). The interplay of these friendship processes may enhance similarities in behaviors among friends. Over time, this may contribute to the proliferation of behavior in classrooms, which can be desirable when pertaining to prosocial behavior or high academic achievement, but undesirable when these processes would enhance aggression.

Social network analyses in RSIENA enable the disentanglement of friendship selection, maintenance, and influence processes in a statistically sound way (Snijders, Steglich, & Schweinberger, 2007). To date, some previous studies used RSIENA to examine peer selection, maintenance and influence processes with respect to aggression (Dijkstra, Berger, & Lindenberg, 2011; Logis et al., 2013), prosocial behavior (Molano et al., 2013; Logis et al., 2013) and academic behaviors (Flashman, 2012; Shin & Ryan, 2014a, 2014b). Importantly, their findings on the strength of selection, maintenance, and influence processes related to these attributes varied considerably across and within studies. So far, studies have only reported these variations across settings, but have not provided an explanation for it. One explanation could be that these studies operated in different settings, with each having a distinct peer context with certain peer norms.

Classrooms can vary from each other in which behaviors are typical or normative. This is also referred to as the “*peer norm*”: a certain consensus on what behaviors are expected or appropriate in a particular setting. The most common way to capture aggressive, prosocial, or academic peer norms is by assessing *descriptive norms*: the average perceived behavior or attitudes of *all* individuals in a setting such as the classroom (e.g., Wright et al., 1986). Alternatively, a norm salience perspective argues that *status norms* may be particularly relevant to adolescents (Henry et al., 2000). Status norms reflect the

extent to which behaviors are rewarded with high status (acceptance, popularity), or punished with *low* status (rejection, unpopularity) among peers. Adolescents increasingly desire for popularity, perhaps because it provides them access to valuable social and material resources (Hawley, 1999). Therefore, particularly popular peers may set a norm (*'popularity norm'*) within classrooms for which behaviors are seen as attractive and valuable (Dijkstra & Gest, 2015) and function as role models (Bandura, 1977). In this way, norms may shape what behaviors are important and valuable within a particular context, which can provide a basis for friendship dynamics in classrooms.

Based on various theories, it can be reasoned that peer norms – and in particular popularity norms – for social and academic behaviors have important implications for adolescents' peer relations and behavior, and for the coevolution between the two. Following social misfit theory (Wright, Giammarino, & Parad, 1986), adolescents who conform to the norm are more likely to be accepted by their peers, whereas those who deviate are at risk of peer rejection. As such, peer norms may affect adolescents' peer preferences and affiliations. Moreover, because peer acceptance is important for adolescents' feelings of belongingness (Tarrant et al., 2001), affection, and trust, adolescents try to conform to peer norms. Consequently, norms may not only affect peer relationships, but also adolescents' behavioral development. Moreover, the reputational salience hypothesis (Hartup, 1996) states that behaviors that relate to popularity become "reputationally salient": an important and valuable tool to obtain popularity. Therefore, these behaviors become of valence for adolescents friendship processes.

At the start of this dissertation, only one prior study had integrated the role of popularity and descriptive norms with friendship selection and influence processes in a social network framework. It showed that students only adopted positive attitudes toward antisocial behaviors in classrooms where these attitudes were rewarded with popularity, indicating the spread of positive attitudes toward antisocial behaviors via status-based influence processes (Rambaran, Dijkstra, & Stark, 2013). Descriptive norms did not affect these friendship processes. The current dissertation extends upon this prior work in two ways. First, I examined the role of descriptive norms and popularity norms in friendship processes related to social (prosocial and aggressive) and academic (academic achievement and

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motivation) behavior. Second, I aim at unraveling the antecedents of popularity norms in adolescent classrooms.

### **Method**

In this dissertation, six studies were conducted on data of the SNARE (Social Network Analysis of Risk behaviors in Early adolescence) project, a longitudinal project on adolescents' social networks and the development of adolescent behavior. In total, about 2,800 first-, second-, and third-year students from three secondary schools participated in the SNARE project. Half of them were girls; they were on average 13 years of age. Most adolescents (about 87%) were born in the Netherlands. Data were collected in the autumn, winter, and spring in various subsequent school years. At each measurement occasion, participants were asked about several aspects of their daily lives, for example, their relationship with parents, their social-emotional functioning, and how they spent their time. Schools also provided us with the GPA's of students as an objective measure for academic functioning. In addition, peer nominations were used to assess, amongst others, friendships, aggressive and prosocial behaviors, and peer valued characteristics such as popularity. In this way, information was retrieved about full friendship networks in the classroom. Moreover, for peer-perceived behavior and reputation (such as popularity), the number of received nominations was divided by the number of nominators within the classroom, resulting in a proportion score. This proportion score presents the percentage of classmates that nominated a particular adolescent on a certain item. Based on these proportion scores, we calculated classroom peer norms. Descriptive norms reflected the average peer-perceived behavior for each classroom. Popularity norms were calculated as the within-classroom correlation between peer-perceived behavior and peer-perceived popularity.

