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Popularity Contagion among Adolescents

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Abstract

This study aimed to support the theory of popularity contagion, which posits that popularity spreads among friends spontaneously and regardless of behavioral changes. Peer nominations of status and behavior were collected annually between 6th and 12th grades from a total of 1062 adolescents. Longitudinal hypotheses were mostly supported using path analyses, showing (a) that individual popularity could be predicted by friends' popularity levels over time, even when controlling for stability of individual popularity; (b) that this prediction was not accounted for by behavioral contagion of aggressive or prosocial behaviors; and (c) that individual social preference generally could not be predicted by friends' preference levels over time. Implications, limitations, and directions for future research are discussed.

Keywords: Popularity, Preference, Friendships, Adolescents

Throughout most of the 20th century, adolescent popularity was quantitatively measured by asking adolescents to name their peers that they liked best. Popularity was, therefore, considered to be synonymous with social preference or peer acceptance (see Cillessen & Marks, 2011). In the late 1990s, studies conducted by Parkhurst and Hopmeyer (1998) established a new operationalization for the popularity construct that allowed adolescents to define popularity for themselves by asking them "Who are the most popular kids in your class?" Since this time, research has consistently supported the distinction between social preference (measuring an emotional reaction) and popularity (measuring an adolescent's place in the social hierarchy).

Thus, dedicated quantitative research on adolescent popularity has been conducted for about a dozen years; the literature is just now reaching its own adolescence. During this time, the majority of studies on popularity have looked at behavioral or personality correlates of the construct (e.g., aggression, prosocial behavior). In contrast, researchers have made few attempts to explore how popularity functions within the peer group and in different types of relationships. Only a few studies have quantitatively investigated a fundamental question that must be asked for any peer-focused variable: How does popularity work within close relationships?

The goal of the current study is to provide preliminary information about how popularity functions and spreads within close relationships. Specifically, this study examines the hypothesis that friendships with more popular peers can make an adolescent more popular over time. Ultimately, this investigation aims to provide initial support for a theory of one of the most basic principles of popularity: that it is *contagious* within the peer group.

Popularity as a Manifestation of Status

At its core, popularity is a manifestation of status (Adler & Adler, 1998; Duncan, 2004). It is not synonymous with status; rather, we can consider the term *status* to refer to a broad

category of status types, with *popularity* being the type of status that is most relevant to modern adolescent peer groups.

The assertion that popularity is a manifestation of status provides researchers a framework from which to understand and organize its basic properties. First, status involves a ranking of people. Status systems are necessarily hierarchical, intrinsically rating individuals on a scale based on their relative levels of inferiority and superiority (Benoit-Smullyan, 1944). Because it represents an internally differentiated ranking of individuals within a system (Schwarz & Merten, 1967), an individual's status provides a comparison between that individual and every other individual in the system (Park & Burgess, 1924).

Certainly, adolescent social structure has been found to be hierarchical, placing adolescents in more or less desirable positions along a popularity continuum (Michell, 1997; Michell & Amos, 1997). Such positions can be won or lost through competition (though not, by necessity, through aggressive competition; Merten, 1997), based on the actions of oneself or others (Adler & Adler, 1998).

Another central aspect of status that is reflected in popularity is its basis in social consensus. Any individual's position in the status hierarchy is based on the consensus of that individual's reputation among the members of the system (see May & Hartshorne, 1930; Riley, Riley, & Toby, 1954). Thus, status is determined by the cognitive attributions of others (Goldhamer & Shils, 1939).

The fact that popularity is based on group consensus is reflected in its measurement (Babad, 2001; Thompson, 1997). Qualitative and quantitative studies have shown that adolescents can accurately identify and agree upon the status levels of others (Coleman, 1961; Duncan, 2004; Riley et al., 1954). Furthermore, although an adolescent may be able to influence

peers to affect his or her own status levels in the minds of others, only peers themselves can directly endow an individual with popularity or unpopularity (Lemann & Solomon, 1952).

Status also acts as a cognitive filter which determines schemas for individual social interaction (Schwartz & Merten, 1967). It not only activates behavior sets regarding specific social norms for the self, but also attributions and opinions regarding others (see Brantlinger, 2003). To the extent that behaviors and expectations in individual situations must conform to a general power, prestige, or esteem hierarchy, a consensus-based understanding of others' status allows individuals to immediately know how to act and what to expect in social interactions (Park & Burgess, 1924).

Research on the associations between popularity and social cognition in different age groups indicates that a peer's popularity level activates social schemas. LaFontana and Cillessen (1999) showed that the valence and stability of early adolescents' attributions about a peer are influenced by the peer's popularity. Cohen and Prinstein (2006) found that high school students were more likely to change their opinions to conform to those of popular peers than their unpopular peers. Marks and Crick (2009) demonstrated that undergraduates were more likely to attribute hostile intent to popular than non-popular peers in some situations.

Thus, popularity fulfills several requirements for being classified as a type of status. It (a) is a hierarchical ranking of people, (b) based on group consensus, which (c) determines social perceptions and actions of individuals.

Popularity Contagion

In a 1944 sociological article on the social status hierarchy, Benoit-Smullyan referred to prestige as "*contagious*" (p. 157), asserting that associations with high-status others will tend to raise an individual's social status, and that association with lower-status others will tend to lower

the individual's status.

The contagious properties of status seem to extend to adolescent popularity (see Milner, 2004, for a discussion). Qualitative research on adolescent peer relationships is full of examples of friendships and acquaintanceships based on popularity, and the importance of associating with popular individuals. Eder (1985; 1995) noted that, while the most reliable way for girls to achieve popularity in middle school was to become a cheerleader, becoming a *friend* of a cheerleader was nearly as effective (see also Eder & Kinney, 1995). Other qualitative researchers (Adler & Adler, 1998; Gordon, 1957) have noted that membership in social cliques and crowds help to define levels of popularity. Milner (2004) qualifies the effect, proposing that popularity (high or low) should spread most clearly between individuals who engage in close and/or intimate associations. Even something as seemingly trivial as eating with particular peers during lunch can be seen as a sign (or a cause) of association-based status (Eder, 1995; Milner, 2004).

