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

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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 ($N_{classrooms}$ = 120; M_{age} = 13.18; 51.3% 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.

In early adolescence, being popular becomes prioritized over other domains in life (La Fontana & 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, 2018). 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 et al., 2017), whereas high prosocial popularity norms may foster prosocial behaviors (Laninga-Wijnen et al., 2018). 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 (Garandeau, 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.

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., Garandeau, Ahn, & Rodkin, 2011; Garandeau 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 1a, 1b) or many popular individuals and a few unpopular individuals (inverted pyramid, see Figure 1c) or an equal number of individuals high and low in popularity (Figure 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 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. This study is the first to investigate both types of hierarchy in relation to norms.

Popularity Hierarchy as Predictor of Aggressive and Prosocial Popularity Norms

Functionalist Approach

Inspired by evolutionary theory (see Anderson & Brown, 2010), the *functionalist perspective* (Pellegrini & Long, 2002) proposes that hierarchies serve an important *function:* they promote harmony and social order,
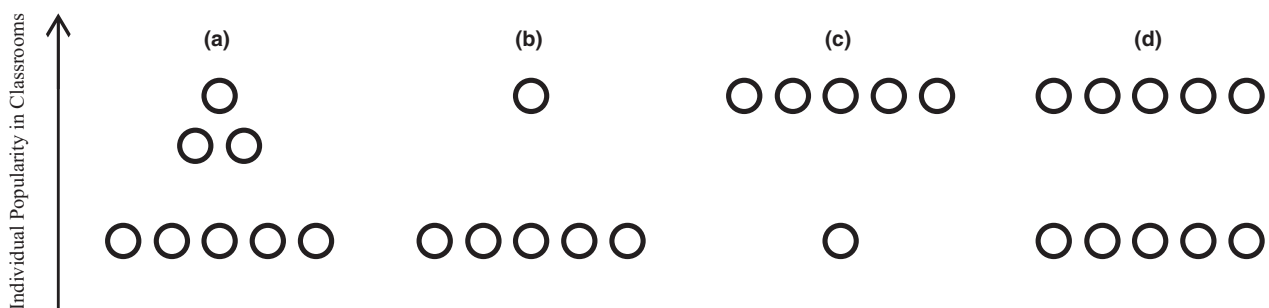

Figure 1. Example of potential configurations of popularity hierarchy structures: pyramid (a,b), inverted pyramid (c), or symmetric (d).

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 relatively more 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 prosocial 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 & Mils, 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 (Garandeau 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 (Garandeau 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, Díaz-Aguado, Arias, & Steglich, 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.

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 coevolve over time within a classroom.

This 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 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 1b). We expect that both types of hierarchy independently contribute to the popularity norm (Pattiselanno et al., 2015; Hypothesis 1c). Second, we expect that high aggressive and low prosocial popularity norms might strengthen the popularity hierarchy over time (Hypothesis 2). In line with previous studies, we control for educational level, grade, classroom size, and sex proportion in our analyses (Garandeau 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.

Method

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 preassessment 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 min 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 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 about 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 ($M = 13.18$, $SD = .80$), with 51.3% 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.

Measures

All research variables described below were based on peer nominations, measured at each of the three waves (T1, T2, and T3), 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 α_{T1} = .72, α_{T2} = .77, and α_{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., 2018): "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 0.76 to 0.89). 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 α_{T1} = .72, α_{T2} = .79, and α_{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 popularity scores (see Table 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 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

Table 1

Description of Popularity Norms and Popularity Hierarchy and Structure

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

Note. Means with different superscripts change significantly over time.

Table 2

Correlations Between Popularity Norms, 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**	-.41***	-.30**												
5. Aggressive popularity norm T2	-.18*	-.43***	-.24**	.64***											
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	.008	-.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

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

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: prevocational education with a practically oriented pathway (and extra support; LWOO or VMBO-bg; 17.5% of the respondents), prevocational education with a theoretically oriented pathway (VMBO-th; 22.5% of the respondents), and three levels of preuniversity/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.