One chapter is based on the CUTRAN data, retrieved from about 1000 students in fifth- and sixth grade; at two time-points (Midwestern U.S.). The goal of this project was to examine peer-nominated and self-reported data on adolescent academic (achievement, academic engagement, achievement goals) and social development (peer networks, friendships).

## Findings

In Chapters 2, 3, and 4, I focused on the role of popularity norms in the coevolution between adolescent friendships and *social* (aggressive and prosocial) behaviors. In Chapter 2, I tested whether aggressive descriptive and popularity norms strengthened friendship selection, maintenance, and influence related to aggression in seventh grade. In the Netherlands, this is the first year of secondary education, which presents a relatively new peer context to adolescents. Longitudinal social network analyses in RSIENA indicated that aggressive popularity norms – rather than descriptive norms – affected the strength of friendship selection and influence processes related to aggression. Specifically, *only* in classrooms where the valence of aggression was high (because its positive association with popularity), adolescents tended to select their friends based on similarity in aggression and adopted the aggressive behaviors of their friends.

Chapter 3 and 4 extended upon Chapter 2 by not only focusing on adolescents' aggression but also on more positive, prosocial behaviors. Aggression and prosocial behavior can be considered as two opposite constructs (Card et al., 2008), but these behaviors can also co-occur when serving the same goal (such as achieving popularity; Hawley, 2003). This may imply that prosocial and aggressive norms co-exist within certain classrooms. Therefore, in Chapter 3, I took a profile-centered approach to examine whether peer norm constellations of prosocial and aggressive norms could be distinguished within adolescent classrooms. I examined how these peer norm constellations develop over time and whether they relate to individual behavioral trajectories. Longitudinal latent class analysis (LLCA) on *descriptive norms* elucidates two types of classrooms: A minority of classrooms was defined as a prosocial descriptive norm classroom (high prosocial and low aggressive norms) and a majority was defined as a mixed descriptive norm classroom (high prosocial and high aggressive norms). Regarding popularity norms, another LLCA distinguished: mixed classrooms with high prosocial and high aggressive popularity norms, prosocial classrooms with high prosocial and very low aggressive popularity norms, and aggressive classrooms with high aggressive and relatively low prosocial norms. Results of Latent Transition Analyses (LTA) indicated that descriptive norms did not change over time whereas popularity norms did. At the end of the school year, most classrooms were characterized by an aggressive or mixed popularity norm profile. Moreover, Multi-level Latent Growth Curve Analysis indicated that the

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development popularity norm profiles was associated with individuals' prosocial behavior development. Specifically, adolescents were more likely to increase in prosocial behavior in classrooms with that were stable or transitioned towards a prosocial popularity norm profile.

In Chapter 4, I examined the role of prosocial and aggressive popularity norm combinations in adolescent prosocial and aggressive friendship processes. Findings of longitudinal social network analyses using Bayesian inference indicated that in prosocial classrooms (low aggressive and high prosocial popularity norms), friendship maintenance based on similarity in prosocial behavior was enhanced, whereas aggressive friendship processes were largely mitigated. Instead, when aggressive popularity norms were equally strong or stronger than prosocial norms (mixed and aggressive classrooms, respectively), aggression was more important for adolescent friendship processes than prosocial behavior. These findings show that the prosocial behavior of popular peers may only buffer against aggressive friendship processes and stimulate prosocial friendship processes if these popular peers (or other popular peers in the classroom) also abstain from aggression. In other words: aggressive popularity norms overpower prosocial popularity norms.

In Chapter 5 and Chapter 6, I focused on the role of *academic* peer norms in achievement-based friendship processes. Chapter 5 addressed the relative impact of four types of classroom academic status (acceptance, rejection, popularity and unpopularity) norms and descriptive norms on the strength and direction of adolescents' achievement-based friendship selection and influence processes. Multi-level longitudinal social network analyses indicated that classroom unpopularity- and popularity norms moderated the strength and direction of friendship selection processes (but not of influence processes) for academic achievement. Specifically, in classrooms where high achievement related to unpopularity, low-achieving adolescents selected each other as friends, whereas high-achieving adolescents were viewed as unattractive friendship partners. In classrooms where achievement was rewarded with popularity, adolescents selected their friends on the basis of similarity, both in high- and low achievement. Descriptive-, acceptance- and rejection norms did not moderate these friendship processes. These findings suggest that (un)popular peers' achievement has some consequences for friendship selection based on achievement, but not for friendship influence.