Qualitative researchers have also noted that popularity contagion is an impetus for social behaviors. For example, it has been reported that popular individuals may "compete for 'the better friends'" (Eckert, 2000, p. 51) and will often choose not to associate (or may choose to deliberately *disassociate*) with lower-status individuals (Eder, 1995). In fact, cliques and other social groups may censure or expel group members who associate with lower-status individuals, because such associations can negatively affect the status of the entire group (Milner, 2004).

A handful of quantitative studies are relevant to popularity contagion among friends. Research has shown robust associations between the popularity nomination scores of mutual friends among adolescents (Peters, Cillessen, Riksen-Walraven, & Haselager, 2010; Rose, Swenson, & Carlson, 2004; Simon, Aikins, & Prinstein, 2008). Riley et al. (1954) informally reported the most direct investigation of popularity contagion to date, hypothesizing that "if the

subject who associates with the object (but does not name him popular) is himself high-status, then the object is apt to be thought popular by someone else. If the subject is low status, then the object is less apt to be thought popular" (p. 257-8). Though the study had some key limitations and was not longitudinal, results supported this hypothesis.

Only one study (Simon et al., 2008) has directly examined how individual popularity is affected by the popularity of a close partner over time. Simon et al. used multiple regression to investigate the longitudinal interaction between 78 middle-school adolescents' individual popularity and their romantic partners' popularity. They found that adolescents low in popularity at Time 1 gained popularity over the course of 11 months *if* their romantic partners were high in popularity. Low-popular adolescents with low-popular romantic partners, as well as high-popular adolescents (regardless of romantic partners' popularity), did not change over time. The current study used similar methods to investigate popularity contagion, specifically through adolescent friendships, while also including a larger sample and more data collection points.

Contagion of behaviors. Behavioral contagion has been identified in relation to a number of behaviors, particularly for overtly aggression and other deviant behaviors. Adolescents who associate with overtly aggressive peers and those who have more overtly aggressive friends tend to become more aggressive over time (see Crick, Murray-Close, Marks, & Mohajeri-Nelson, 2009). This increase in aggression occurs over and above selection effects. Theories of the process by which behavioral contagion occurs include simple imitation of peer behaviors (Boxer, Guerra, Huesmann, & Morales, 2005), the desire to achieve common ground or intimacy through imitation (Adams, Bukowski, & Bagwell, 2005), and direct reinforcement/joint enjoyment of behaviors (i.e., "deviancy training," see Dishion & Piehler, 2009). Furthermore, despite the connotation of "contagion" as involving the spread of pathology

(Dishion & Piehler, 2009), similar peer socialization processes have been observed for positive/non-deviant behaviors, such as prosocial behavior (Barry & Wentzel, 2006).

A theory for the process of popularity contagion. We propose that popularity contagion occurs through a fundamentally different process than behavioral contagion does. Assuming that behavioral contagion does not fully mediate popularity contagion, none of the explanations for behavioral contagion can apply to popularity, because popularity is not a behavior or behavior set. Indeed, popularity contagion can best be understood in contrast to behavioral contagion by considering popularity as a manifestation of status. Whereas behavioral contagion can occur purely at the dyadic level, popularity contagion cannot. Because an individual's popularity is based on the consensus of the group, the peer group as a whole must implicitly acknowledge the change in popularity in order for it to occur. A change in aggression, in contrast, need not necessarily correspond to a change in one's reputation for aggression (e.g., an adolescent can maintain a reputation for being aggressive even if they have stopped engaging in aggression – behavior levels do not depend on peers' perceptions of those behaviors).

To reiterate, given the nature of popularity, any change in popularity must occur based on a change of perceptions and attributions among the peer group. The theory proposed here is that a change in popularity can occur solely on the basis of an individual being associated with peers who are more or less popular than the individual, due to the fact that adolescents use relationship associations as a guide to determine the popularity of a peer (Cohen & Prinstein, 2006; Milner, 2004). An individual's popularity may increase simply because they are seen interacting with popular peers. The group begins to associate that peer with popularity and a high place in the status hierarchy, and the group's perceptions of the peer begin to change.

To illustrate this process, suppose that Katie, who has an average popularity level,

becomes friends with Jessalynn, who is one of the most popular girls in the grade. As Katie and Jessalynn interact, their peers see the interactions, and begin to associate the two of them. Peers begin to see Katie as a popular peer, simply because she interacts with her popular friend. And because popularity exists as a social consensus, a change in peers' *perceptions* of Katie's popularity is identical to a change in Katie's popularity, itself.

Obviously, not all interaction patterns will increase peer perceptions of associations between the individual and popular peers. Interactions that are observably positive, particularly those indicating close friendship or romantic interactions are expected to most quickly and strongly create associations in the minds of others. On the one hand, even relatively neutral interactions (such as eating together; Milner, 2004) may produce associations and raise an individual's popularity level over time. On the other hand, negative interactions, particularly unidirectional antagonistic interactions involving a clear power differential, should generate a *dis*association between the individual and a popular peer (Eder, 1995; Milner, 2004). For example, victims of popular bullies are expected to be seen as less popular, rather than more popular over time, despite repeated (and visible) interactions between the bully and the victim.