Analytic Strategy

Cross-lagged panel analysis was performed on three data waves with structural equation modeling in M*plus* version 8 (Muthén & Muthén, 2011). In this way, relationships of popularity hierarchy on popularity norms were analyzed with about 3 months lag time, while controlling for reverse relationships. This design was chosen as it provides information on bidirectional relationships and the temporal order of these relationships. We used maximum likelihood estimations with robust standard errors (Byrne, 2011). Model fit precision was examined using the chi-square statistic (χ^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-square test assesses the discrepancy of fit between the observed and hypothesized models; a nonsignificant chi-square 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).

Results

Descriptive Results

Tables 1 and 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, $F(2, 1) = 1.16$; $p = .$ 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.

The Classroom-Level 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 2, and a complete overview of concurrent and prospective results—including nonsignificant ones—can be found in Appendix (Table A1 and Table A2). 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 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 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 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
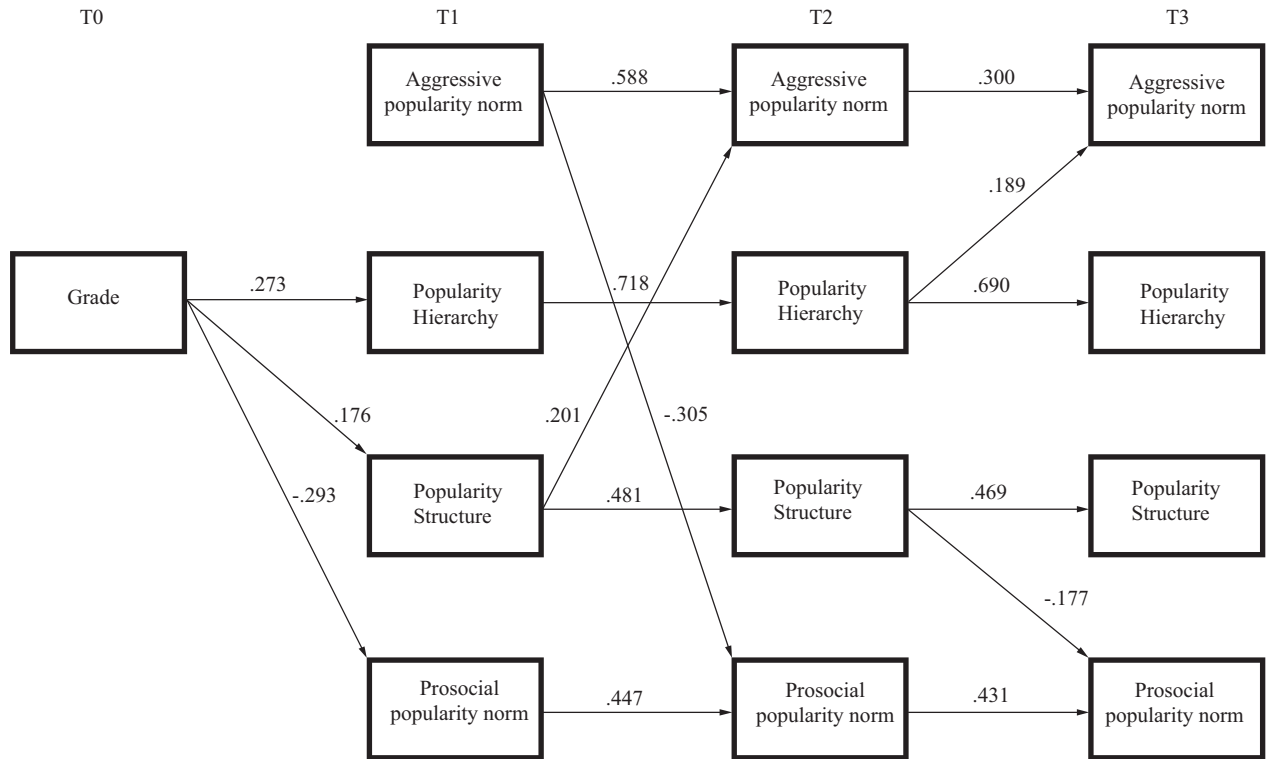
Figure 2. Standardized coefficients for significant prospective relations between popularity norms, strength of popularity hierarchy, and popularity hierarchy structure in classrooms (*N* = 120). The higher the value for popularity hierarchy structure, the more a classroom hierarchy is shaped as a pyramid.