One reason for this modest role of academic popularity norms, is that popular peers' objective achievement does not pose a strong norm to adolescents. It is not highly visible and does not capture the motives or goals underlying this high achievement. In achievement settings, two contrasting goals are often evident: mastery and performance goals (Elliot, 2005). When *mastery goals* are salient in classrooms, there is a focus on self-improvement in understanding and mastering academic tasks, whereas when *performance goals* are salient, there is a focus on demonstrating academic competence relative to other students, through superior performance (e.g., high achievement) or looking smart (Pintrich, 2000). Chapter 6 examined whether achievement-based friendship processes are affected by the extent to which popular peers make mastery or performance goals salient. Data included students who were in fifth and sixth grade, from the Midwestern states of the U.S., and longitudinal social network analyses in RSIENA were applied. Findings showed that achievement goal popularity norms played a role in achievement-based friendship processes, rather than achievement goal descriptive norms. Specifically, adolescents formed friendships with similarly achieving peers in classrooms with high performance goal popularity norms but these friendships were less likely to last over time. Furthermore, friendship influence on achievement took place in classrooms with high mastery goal popularity norms, but not in classrooms with low mastery goal popularity norms. Chapter 6 therefore indicates that the strength and direction of achievement-based friendship selection, maintenance, and influence depend on which *achievement goals* are made salient by virtue of their association with popularity in classrooms.

I examined the antecedents of prosocial and aggressive popularity norms in Chapter 7 and 8. In Chapter 7, I tested two contrasting hypotheses about the role of popularity hierarchy (the degree to which popularity is unequally distributed in the classroom) in the development of prosocial and aggressive popularity norms. According to a *functionalist perspective*, a strong popularity hierarchy would result in a well-established, orderly, and harmonious environment, where prosocial behavior is highly valued whereas aggression is not (i.e., high prosocial and low aggressive popularity norms). In contrast, a *balance of power* perspective (Garandeau, Lee, & Salmivalli, 2014) argues that a strong popularity hierarchy relates to a power imbalance and unequally divided resources, which evokes competition for popularity. Aggression may then be seen as a valuable and

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strategic tool to occupy a favored position in the hierarchy and secure access to resources, resulting in high aggressive and low prosocial popularity norms. Results of classroom-level cross-lagged panel analyses supported the *balance of power perspective*: Classrooms with few highly popular and many unpopular students increased in aggressive popularity norms and decreased in prosocial popularity norms. Also, strong within-classroom asymmetries in popularity predicted relatively higher aggressive popularity norms. This indicates that a strong popularity hierarchy elicits more competition for the coveted positions at the top of the popularity ladder, as benefits associated with popularity are not equally available to everyone. In such a competitive context, high aggressive and low prosocial behaviors may be seen as valuable means rewarded with popularity.

In Chapter 8, I took a closer look at the classroom composition as factor in the formation of aggressive popularity norms. I examined Social Impact Theory (Latané, 1981) by testing whether the formation of norms is a function of the number and strength (e.g., social dominance) of prosocial, aggressive, and bi-strategic adolescents within a classroom. In addition, I extended upon Chapter 7 by examining whether certain types of students contribute to the popularity norm by establishing a strong popularity hierarchy. Classroom-level regression analyses show that classrooms with socially dominant aggressive and bi-strategic students contributed to higher aggressive popularity norms, both directly *and* by enhancing the classrooms' popularity hierarchy. Instead, non-socially dominant aggressive students and socially dominant prosocial students lowered aggressive popularity norms. Socially dominant prosocial students also buffered against the role of socially dominant aggressive adolescents in the aggressive popularity norm (moderation effect), but not against bi-strategic adolescents' role. These findings suggest that socially dominant aggressive and bi-strategic students have the power to establish a 'pecking order' that facilitates the development of aggressive popularity norms.