Although the theory of popularity contagion is novel, the implicit spread of trait or reputation attributions based on associations has long been studied in adult social psychology. Research on impression management notes that individuals may act to increase associations with high-status or successful others to make themselves look better (i.e., "basking in reflected glory," see Cialdini & De Nicholas, 1989, Dijkstra, Cillessen, Lindenberg, & Veenstra, 2010). Indeed, individuals seem to be evaluated more positively if they are associated with a physically attractive partner (e.g., Sigall & Landy, 1973; Strane & Watts, 1977). In contrast, research on social stigma indicates that an individual's mere physical proximity to stigmatized (i.e., low-

status) others may negatively affect opinions and attributions regarding that individual (e.g., Argo & Main, 2008; Hebl & Mannix, 2003). Similar implicit social processes are likely to be in play in considering the spread of popularity attributions among adolescents.

Popularity versus behavioral contagion. The theory presented here does not imply that other changes might not account for changes in popularity. Certainly, changes in behavior may cause an individual to gain or lose status among peers. As an extension, behavioral contagion may affect an individual's popularity. If Perik starts hanging out with the popular clique and becomes more relationally aggressive through his interactions with them, we expect Perik to become more popular (because relational aggression predicts popularity; Cillessen & Mayeux, 2004), regardless of the effects of his popular associations. This is a process by which behavioral change produces a change in popularity, not a process by which peer associations *themselves* produce a change in popularity. It should, therefore, not be considered an example of popularity contagion. These are parallel or even reciprocal processes, but they are not identical. One goal of the current study is to demonstrate that behavioral contagion does not fully mediate popularity contagion; that is, that popularity contagion occurs regardless of behavioral change.

Distinguishing popularity and preference. Although popularity and preference are correlated across a variety of studies and samples (see Cillessen & Marks, 2011, for a review), these two constructs are functionally distinct. Despite the common use of the term *status* in discussing social preference, social preference is not a form of status. Preference is based on individual emotional attributions of liking and disliking from one person to another (see Moreno, 1934). Although feelings of the group may influence these attributions, preference is not a measure or a quantification of group consensus (Cillessen & Marks, 2011). The question "Who do you like most in your class?" asks adolescents about their personal feelings. In contrast, the

question “Who are the most popular kids in your class?” asks adolescents to consider, reflect, and report the judgment of the group. By the same token, there is no reason to believe that preference is hierarchical. Whereas high popularity can be viewed as a limited resource (Milner, 2004), preference is theoretically limitless.

Although preference is not a form of status, it does share characteristics with popularity. Preference and popularity are both based on abstract attributions and both affect interactions between adolescents. These shared characteristics, along with the long history of research on preference and its established statistical association with popularity, make social preference an ideal comparator to popularity. If, as theorized, popularity is contagious due to its properties as a form of status, then preference should *not* be contagious, because it is *not* a form of status.

The Current Study

The current study first examined associations between individual and friends’ levels of popularity, and then tested hypotheses relevant to the theory of popularity contagion.

Relation of individual to mutual friends’ popularity. Previous work has shown consistently positive relations between an adolescent’s individual popularity score and the popularity score of that adolescent’s best friend (Peters et al., 2010; Rose et al., 2004; Simon et al., 2008) or group of friends (Witvliet et al., 2010). We expected to replicate this and find a high correlation between friends’ popularity scores in middle and high school.

Rose et al. (2004) and Peters et al. (2010) additionally found that best friends’ social preference scores were significantly correlated, but that this correlation was lower than the correlation between individual and best friend’s popularity. This is to be expected, given that preference is not a form of status, as is popularity. Because liking is based on an individual’s assessment of another individual (rather than on a group consensus), and because liking should

not spread from one individual to another (as should popularity), there is no reason to expect selection or socialization processes that would make an adolescent's level of social preference similar to that of his or her friends. Thus, we hypothesized that the correlations between friends' preference will be significantly lower than the correlations between friends' popularity.

Popularity contagion. Longitudinal analyses in the current study utilized path analysis procedures, and interpretations of results focused on particular loadings (e.g., the loading of mutual friends' popularity on individual popularity), rather than on overall model fit statistics. Path analyses were used, as opposed to a series of multiple regression analyses, because they allow for greater control of stability of variables over time, and because they allow for direct comparison and interpretation of findings across multiple data collection time points.

The primary model. The first and most basic hypothesis of the theory of popularity contagion is that the popularity of one's mutual friends will longitudinally predict one's own individual popularity. The primary model provided an initial test of this effect of mutual friends' popularity on individual popularity over time, over and above the stability of individual popularity (which is moderate to high across consecutive years; Cillessen & Mayeux, 2004; Rose et al., 2004). Support for this hypothesis will show that the popularity of an adolescent's friends affects his or her own popularity over time, and will provide a basis for additional hypotheses.

Gender differences in the primary model were also investigated. Studies have suggested that girls' popularity might depend more on the status of their associates than boys' popularity (Coleman, 1961; Eder, 1995; Michell, 1997). Coleman (1961) noted that girls were more relationally self-conscious and worried about their popularity than boys, and argued that male popularity is based on what a boy *does* (e.g., athletic and academic achievement) whereas female popularity is based more on what a girl *is* (e.g., attractiveness, reputation). Eder (1995) echoed

this finding and noted that many girls seem resentful of the female status hierarchy, which they see as being based on arbitrary factors like SES, cheerleading participation, and friendships with cheerleaders. On this basis, we hypothesized that individual popularity would be more strongly predicted by friends' popularity for girls than for boys.

Replication of the primary model with preference. Because preference is not technically a form of status, it is not theorized to be contagious in the same way as popularity. The primary model was replicated to investigate longitudinal associations between mutual friends' preference and individual preference, with stability of both variables controlled. It was hypothesized that mutual friends' preference will not predict individual preference over time.