predict a relative increase or decrease in popularity hierarchy (in contrast to Hypothesis 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, β = .273) and the more a classroom was shaped as a pyramid (*B* = .013, *SE* = .006, *p* = .039, β = .176). Also, classrooms in higher grades were characterized by less prosocial popularity norms (*B* = −.105, *SE* = .028, *p* < .001, β = −.293). Educational level, classroom size, and sex proportion did not predict popularity hierarchy nor popularity norms.

Extra 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 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 seperately. 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.

Discussion

The aim of this study was to examine the co-evolution 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.

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 this 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, Dodge, & Coppotelli, 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.

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' hierachical 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 social economic status and ethnicity into account.

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-related 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., 2018; 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 this 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.

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 bistrategics) are the ones occupying the top positions of the hierarchy, and to examine whether bistrategic children contribute to set the popularity norm more than children who are solely prosocial or solely aggressive (De Bruyn & Cillessen, 2006) 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.

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 et al., 2017), whereas high prosocial popularity norms may encourage prosocial behaviors (Laninga-Wijnen et al., 2018). 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 well-being 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.

References

Adler, P. A., & Adler, P. (1998). *Peer power: Preadolescent culture and identity*. New Brunswick, NJ: Rutgers University Press.

Ahn, H.-J., Garandeau, C. F., & Rodkin, P. C. (2010). Effects of classroom embeddedness and density on the social status of aggressive and victimized children. *The Journal of Early Adolescence, 30*, 76–101. https://doi.org/10.1177/0272431609350922

Ahn, H. J., & Rodkin, P. C. (2014). Classroom-level predictors of the social status of aggression: Friendship centralization, friendship density, teacher–student attunement, and gender. *Journal of Educational Psychology, 106*, 1144–1155. https://doi.org/10.1037/a0036091

Anderson, C., & Brown, C. E. (2010). The functions and dysfunctions of hierarchy. *Research in Organizational Behavior, 30*, 55–89. https://doi.org/10.1016/j.riob.2010.08.002

Barbarro, M. J., Díaz-Aguado, M. J., Arias, R. M., & Steglich, C. (2017). Power structure in the peer group: The role of classroom cohesion and hierarchy in peer acceptance and rejection of victimized and aggressive students. *Journal of Early Adolescence, 37*, 1197–1220. https://doi.org/10.1177/0272431616648451

Benson, F. E., Nierkens, V., Willemsen, M. C., & Stronks, K. (2015). Smoking cessation behavioural therapy in disadvantaged neighbourhoods: An explorative analysis of recruitment channels. *Substance Abuse Treatment, Prevention, and Policy, 10*(1), 28. https://doi.org/10.1186/s13011-015-0024-3

Berger, C., & Dijkstra, J. K. (2013). Competition, envy, or snobbism? How popularity and friendships shape antipathy networks of adolescents. *Journal of Research on Adolescence, 23*, 586–595. https://doi.org/10.1111/jora.12048

Bukowski, W. M., Gauze, C., Hoza, B., & Newcomb, A. F. (1993). Differences and consistency between same-sex and other-sex peer relationships during early adolescence. *Developmental Psychology, 29*, 255–263. https://doi.org/10.1037/0012-1649.29.2.255

Bukowski, W. M., & Hoza, B. (1989). Popularity in friendship: Issues in theory, measurement and outcome. In T. J. Berndt & G. W. Ladd (Eds.), *Peer relationships in child development. Wiley series on personality processes* (pp. 15–45). Oxford, UK: Wiley.