## Conclusion

Based on the combined findings of the seven empirical chapters, five main conclusions can be provided. First, popularity norms rather than descriptive norms matter for the extent to which behaviors are seen as attractive or valuable in a classroom. This may be due to popular peers' position: they have many affiliations, enjoy admiration and are at the center of their peers' attention (Adler & Adler,

1995; Cillessen & Marks, 2011). Therefore, popular peers' behaviors are more visible to students (enhancing conformation). Furthermore, adolescents may view the behaviors of popular peers as a valuable tool to gain popularity themselves, for instance through affiliation with peers who display reputationally salient behaviors (bask in reflected glory) or by adopting their friends' behaviors if associated with popularity.

A second main conclusion is that popularity norms matter in particular for friendship selection processes. Whereas traditionally, it was assumed that influence processes would underlie friends' homogeneity in behavior, this dissertation points out that the regularly overlooked and under-examined *selection processes* may be the first – and probably foremost – mechanism explaining similarity among friends in normative behaviors. Apparently, popularity norms not only function as reference framework guiding behavioral decisions (Cialdini & Trost, 1991), but also – and even in particular – drive relational decisions (Hartup, 1996; Van den Bongardt et al., 2015). Popularity norms also have some effects on maintenance and influence processes, but the effects on selection were most consistently present. Hence, norms seem to firstly design adolescents' social landscape: they define whom adolescents view as attractive friendship partners or not.

A third main conclusion is that aggressive popularity norms overpower prosocial popularity norms. Prosocial popularity norms can stimulate prosocial friendships and discourage aggressive friendship influence, only when aggressive popularity norms are absent. However, when aggression is also 'cool' in classrooms, these aggressive popularity norms dominate prosocial popularity norms in affecting friendship processes. This finding is in line with prior work that considers aggression as a fundamentally more overruling, visible, and impactful behavior than prosocial behavior. Aggression may trigger strong alertness as an acute response toward potential threats may be required (Giletta, Slavich, Rudolph, Hastings, Nock, & Prinstein, 2018). The processing of fear signals is prioritized over the processing of positive (prosocial) signals – until vigilance for potential threat is over (Williams, Palmer, Liddell, Song, & Gordon, 2006). Aggression may also create awe or admiration, particularly in adolescents, as opposing adult values and breaking adult-enforced rules may be a way to bridge the maturity gap and assert independence and increased autonomy (Moffitt 1993; Bukowski et al., 2000). Therefore, more attention is drawn to the aggressive side

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than to prosocial side of popular peers. As attention is a prerequisite for influence, adolescents may be more strongly influenced by aggressive popularity norms than by prosocial popularity norms.

A fourth main conclusion is that popular peers' achievement goals rather than their objective achievement set a norm for achievement-based friendship processes. This finding can be explained by social interdependence theory. When performance goals relate to popularity (high performance goal popularity norms), academic achievement may become a *social strategy*: a way to gain higher status at others' expense (as outperforming others is reputationally salient). This would enhance competition where being similar in achievement to friends may seem "safe", as social comparison with friends would then not result in lower self-esteem. However, in the longer run these friendships may not hold – perhaps because they obstruct each other's' goal attainment, which also diminishes the opportunities to learn from friends. Instead, when the focus is on *learning* and helping each other to jointly master academic tasks, a safe, cooperative environment is created, which is a necessary condition to actually learn from friends and increase one's academic functioning. Importantly, this enhanced friendship influence in classrooms with high mastery goal popularity norms could be for better (toward higher achievement) or worse (toward lower achievement). This illustrates the need for teachers to guide discussions and help-seeking among students.

A fifth main conclusion is that the emergence and development of popularity norms depend on the popularity hierarchy and the classroom composition. Regarding hierarchy, stronger asymmetries in students' popularity within classrooms relate to relatively more aggressive and less prosocial popularity norms. An explanation for this finding is that a popularity hierarchy can evoke a power imbalance that facilitates the abuse of power of popular leaders. Moreover, when resources related to popularity are unequally available for everyone, this may trigger competition: a "war" for resources. In such contexts, high aggression and low prosocial behaviors may be valuable tools to gain or maintain the coveted spots in the popularity ladder. Regarding classroom composition, the development of popularity norms also depends on the type of students present in the classroom, from the very beginning of the school year onwards. Socially dominant aggressive and socially dominant bi-strategic students contributed to higher aggressive popularity norms, both directly and by enhancing the classrooms' popularity

hierarchy. Socially dominant prosocial students *weakened* aggressive popularity norms, both directly and by buffering against the role of socially dominant aggressive adolescents in the aggressive popularity norm.