Controlling for behavioral contagion. According to our theory, popularity contagion is a direct result of being perceived as closely associating with popular peers. Although behavioral change and behavioral contagion may also affect popularity, the popularity of one's friends should affect one's own popularity *regardless* of these behavioral effects. We investigated whether predictions of individual popularity from friends' popularity were mediated either by concurrent individual behaviors or by the longitudinal effects of mutual friends' behaviors. In accordance with our theory, we hypothesized that mutual friends' popularity will still significantly predict individual popularity, even with these behavioral variables factored out.

The behaviors in our analyses were overt aggression, relational aggression, and prosocial behavior, because they have established associations with popularity (Crick et al., 2009), and because both aggression (e.g., Espelage et al., 2003) and prosocial behavior (e.g., Barry & Wentzel, 2006) have been found to spread between adolescent peers and friends.

Summary. This study examined three central hypotheses of the theory of popularity contagion: (a) that individual popularity is predicted by mutual friends' popularity over time, (b)

that social preference is not predicted by mutual friends' preference over time, and (c) that mutual friends' popularity still predicts individual popularity when overt aggression, relational aggression, and prosocial behavior are factored out. These three hypotheses, if supported, will provide a foundation for future research on popularity contagion.

Method

Participants

Participants were engaged in a larger longitudinal study which collected data once each year from grades 6 through 12 (approximate ages 12-18) in middle and high schools in a mid-sized New England city. Participants included all students enrolled in the target grade in a given year, and were drawn from two middle schools in grades 6-8 which fed into one large high school for grades 9-12. In total, 1062 adolescents participated over the course of these seven years of data collection, with between 481 and 663 participating in any given year.

In accordance with the policies of the school district, passive consent procedures were used to recruit participants. That is, a letter was sent to all parents giving them the opportunity to deny their child permission to participate in the study. Approximately 1% of participants were excluded by parental request in any given year. Students were also given the choice to opt out of participation. Due to these factors (lack of parental consent or student assent) and others (absences, etc.), not all participants completed measures in each year. Although peer nominations received were available for participants who did not complete measures themselves, self-report and friendship data were not available for them. In total, between 64.0% and 90.3% of all participants completed measures in any given year, exceeding the 60% recommended minimum participation rate for peer nomination research (Cillessen & Marks, 2011).

Because all analyses used friendship information (operationally defined below), the

sample for this study consists of all adolescents with at least one mutual friend in any given year. In total, 775 students (73% of all possible participants) met this criterion; most participants (84.7% - 97.0% in any given year) who completed measures had at least one mutual friend. This sample included between 261 and 524 participants in each year. The sample was 50.8% female, with a racial breakdown of 65.0% White, 20.0% Black, and 12.5% Hispanic.

Peer Nomination Measures

All peer nomination measures allowed participants to nominate an unlimited number of same-grade peers of either sex for each item. Self-nominations were removed when nomination data was tabulated. In middle school, participants received a full roster of same-grade peers (approximately 300 in each school) for each question, and circled the names of peers who fit each description. In high school, participants received a single roster with code numbers for all peers in their grade, and were asked to write the numbers of those who fit each description.

Friendship. Participants were asked to identify "the people who are your best friends." *Mutual friends* were identified based on reciprocal nominations. Only nominated friends who completed the peer nomination measure themselves could be mutual friends (i.e., if they did not participate, they could not provide a reciprocal nomination). The mean number of mutual friends ranged from 3.76 to 5.27 in middle school, and from 2.88 to 3.08 in high school.

Popularity and preference. Participants identified the most popular peers ("the people in your grade who are the most popular"), peers they liked most ("the people in your grade you like the most"), and peers they liked least ("the people in your grade you like the least"). For each item, the number of nominations received was each participant's raw score.

Social behaviors. Participants also identified peers for three sets of social behaviors. Overt aggression was assessed by asking participants to identify "the people in your grade who

start fights, say mean things, and/or tease others." Relational aggression was assessed using one item in grades 6 and 10-12 ("the people in your grade who ignore others or spread rumors about them when they are mad at them"), and an additional item in grades 7-9 ("the people in your grade who try to keep others who they don't like from being in their group"). Prosocial behavior was assessed with one item in Grade 6 ("the people in your grade who cooperate, share, and help others"), and an additional item in grades 7-12 ("the people in your grade who are leaders and good to have in charge"). When one item was used, the number of nominations received for that behavior was each participant's raw score. When two items were used, the raw score was the average number of nominations received across both items.

Computation of Peer Nominations

Initial preparation of peer nomination variables. The raw peer nomination scores were positively skewed. Therefore, they were log 10 transformed, which decreased skew and made the distributions of these variables closer to normal (Rose & Swenson, 2009; Witvliet et al., 2010).

Calculating social preference. Adolescents' social preference scores were calculated by subtracting their logged "liked least" score from their logged "liked most" score. Difference scores are commonly used to calculate social preference (Cillessen & Marks, 2011).

Calculating mutual friends' popularity, preference, and behaviors. Mean values associated with each participants' mutual friends were determined for each sociometric variable. Less than a quarter of mutual friends' scores were based on only one mutual friend in any year. Similar calculations of mutual friends' scores have been used in previous work on aggression (Criss, Pettit, Bates, Dodge, & Lapp, 2002) and deviancy (Brendgen, Vitaro, & Bukowski, 2000). As with individual peer nominations, mutual friends' scores were positively skewed across all peer nomination variables, and scores were similarly log-transformed (again, with a

constant of 1 added to raw scores). Following log transformation, a difference score between mutual friends' scores of liked most and liked least nominations was calculated, creating a score for mutual friends' social preference.

Results

Associations between Individual and Friends' Popularity and Preference

Pearson's correlations were computed to determine the associations between individual and friends' popularity and preference. As expected, correlations between adolescents' own popularity and the popularity of their friends were relatively high and remarkably consistent, ranging from .62 to .72 across the seven years of data collection.