Byrne, B. M. (2011). Structural Equation Modeling with Mplus: Basic Concepts, Applications, and Programming. Mahwah, NJ: Routledge.

Chein, J., Albert, D., O'Brien, L., Uckert, K., & Steinberg, L. (2011). Peers increase adolescent risk taking by enhancing activity in the brain's reward circuitry. *Developmental Science*, *14*, F1–F10. https://doi.org/10.1111/ j.1467-7687.2010.01035.x

Cillessen, A. H. N., & Borch, C. (2006). Developmental trajectories of adolescent popularity: a growth curve modelling analysis. *Journal of Adolescence*, *29*, 935–959.

Cillessen, A. H. N., & Marks, P. E. L. (2011). Conceptualizing and measuring popularity. In A. H. N. Cillessen, D. Schwartz, & L. Mayeux (Eds.), *Popularity in the peer system* (pp. 25–56). New York, NY: Guilford.

Cillessen, A. H. N., & Mayeux, L. (2004). From censure to reinforcement: Developmental changes in the association between aggression and social status. *Child Development*, *75*, 147–163. https://doi.org/10.1111/j. 1467-8624.2004.00660.x

Clark, M. S., & Mils, J. (1993). The difference between communal and exchange relationships: What it is and is not. *Personality and Social Psychology Bulletin*, *19*, 684–691. https://doi.org/10.1177/0146167293 196003

Closson, L. M. (2009). Aggressive and prosocial behaviors within early adolescent friendship cliques: What's status got to do with it? *Merrill-Palmer Quarterly*, *55*, 406–435. https://doi.org/10.1353/mpq.0.0035

Coie, J. D., Dodge, K. A., & Coppotelli, H. (1982). Dimensions and types of social status: A cross-age perspective. *Developmental Psychology*, *18*, 557–570. https://doi. org/10.1037/0012-1649.18.4.557

Coie, J. D., Dodge, K. A., & Kupersmidt, J. B. (1990). Peer group behavior and social status. In S. R. Asher & J. D. Coie (Eds.), *Peer rejection in childhood* (pp. 17–59). Cambridge, UK: Cambridge University Press.

Crone, E. A., & Dahl, R. E. (2012). Understanding adolescence as a period of social-affective engagement and goal flexibility. *Nature Reviews Neuroscience*, *13*, 636–650. https://doi.org/10.1038/nrn3313

Dawes, M., & Xie, H. (2014). The role of popularity goal in early adolescents' behaviors and popularity status. *Developmental Psychology*, *50*, 489–497. https://doi.org/ 10.1037/a0032999

De Bruyn, E. H., & Cillessen, A. H. N. (2006). Popularity in early adolescence: Prosocial and antisocial subtypes. *Journal of Adolescent Research*, *21*, 607–627. https://doi. org/10.1177/0743558406293966

Dijkstra, J. K., & Gest, S. D. (2015). Peer norm salience for academic achievement, prosocial behavior, and bullying: Implications for adolescent school experiences. *The Journal of Early Adolescence*, *35*, 79–96. https://doi.org/ 10.1177/0272431614524303

Faris, R., & Felmlee, D. (2011). Status struggles: Network centrality and gender segregation in same- and cross-gender aggression. *American Sociological Review*, *76*(1), 48–73. https://doi.org/10.1177/0003122410396196

Garandeau, C. F., Ahn, H. J., & Rodkin, P. C. (2011). The social status of aggressive students across contexts: The role of classroom status hierarchy, academic achievement, and grade. *Developmental Psychology*, *47*, 1699–1710. https://doi.org/10.1037/a0025271

Garandeau, C., Lee, I., & Salmivalli, C. (2014). Inequality matters: Classroom status hierarchy and adolescents' bullying. *Journal of Youth and Adolescence*, *43*, 1123–1133. https://doi.org/10.1007/s10964-013-0040-4

Gest, S. D., & Rodkin, P. C. (2011). Teaching practices and elementary classroom peer ecologies. *Journal of Applied Developmental Psychology*, *32*, 288–296. https:// doi.org/10.1016/j.appdev.2011.02.004