## **Implications**

In adolescence, popular peers are highly visible and powerful, and function as role models. Their behaviors may become attractive and valuable and pose a norm to others. Popular peers therefore yield effective targets for classroom-based interventions to prevent aggression and instead, promote prosocial behavior and foster positive adjustment among adolescents. Interventions may prevent or reduce aggressive (bullying) norms by rewarding prosocial behavior and making it reputationally salient (Meaningful Roles Intervention, Ellis et al., 2016). However, it is important to take into account that classrooms are often characterized by a *combination* of prosocial and aggressive popularity norms – and that aggressive popularity norms overpower the role of prosocial norms in these classrooms. Accordingly, it seems that not only prosocial popularity norms need to be stimulated. It is also necessary to actively discourage aggression among popular peers. Future studies should examine what means may be most effective and appropriate for discouraging aggressive popularity norms (see Huitsing et al., 2019).

One recent intervention study (Roots Intervention, Paluck et al., 2016), showed that aggressive peer norms can change, resulting in a decline of aggression at school. In this intervention, “social referents” are encouraged to take a public stance against conflict (such as verbal and physical aggression) at school. These “social referents” are students who have many connections within the peer network: for instance (but not necessarily), due to their high popularity. This indicates that highly central peers – such as popular peers – can be an important target to foster prosocial behaviors and discourage aggression. Yet, in some classrooms, popular peers have earned their high status because they are very aggressive. It should be carefully monitored whether the behavior of popular peers themselves hinder them in taking a public stance against aggression. It could be that when highly aggressive popular adolescents are encouraged to take a public stance against aggression, they feel motivated to change their own aggressive behavior as well. However, it could also work counterproductively. This is particularly important, as aggression can be a way to oppose to adult values

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and to break adult-enforced rules. Therefore, it should be carefully considered what the role of significant adults (such as teachers) can be in such interventions.

Next, schools could use the insights generated by this dissertation to *prevent* the emergence of aggressive norms, perhaps in their decision-making on classroom composition. Retrieving information about students' social dominance and behavior from primary schools may help secondary schools to organize classrooms in such a way that the percentage of socially dominant aggressive adolescents and socially dominant bi-strategic students is kept to a minimum, while the percentage of socially dominant prosocial students is maximized across classrooms. Also, certain teacher practices may facilitate status equality in classrooms. Primary school classrooms have been found to be more egalitarian with regard to popularity when teachers encourage new friendships by creating small student groups and managing seating charts (Gest & Rodkin, 2011). It is unknown whether similar effects of teacher practices would occur in adolescent classrooms at secondary education; particularly in the Netherlands where adolescents may have up to fifteen teachers for all different subjects.

In the domain of *academic achievement*, this dissertation indicated that popular peers' achievement goals affected both adolescents' social- and behavioral decisions. Classrooms may profit from preventing performance goal popularity norms and instead, encouraging mastery goal popularity norms in conjunction with enhanced teacher support of academic discussions and collaborations. Future studies should examine whether popular leaders can be stimulated to enhance their mastery goals, and how this affects achievement-based friendship processes.

In sum, popular peers are characterized by many positive characteristics: they can be prosocial, have strong leadership qualities and are highly talented in various respects. Teaching these popular peers to make use of these talents and skills may put a strong example for other students, creating more desirable classroom climates that foster students' adjustment and well-being.

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# Curriculum Vitae

### **About the Author**

Lydia Laninga-Wijnen (1989) studied Pedagogical Science at Utrecht University, the Netherlands. She obtained her Bachelor's degree in 2011, with a minor in Education. In 2013, she obtained her Master's degree of the Research Master's program Development and Socialisation in Childhood and Adolescence at Utrecht University (cum laude, best student of the year). Half a year later, in 2014, she obtained her second Master's degree of the clinical master Orthopedagogics (GPA: 4.0). For two years, she worked as clinical psychologist at Altrecht (The Netherlands) where she developed and evaluated a social skills training for youth with social difficulties (e.g., autism spectrum disorder). In 2014, Lydia started her PhD project: the NWO funded project SNARE (Social Networks And Risk behavior in Early adolescence), at the department of Interdisciplinary Social Science at Utrecht University. In total, she collected nine waves of data (including genetics data) for this project. During her time as a PhD candidate, she also visited the lab-group of Allison Ryan (Education and Psychology, University of Michigan, Ann Arbor, U.S.A). Moreover, she started a family house with her husband in 2018 (Shelterzorg B.V.), and she started working at Spirit! Amsterdam in order to get acquainted with practice-orientated research on foster care. Currently, Lydia works as a postdoctoral researcher at Sociology, University of Groningen, where she evaluates the SterkWerk program which aims at preventing or diminishing bullying by stimulating prosocial behavior as a means of obtaining higher peer status. She is co-promotor of one PhD-student. She also works as postdoctoral researcher at Interdisciplinary Social Science, Utrecht University, where she will continue working on the SNARE project. In her free time, Lydia works in a hot air balloon team (Hot-R ballonvaarten).