Correlations between individual and friends' preference were lower than for popularity, and were low to moderate in each year. These correlations appeared higher in middle school (*r*s ranged from .24 to .41) than in high school (*r*s between .09 and .26), and were significant (*p*s < .05) in all grades except Grade 11.

Fisher's transformations were conducted and compared to test the hypothesis that correlations between individual and friends' popularity would be significantly higher than the correlations between individual and friends' preference. This was true at all time points (z-scores for the difference ranged from 6.66 to 9.47, *p*'s < .001).

Longitudinal Analyses

The second goal of this study was to investigate the hypothesis that the popularity of one's friends influences one's own popularity over time. Path analyses tested aspects of this hypothesis, as well as alternate hypotheses (i.e., that contagion occurs with non-status attributions such as social preference, and that popularity contagion is due to behaviors).

Longitudinal relations were tested using path analyses modeled in AMOS 17. Full

information maximum likelihood estimation was used in all analyses to account for missing data (e.g., students who did not participate in all seven time points, or students with no mutual friends at any given time point).[1] Error terms were correlated within each year to control for shared method variance (see Cillessen & Mayeux, 2004). In all path models, standardized path coefficients (βs) are displayed as effect sizes for each path.

Dependency due to nested social groups was not a problem in the current analyses, because each participant's friendships represent a unique set of connections within their grade, and are not nested within closed systems of cliques, crowds, or classrooms.

The Primary Model: Predicting Individual Popularity from Mutual Friends' Popularity

Figure 1 shows the model used to provide an initial test for the primary hypothesis regarding popularity contagion: that mutual friends' mean levels of popularity would predict future popularity for the individual, even controlling for stability in popularity from one year to the next. [FIGURE 1 HERE] Individual and mutual friends' popularity were correlated at Time 1 (6^{th} grade). Stability was modeled for each variable by regressing each year on the following year through Time 7 (12^{th} grade). Mutual friends' popularity was also regressed on the following year's individual popularity; this is depicted as the diagonal paths in Figure 1. Pathways predicting mutual friends' popularity from previous year's individual popularity were not included for theoretical reasons. Although it is possible that individual popularity predicted later mutual friends' popularity, and/or that there was a bidirectional relation between them, these paths were unrelated to the current hypotheses, which predicted only a particular direction of

[1] As noted in the Methods section, participants who had at least one mutual friend in at least one year were included in these analyses. The mean number of years in which participants had at least one mutual friend was 3.60, and 98 participants had mutual friends at all 7 time points. Although longitudinal analyses were obviously not possible with participants who had mutual friends at only one time point, these participants (N = 172) were included to provide more representative distributions of variables at any given time point. Longitudinal analyses recomputed with these participants omitted demonstrated an identical pattern of results to those reported here.

effect.

This model provided a reasonable fit for the data, $\chi^2(66) = 425.11$, $p < .001$, CFI = .93, RMSEA = .067 (90% confidence interval = .061-.073).[2] All paths in the model were significant. Stability was moderate to high for both individual popularity and mutual friends' popularity. More importantly, mutual friends' popularity predicted later individual popularity.

Gender Differences in the Primary Model

In order to test the hypothesis that friends' popularity would more strongly predict later popularity for girls than boys, the path analysis described above was conducted separately for both genders, and these models were compared to investigate possible gender differences. The analysis contrasted the fit of the models with the weights unconstrained by gender to models in which the beta weights and intercepts (respectively) were set equal for both genders. Chi-square tests then compared the models. The unconstrained model ($\chi^2 = 542.60$, df = 132 , $p < .001$) did not differ significantly from the model with constrained beta weights ($\Delta\chi^2 = 17.47$, Δdf = 18, *ns*) or the model with constrained intercepts ($\Delta\chi^2 = 39.57$, Δdf = 30, *ns*), indicating that paths and intercepts did not significantly vary by gender. Although the coefficients predicting individual popularity from mutual friends' popularity were larger for girls than for boys (as expected), the differences were not statistically significant, and the hypothesis was not supported.

Longitudinal Prediction of Individual Preference from Mutual Friends' Preference

In order to test whether social preference was contagious in the same way as popularity, the primary path analysis model was repeated using individual and friends' preference in place of popularity. The model showed moderate stability for mutual friends' preference (βs ranged from

[2] Judgments about appropriate fits for all path analyses were based on RMSEA and CFI cutoffs suggested by Kline (2005), who stated that reasonable RMSEA values were below .08, while good CFI values were above .90. Chi-square cutoffs were not used as a central metric of model fit because χ^2 is very sensitive both to large *N*s and to model assumptions, including normality of the data. Chi-square was still used, however, for assessing *relative* fit when investigating gender differences in the primary model.

.31 to .43) and moderate to high stability for individual preference (βs ranged from .55 to .75). Further, the model supported the hypothesized absence of longitudinal associations between friends' and individual preference, $\chi^2(66) = 335.29$, $p < .001$, CFI = .88, RMSEA = .058 (90% confidence interval = .052-.064). Mutual friends' preference did not longitudinally predict social preference across five of the six grade transitions (βs ranged from .02 to .09). Contrary to predictions, however, mutual friends' preference in 7th grade did significantly and positively predict individual preference in 8th grade ($\beta = .11$, $p < .05$).

Popularity Contagion with Concurrent Behaviors Factored Out

Two analytic strategies were used to account for the possible confound of behavioral contagion (i.e., that behavioral contagion, and not popularity contagion *per se*, is responsible for friends' influences on changes in popularity over time).