Gruenfeld, D. H., Inesi, M. E., Magee, J. C., & Galinsky, A. D. (2008). Power and the objectification of social targets. *Journal of Personality and Social Psychology*, *95*, 111–127. https://doi.org/10.1037/0022-3514.95.1.111

Halevy, N., Chou, Y. E., & Galinsky, A. (2011). A functional model of hierarchy. *Organizational Psychology Review*, *1*, 32–52. https://doi.org/10.1177/20413866103 80991

Hartup, W. W. (1996). The company they keep: friendships and their developmental significance. *Child Development*, *67*, 1–13. http://dx.doi.org/10.1111/j.1467-8624.1996.tb01714.x

Hawley, P. H. (1999). The ontogenesis of social dominance: A strategy-based evolutionary perspective. *Developmental Review*, *19*, 97–132. https://doi.org/10. 1006/drev.1998.0470

Hawley, P. H. (2003). Prosocial and coercive configurations of resource control in early adolescence: A case for the well-adapted Machiavellian. *Merrill-Palmer Quarterly*, *49*, 279–309. https://doi.org/10.1353/mpq. 2003.0013

Hopmeyer Gorman, A. H., Schwartz, D., Nakamoto, J., & Mayeux, L. (2011). Unpopularity and disliking among peers: Partially distinct dimensions of adolescents' social experiences. *Journal of Applied Developmental Psychology*, *32*, 208–217. https://doi.org/10.1016/j.appdev. 2011.05.001

Juvonen, J., Nishina, A., & Graham, S. (2006). Ethnic diversity and perceptions of safety in urban middle schools. *Psychological Science*, *17*, 393–400. https://doi. org/10.1111/j.1467-9280.2006.01718.x

Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review*, *110*, 265–284. https://doi.org/10.1037/0033-295x.110.2. 265

Kline, R. B. (2011). *Principles and practice of sttructural equation modeling*. New York, NY: The Guilford Press.

Kornbluh, M., & Neal, J. W. (2016). Examining the many dimensions of children's popularity: Interactions between aggression, prosocial behaviors, and gender. *Journal of Social and Personal Relationships*, *33*(1), 62–80. https://doi.org/10.1177/0265407514562562

Koski, J. E., Xie, H., & Olson, I. R. (2015). Understanding social hierarchies: The neural and psychological foundations of status perception. *Social Neuroscience*,

10, 527–550. https://doi.org/10.1080/17470919.2015.10 13223

La Fontana, K. M., & Cillessen, A. H. N. (2010). Developmental changes in the priority of perceived status in childhood and adolescence. *Social Development*, *19*, 130–147. https://doi.org/10.1111/j.1467-9507.2008.00522.x

La Freniere, P., & Charlesworth, W. R. (1983). Dominance, attention, and affiliation in a preschool group: A nine-month longitudinal study. *Ethology and Sociobiology*, *4*, 55–67. https://doi.org/10.1016/0162-3095(83) 90030-4

Laninga-Wijnen, L., Harakeh, Z., Dijkstra, J. K., Veenstra, D. R., & Vollebergh, W. A. M. (2018). Aggressive and prosocial peer norms: Change, stability and associations with adolescent aggressive and prosocial behavior development. *Journal of Early Adolescence*, *38*, 178–203. https://doi.org/10.1177/0272431616665211

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. https://doi.org/10.1111/cdev12650

Lease, A. M., Kennedy, C. A., & Axelrod, J. L. (2002). Children's social constructions of popularity. *Social Development*, *11*, 87–109. https://doi.org/10.1111/1467-9507.00188

Maccoby, E. E. (1998). *The two sexes: Growing up apart, coming together*. Cambridge, MA: Harvard University Press.