### **Scientific Publications of this Dissertation**

Laninga-Wijnen, L., Harakeh, Z., Dijkstra, J. K., Veenstra, R., & Vollebergh, W. A. M. (2020). Who sets the aggressive popularity norm? It's the number and strength of aggressive, prosocial and bi-strategic adolescents in classrooms. *Journal of Abnormal Child Psychology*, *48*, 13-27. Doi: 10.1007/s10802-019-00571-0

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### **Other publications**

Busch V., Laninga-Wijnen L., Schrijvers A. J. P., De Leeuw J. R. J. (2015). Associations of health behaviors, school performance and psychosocial problems in adolescents in The Netherlands. *Health Promotion International*, 32(2), 280-291. Doi: 10.1093/heapro/dav058.2015

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Branje, S., Laninga-Wijnen, L., Rongqin, Y., & Meeus, W. (2014). Associations among school and friendship identity in adolescence and romantic relationships and work in emerging adulthood. *Emerging Adulthood*, 2, 6 – 16.

De Baat, M., Konijn, C., Nijhof, K., & Laninga-Wijnen, L. (2020). Gezinshuizen en kleinschalige voorzieningen voor oudere jeugd: wanneer werkt het? In A. Harder, E. Knorth & C. Kuiper (Eds.), *Uithuisgeplaatste jeugdigen: Sleutels tot succes in de behandeling*. Amsterdam: SWP.

Stevens, G., Veldkamp, C., Harakeh, Z., & Laninga-Wijnen, L. (2020). Ethnic minority status relates to popularity: Testing the importance of ethnic class composition and aggression. *Journal of Youth and Adolescence*.

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### **Manuscripts in submission**

- Garandeau, C. G., Laninga-Wijnen, L., & Salmivalli, C. (revise and resubmit).  
The quest for social power: When "prosocial" becomes "antisocial".  
*Psychological Review*.
- Garandeau, C. G., Laninga-Wijnen, L., Salmivalli, C. (under review). Effects of  
the KiVa Anti-Bullying Program on Affective and Cognitive Empathy:  
The Role of Student Characteristics and Classroom Norms. *Clinical Child  
& Adolescent Psychology*.
- Laninga-Wijnen, L., Van den Berg, Y. H. M., Mainhard, T., & Cillessen, A. H. N.  
(to be submitted). The role of aggressive peer norms in students'  
perceptions of the classroom peer climate and school adjustment at  
elementary schools. *Child Development*.
- McKellar, S., E., Ryan, A., North, E. A., Rausch, N. R., & Laninga-Wijnen, L. (re-  
submitted). Teachers' emphasis on mastery goals moderates the  
behavioral correlates of popularity in early adolescent classrooms. *Merrill  
Palmer Quarterly*.

### **Awards and honors**

- 2019 First prize "CAS-article of the Year". Paper: "Classroom popularity  
hierarchy predicts prosocial and aggressive popularity norms across the  
school year"
- 2018 Second prize "CAS-article of the Year". Paper: "The moderating role of  
popular peers' achievement goals in 5th- and 6th-graders' achievement-  
related friendships: A social network analysis."
- 2017 Second prize "CAS-article of the Year". Paper: "The norms of popular  
peers moderate friendship dynamics of adolescent aggression"
- 2013 Best Poster Award at the Symposium of the Graduate School of Social and  
Behavioral Sciences, Utrecht University, the Netherlands
- 2013 Best Student of the Year Award
- 2011 Prize: Student visit to Baskent University, Ankara

### **Media**

- 12-2019: Magazine Jente: Vriendschap is van levensbelang!
- 8-2019: Wat is vriendschap eigenlijk? [www.scholieren.com/vriendschap](http://www.scholieren.com/vriendschap)
- 11-10-2018: Kinderboekenweek-thema "vriendschap".  
<https://www.uu.nl/nieuws/gaan-vrienden-op-elkaar-lijken>
- 21-2-2018: Kinder-college "Youth": <https://vimeo.com/264984813>
- 3-10-2017: Radio-interview 3FM! About Friendship:  
<https://www.youtube.com/watch?v=xjZrrDUJ-hw>