The first strategy examined whether longitudinal paths predicting individual popularity from mutual friends' popularity were still significant when the direct effects of concurrent behaviors and the indirect effects of the stability of those behaviors were factored out. Analyses were initially conducted separately for each of the three behaviors (prosocial, overt aggression, relational aggression). Path analyses were set up as depicted in Figure 2, which uses prosocial behavior as an example. [FIGURE 2 HERE] As Figure 2 shows, prosocial behavior concurrently predicted individual popularity in each of the seven years; however, as expected, mutual friends' popularity still longitudinally predicted individual popularity over and above the effects of prosocial behavior, $\chi^2(159) = 756.22$, $p < .001$, CFI = .93, RMSEA = .056 (90% confidence interval = .052-.060). This pattern of results was similar for overt aggression, $\chi^2(159) = 799.20$, $p < .001$, CFI = .92, RMSEA = .057 (90% confidence interval = .054-.061), and relational aggression, $\chi^2(159) = 919.65$, $p < .001$, CFI = .90, RMSEA = .063 (90% confidence interval =

.059-.067). In all models, friends' popularity significantly predicted individual popularity over time.

Popularity Contagion with Mutual Friends' Behaviors Factored Out

The second strategy controlled for the longitudinal effects of mutual friends' behaviors when determining the effect of mutual friends' popularity on individual popularity. Path analyses were set up as shown in Figure 3 for prosocial behavior. [FIGURE 3 HERE] Although individual behaviors were not included in these models, the analyses explored the possibility of behavioral contagion. If popularity contagion is due to the effects of behavioral contagion, then friends' behaviors should predict later individual popularity and should account for the previously observed effects of friends' popularity on individual popularity. That is, if behavioral contagion accounts for popularity contagion, the inclusion of friends' behaviors predicting individual popularity should result in nonsignificant effects of friends' popularity on individual popularity.

As Figure 3 shows, friends' popularity continued to uniquely predict later individual popularity, even with friends' prosocial behavior in the model, $\chi^2(159) = 653.93$, $p < .001$, CFI = .93, RMSEA = .051 (90% confidence interval = .047-.055). Friends' prosocial behavior predicted later individual popularity only between 7^{th} and 8^{th} grade, but was not significant across other transitions. Similar results were found for overt aggression, $\chi^2(159) = 709.46$, $p < .001$, CFI = .92, RMSEA = .053 (90% confidence interval = .049-.057), and relational aggression, $\chi^2(159) = 730.98$, $p < .001$, CFI = .92, RMSEA = .054 (90% confidence interval = .050-.058), except that neither friends' overt aggression nor friends' relational aggression longitudinally predicted individual popularity across any consecutive grades.

Discussion

This study provided initial information regarding the spread of popularity across

friendships. First, it replicated and extended previous findings showing that adolescents tend to be friends with peers who are similar in popularity, but not necessarily similar in preference. Second, it supported hypotheses claiming (a) that the popularity of one's friends during adolescence predicts one's popularity over time, (b) that the contagion effect of popularity is not due to the effects of aggression or prosocial behavior, and (c) that the contagion effect found for popularity does not occur for social preference.

Popularity and Preference within Friendships

Preliminary results across all grades supported previous research showing robust correlations between individual and friends' popularity (Peters et al., 2010; Rose et al., 2004; Simon et al., 2008). They also showed that correlations between individual and friends' preference were significantly lower than the same correlations for popularity, supporting the hypothesis that friends are more similar to each other in popularity than in preference, and implying that friendships may involve a greater interdependence of status than of liking, a central principle of the proposed theory of popularity contagion.

Hypotheses Generated From the Theory of Popularity Contagion

The proposed theory of popularity contagion states that popularity should spread among adolescents within relationships. An adolescent will become more popular simply by being interpersonally associated with a more popular peer. Conversely, being friends with a peer who is less popular will make an adolescent less popular over time. This process of contagion occurs spontaneously, without any necessary effort or further change by the individual, as a property of status. Specifically, when peers perceive a positive link between two others (e.g., new friends), they automatically assume similarity in status between the two. Because status is entirely cognitive, the change in peers' perceptions of status of the individuals is no different from an

actual change in their status.

Three hypotheses were derived from the theory of popularity contagion, all focused on adolescent friendships as a close relationship. The first hypothesis was that the popularity of an individual's friends would predict that individual's popularity over time, even when controlling for the stability of the individual's popularity. The second hypothesis was that friends' preference would not similarly predict individual preference, because preference is not a form of status. The third hypothesis was that friends' popularity would still predict individual popularity even with behaviors (prosocial, overt aggression, relational aggression) factored out.

All three hypotheses were supported. Friends' popularity indeed predicted individual popularity consistently across all six grade transitions. These predictions held even when prosocial behavior and aggression were factored out. In contrast, friends' preference did not predict individual preference across all six transitions except one. The exception (Grade 7 to 8) may have been a statistical anomaly given the small size of the effect. Together, these findings support the theory of popularity contagion and provide a starting point for future work.

Gender Differences in Popularity Contagion

One additional analysis investigated gender differences in popularity contagion, and tested the hypothesis that popularity contagion would be stronger for girls than for boys (i.e., that friends' popularity would more strongly predict individual popularity for girls than boys). This hypothesis was not supported; there was no major gender difference. This may contradict qualitative evidence that popularity is more interdependent among females than males. Obviously, this does not preclude the possibility that popularity involves different bases and processes for boys and girls, as suggested by Coleman (1961), Eder (1995), and others; however, it does suggest that reputation does not spread to different extents among boys and girls.

Limitations and Directions for Future Research

A handful of issues must be taken into account when considering our results and conclusions. First, the proportion of participants who completed measures (in relation to the full number of adolescents in each grade) was less than ideal in some years, particularly during high school. Although the completion rate was always above the minimum recommended rate suggested by Cillessen and Marks (2011), the completion rate may have impacted results with regards to mutual friendships. Some participants may have had a higher number of mutual friends if there had been a full completion rate (i.e., a participant could not reciprocate a friendship nomination if they did not complete the peer nomination measure). Because a portion of non-reciprocated friendships might have been reciprocated if all participants had completed measures, the comparisons between nominated friends and mutual friends should be interpreted with some caution because some nominated friends might have been mutual friends.