Mayeux, L., & Cillessen, A. H. (2008). It's not just being popular, it's knowing it, too: The role of self-perceptions of status in the associations between peer status and aggression. *Social Development*, *17*, 871–888. https://doi.org/10.1111/j.1467-9507.2008.00474.x

Merten, D. E. (1997). The meaning of meanness: Popularity, competition, and conflict among junior high school girls. *Sociology of Education*, *70*, 175. https://doi.org/10.2307/2673207

Muthén, L. K., & Muthén, B. O. (2011). *Mplus user's guide* (3rd ed.). Los Angeles, CA: Author.

Neal, J. W. (2010). Social aggression and social position in middle childhood and early adolescence: Burning bridges or building them? *Journal of Early Adolescence*, *30*, 122–137. https://doi.org/10.1177/0272431609350924

Pattiselanno, K., Dijkstra, J. K., Steglich, C., Vollebergh, W. A. M., & Veenstra, R. (2015). Structure matters: The role of clique hierarchy in the relationship between adolescent social status and aggression and prosociality. *Journal of Youth and Adolescence*, *44*, 2257–2274. https://doi.org/10.1007/s10964-015-0310-4

Pellegrini, A. D., & Bartini, M. (2001). Dominance in early adolescent boys: Affiliative and aggressive dimensions and possible functions. *Merrill-Palmer Quarterly*, *47*, 142–163. https://doi.org/10.1353/mpq.2001.0004

Pellegrini, A. D., & Long, J. D. (2002). A longitudinal study of bullying, dominance, and victimization during the transition from primary school through secondary school. *British Journal of Developmental Psychology*, *20*, 259–280. https://doi.org/10.1348/026151002166442

Pettit, G. S., Bakshi, A., Dodge, K. A., & Coie, J. D. (1990). The emergence of social dominance in young boys' play groups: Developmental differences and behavioral correlates. *Developmental Psychology*, *26*, 1017–1025. https://doi.org/10.1037/0012-1649.26.6.1017

Pouwels, J. L., Lansu, T. A. M., & Cillessen, A. H. N. (2018). A developmental perspective on popularity and the group process of bullying. *Aggression and Violent Behavior*, *43*, 64–70. https://doi.org/10.1016/j.avb.2018.10.003

Pratto, F., Pearson, A. R., Lee, I.-C., & Saguy, T. (2008). Power dynamics in an experimental game. *Social Justice Research*, *21*, 377–407. https://doi.org/10.1007/s11211-008-0075-y

Rambaran, A. J., Dijkstra, J. K., & Stark, T. H. (2013). Status-based influence processes: The role of norm salience in contagion of adolescent risk attitudes. *Journal of Research on Adolescence*, *23*, 574–585. https://doi.org/10.1111/jora.12032

Rubin, K. H., Wojslawowicz, J. C., Rose-Krasnor, L., Booth-LaForce, C., & Burgess, K. B. (2006). The best friendships of shy/withdrawn children: Prevalence, stability, and relationship quality. *Journal of Abnormal Child Psychology*, *34*, 139–153. https://doi.org/10.1007/s10802-005-9017-4

Sandstrom, M. J., & Cillessen, A. H. N. (2006). Likeable versus popular: Distinct implications for adolescent adjustment. *International Journal of Behavioral Development*, *30*, 305–314. https://doi.org/10.1177/0165025406 072789

Savin-Williams, R. C. (1979). Dominance hierarchies in groups of early adolescents. *Child Development*, *50*, 923. https://doi.org/10.2307/1129316

SNARE software (2011). [Computer software]. Europe, Estonia: Bright Answer OU.