Second, within the path analyses, the effect sizes for predictions of individual popularity from friends' popularity were relatively small. Small effect sizes were unsurprising, however, given the moderate correlation between individual and friends' popularity, and the fairly high stability of individual popularity (Cillessen & Mayeux, 2004; Rose et al., 2004); these likely accounted for a large portion of the variance for predictions of individual popularity from mutual friends' popularity. The fact that mutual friends' popularity predicted individual popularity *despite* these statistical constraints is exactly the result that was hypothesized.

Third, the theory of popularity contagion asserts that popularity contagion should occur regardless of behavioral change. This was true for overt aggression, relational aggression, and prosocial behavior. Other behaviors should also be considered in future studies.

The theory of popularity contagion emerged from the assertion that popularity is a

manifestation of status. Because status exists (in different forms, under different names, and with different levels of rigidity) in all cultures around the world, similar contagion processes should be universal. We theorize that our longitudinal findings should replicate within any social system of adolescents, regardless of race, culture, or location. However, our results were based on a particular population, and future research must establish the generality of our findings.

Implications and Conclusion

The fact that popularity was predicted by friend popularity has interesting implications. One is that popularity should not be treated exclusively as an individual phenomenon, as most studies that focus on the individual traits and behaviors associated with popularity. Our study shows that friendships should also be considered. While the popularity literature traditionally has recognized the importance of peer cliques, the focus on friendship dyads is newer. The current study emphasizes the role of such dyadic influences on popularity that may also include other types of dyadic relationships (e.g., romantic couples, mutually competitive pairs).

The contrasting finding that preference was not predicted by friend preference strengthens the distinct roles of preference and popularity in adolescent peer relations. So far this distinction has focused primarily on the role of aggression. The current study points to differences in the emergence of both dimensions of adolescent peer relations. Interestingly, because popularity is more stable than preference, it is more often considered a stable individual trait. We now learn that this interpretation may be misleading. The higher stability of popularity may have a lot to do with dyadic processes or other relational forms of status support.

Our findings for popularity and preference were remarkably consistent across the seven years of the study and for boys as well as girls. This implies a great deal of universality across age groups and gender for the friendship-popularity connection. This further points to a more

general implication for peer relationships research. Peer relationships researchers traditionally make a distinction between individual, dyadic, and group levels of analysis in the study of the peer group. It is also often stated that more efforts should be made to integrate these levels rather than to treat them individually. The current study is an example of the integration of levels that could be applied in peer relationship studies more generally.

Finally, there are practical implications. Studies have shown that there are sometimes health risks and academic risks associated with popularity (Sandstrom, 2011; Schwartz & Gorman, 2011), risks that researchers and practitioners alike wish to prevent. The current findings suggest that in the prevention of such risks, the influence of popular friends on the adolescent should also be considered. Popular friends may have a strong impact and entice an adolescent to engage in health risk behaviors. Popular friendships may also form a core from which popular cliques are formed, and the risk behaviors of popular cliques are also documented. Thus, prevention work should not only focus on the individual popular adolescent, but also include her or his dyadic relationships and the cliques in which they are embedded.

The theory of popularity contagion addressed the association between popularity and friendships. The findings in this study reinforce previous work (e.g., Peters et al., 2010; Rose et al., 2004) by showing that friendships can affect and be affected by popularity. The theory and the findings from this study for a solid basis for further studies on the longitudinal associations among adolescent peer status, friendships, and other close relationships.

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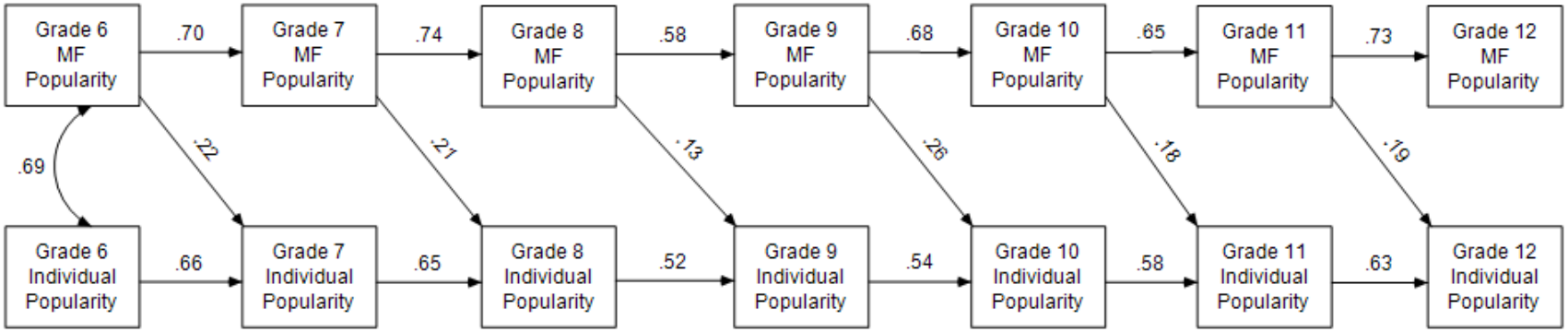

Figure 1. Primary path model predicting individual popularity from mutual friends' popularity over time. MF = mutual friend. Path coefficients are standardized. All concurrent error terms were correlated, but are not displayed for clarity of presentation. All paths in this model were significant ($p < .05$).

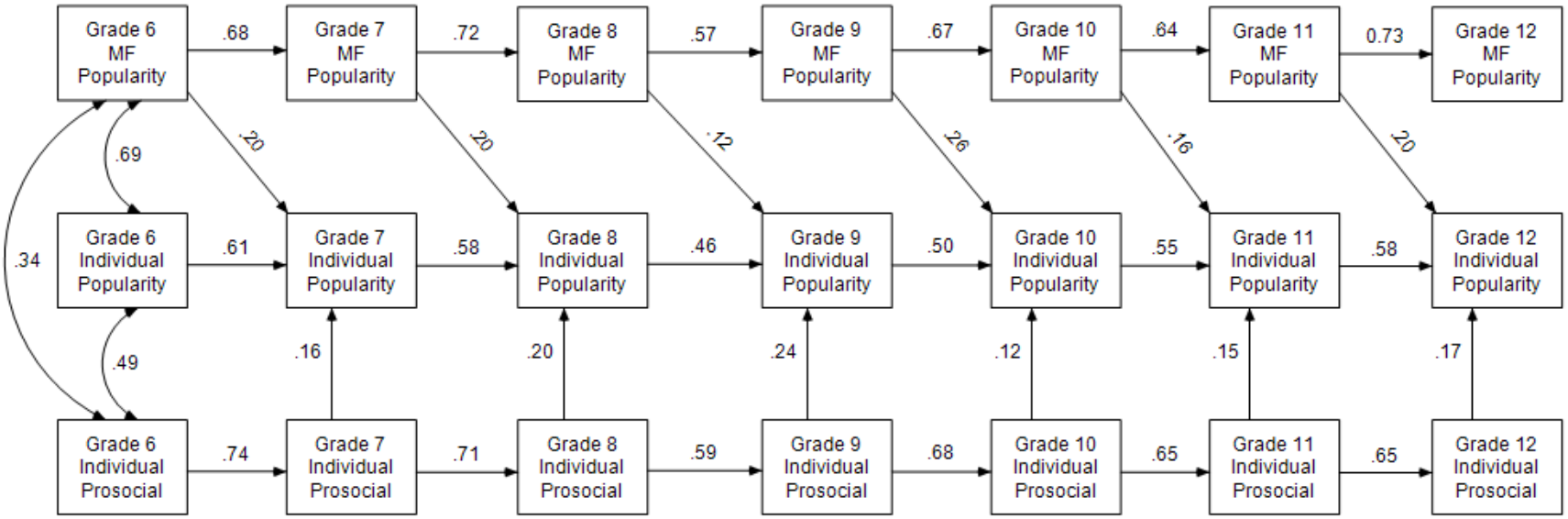

Figure 2. Path model predicting individual popularity from mutual friends' popularity over time with concurrent prosocial behavior controlled. MF = mutual friend. Path coefficients are standardized. All concurrent error terms were correlated, but are not displayed for clarity of presentation. All paths in this model were significant ($p < .05$).

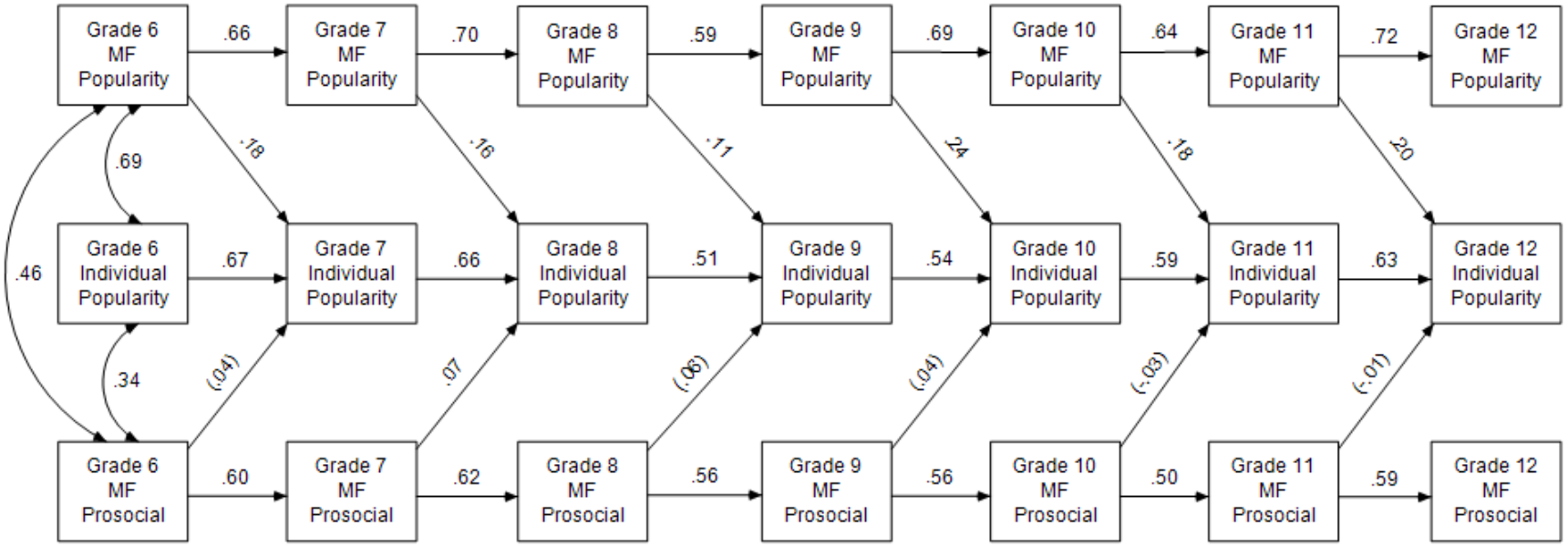

Figure 3. Path analysis predicting individual popularity from mutual friends' popularity and mutual friends' prosocial behavior over time. MF = mutual friend. Path coefficients are standardized. All concurrent error terms were correlated, but are not displayed for clarity of presentation. Non-significant paths ($p > .05$) are displayed in parentheses.