Vaillancourt, T., & Hymel, S. (2006). Aggression and social status: The moderating roles of gender and peer-valued characteristics. *Aggressive Behavior*, *32*, 396–406. https://doi.org/10.1002/ab.20138

Van Kleef, G. A., Oveis, C., Van Der Löwe, I., LuoKogan, A., Goetz, J., & Keltner, D. (2008). Power, distress, and compassion: Turning a blind eye to the suffering of others. *Psychological Science*, *19*, 1315–1322. https://doi.org/10.1111/j.1467-9280.2008.02241.x

Zwaan, M., Dijkstra, J. K., & Veenstra, R. (2013). Status hierarchy, attractiveness hierarchy and sex ratio. *International Journal of Behavioral Development*, *37*, 211–221. https://doi.org/10.1177/0165025412471018

Appendix

Table A1

Standardized and Nonstandardized Coefficients of Prospective Relations in Cross-Lagged Panel Analyses

Predictors	Aggressive popularity norm T1			Prosocial popularity norm T1			Strength popularity hierarchy T1			Pyramid-structure popularity hierarchy T1		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Educational level T0	.008	.023	.041	.006	.015	.041	−.001	.006	−.015	.006	.004	.203
Grade T0	.049	.037	.115	−.105***	.028	−.293	.030**	.010	.273	.013*	.006	.176
Classroom size T0	.013	.008	.210	−.008	.005	−.155	−.003	.002	−.190	−.001	.001	−.055
Sex proportion T0	.248	.225	.108	−.094	.193	−.049	.020	.061	.033	−.025	.031	−.064

	Aggressive popularity norm T2			Prosocial popularity norm T2			Strength popularity hierarchy T2			Pyramid-structure popularity hierarchy T2		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Aggressive popularity norm T1	.626***	.078	.588	−.257***	.064	−.305	−.010	.019	−.034	.002	.018	.011
Prosocial popularity norm T1	−.010	.093	−.008	.451***	.085	.447	.022	.024	.064	.008	.023	.032
Strength popularity hierarchy T1	.244	.297	.059	.349	.319	.107	.809***	.072	.718	.062	.069	.078
Pyramid-structure T1	1.259**	.413	.201	−.205	.315	−.041	.025	.107	.015	.585***	.094	.481

	Aggressive popularity norm T3			Prosocial popularity norm T3			Strength popularity hierarchy T3			Pyramid-structure popularity hierarchy T3		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Aggressive popularity norm T2	.242*	.097	.300	−.014	.050	−.018	−.024	.024	−.087	.001	.022	.007
Prosocial popularity norm T2	−.112	.091	−.110	.413***	.095	.431	.000	.030	.000	−.006	.019	−.025
Strength popularity hierarchy T2	.557*	.252	.189	.250	.206	.090	.683***	.067	.690	.093	.064	.130
Pyramid-structure T2	−.200	.329	−.048	−.693*	.313	−.177	.021	.097	.015	.473***	.093	.469

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

Table A2

Standardized and Nonstandardized Coefficients of Concurrent Relations in Cross-Lagged Panel Analyses

Predictors	Aggressive popularity norm T1			Prosocial popularity norm T1			Strength popularity hierarchy T1		
	B	SE	β	B	SE	β	B	SE	β
Prosocial popularity norm T1	−.011*	.004	−.183	—	—	—	—	—	—
Strength popularity hierarchy T1	.004*	.002	.215	.003	.001	.183	—	—	—
Pyramid-structure T1	.002	.001	.124	.000	.001	.041	.000	.000	.027

	Aggressive popularity norm T2			Prosocial popularity norm T2			Strength popularity hierarchy T2		
	B	SE	β	B	SE	β	B	SE	β
Prosocial popularity norm T2	−.012*	.004	−.279	—	—	—	—	—	—
Strength popularity hierarchy T2	.000	.001	.038	.002	.001	.152	—	—	—
Pyramid-structure T2	.001	.001	.078	−.002	.001	−.227	.000	.000	−.006

Table A2
(Continued)

	Aggressive popularity norm T3			Prosocial popularity norm T3			Strength popularity hierarchy T3		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
Prosocial popularity norm T3	−.006*	.003	−.169	—	—	—	—	—	—
Strength popularity hierarchy T3	.003*	.001	.244	.002*	.001	.168	—	—	—
Pyramid-structure T3	.001	.001	.067	−.002*	.001	−.213	.000	.000	.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 ($B = 4.720$, $SE = .847$, $p < .001$).
*$p < .05$.