Longitudinal Associations Among Popularity, Likeability, and Drinking
Across the Adolescent Transition:
A Multivariate Latent Growth Curve Analysis

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ABSTRACT

SOPHIA C. CHOUKAS-BRADLEY: Longitudinal Associations Among Popularity, Likeability, and Drinking Across the Adolescent Transition: A Multivariate Latent Growth Curve Analysis
(Under the direction of Mitch Prinstein, Ph.D.)

This study used latent growth curve modeling to examine associations between two forms of peer status and longitudinal drinking trajectories across the transition to high school. In a sample of 165 adolescents in Grade 8 at baseline, participants self-reported their alcohol use and provided sociometric nominations of peers' popularity and likeability, at three annual time points. Consistent with hypotheses, higher 8th grade popularity was associated with higher baseline drinking and with increased drinking trajectories from 8th to 10th grade. However, contrary to hypotheses, *lower* baseline likeability predicted increased concurrent and longitudinal drinking. These findings underscore the importance of studying the risk behavior correlates of these two distinct peer status constructs. Additionally, results suggest the value in considering preventive interventions that target popular youth; these adolescents may be at higher risk for alcohol use and also may be in a unique position to influence the attitudes and behaviors of their peers.

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INTRODUCTION

Adolescent alcohol use is a significant public health concern with risks of injury, mortality, brain damage, and future substance abuse (Matthews, 2010). According to NIH's 2008 Monitoring the Future Survey, 39% of 8th graders reported trying alcohol during their lifetime, with rates increasing to 58% by 10th grade and 72% by 12th grade (Johnston, O'Malley, Bachman, & Schulenberg, 2009). While estimates of heavy episodic drinking (i.e., binge drinking, or consuming five or more drinks within a short period of time) vary and are generally significantly lower than rates of overall alcohol use, the prevalence of binge drinking also increases over the middle school and high school years, with 8% of 8th graders, 16% of 10th graders, and 25% of 12th graders reporting binge drinking within the past two weeks (Johnston et al., 2009). The high prevalence of drinking among adolescents is especially concerning given the long-term health effects of early alcohol use. Animal analogue studies indicate that ethanol consumption during adolescence is associated with significant brain damage that resembles deficits seen in chronic alcoholism (Crews, Braun, Hoplight, Switzer, & Knapp, 2000; Taffe et al., 2010). Longitudinal and retrospective research on adolescent and young adult humans also indicates that binge drinking in middle school and high school is a significant predictor of future problematic drinking and alcohol abuse disorders (Wechsler, Dowdall, Davenport, & Castillo, 1995; DeWit, Adlaf, Offord, & Ogborne, 2000; Palmer et al., 2009).

Surprisingly, studies of adolescent alcohol use are only a recent focus of inquiry. A Pubmed search for articles using "alcohol" and "adolescent" in the title and/or abstract yielded 17 hits in 1983 (Matthews, 2010); the same Pubmed search today yields hundreds of articles, and an equivalent search in PsycInfo yields thousands. Most research has begun to look at risk factors, including the social contexts and processes associated with adolescent alcohol use. The peer context has been highlighted as perhaps the strongest predictor of substance use among adolescents (e.g., Chassin, Hussong, & Beltran, 2009). Peer factors, such as friends' drinking behaviors and perceptions of peer attitudes and social norms regarding alcohol, are consistently found to be strong predictors of adolescent alcohol use (see Borsari & Carey, 2001, 2003). Such peer factors appear to be more strongly related to adolescents' drinking behaviors than are parental factors (Beal, Ausiello, & Perrin, 2001; Cumsille, Sayer, & Graham, 2000; D'Amico et al., 2001).

A focus on peer factors in studies of adolescents' alcohol use is not surprising, given both the social nature of drinking (e.g., Courtney & Polich, 2009; Borsari & Carey, 2001), and important psychosocial changes associated with the transition to adolescence (Crews, He, & Hodge, 2007; Chassin et al., 2009), a developmental period marked by increasing levels of risk-taking, exploration, novelty- and sensation-seeking, and social interactions with peers (Crews et al., 2007). In addition to increases in the frequency of peer interactions, work by developmental psychologists indicates that the transition to adolescence is associated with substantial changes in the *meaning* of peer interactions. By adolescence, peers' approval and acceptance play increasingly significant roles in youths' sense of self-worth (Harter, Stocker, & Robinson, 1996). Moreover, adolescents' desire to engage in behaviors that might increase their peer status outweighs their

motivation to engage in behaviors that will earn adult approval (Juvonen & Murdock, 1995). Indeed, research suggests that an adolescent's drinking behaviors may be influenced by the alcohol use of his/her friends (e.g., Andrews, Tildesley, Hops, & Li, 2002), friend group (e.g., Urberg, Degirmencioglu, & Pilgrim, 1997), and peer "crowd" (e.g., Dolcini & Adler, 1994). Research has also provided evidence of a potential link between alcohol use and high peer status (e.g., "popularity"; Cohen & Prinstein, 2006; Mayeux, Sandstrom, & Cillessen, 2008).

Moffitt's (1993) theory of the *maturity gap* provides a theoretical framework that may help explain the high rates of substance use during adolescence. According to her theory, adolescents reach biological maturity with the onset of puberty, but society expects them to delay their adoption of adult social roles until after middle school, high school, and – in many cases – college. Adolescents in the United States are, by law, restricted from driving before roughly age 16, voting before age 18, and drinking before age 21. The five-to-ten-year gap between biological maturity and social maturity creates a "role vacuum" during which the modern teenager is expected to "delay most of the positive aspects of adult life" (Moffitt, 1993, p. 686). During this time, teens may feel eager to engage in substance use and other delinquent activities that symbolize the independence and maturity for which they feel biologically prepared but from which they are legally and socially restricted (Moffitt, 1993). Indeed, in a qualitative study of motivations for binge drinking, adolescents reported that they enjoyed binge drinking because it was "associated with an image of being older and 'harder' than others" (Coleman & Cater, 2005, p. 130).

According to Moffitt, it is around the time that adolescents begin to feel the "discomfort" of the maturity gap that they also enter high school, where they come into contact with older students, a "social reference group that has endured the gap for 3 to 4 years and has already perfected some delinquent ways of coping with it" (Moffitt, 1993, p. 687). Social reference groups in the high school setting may play a significant role in influencing other youths' substance use behaviors (Cohen & Prinstein, 2006). An emerging body of research suggests that one of the strongest social reference groups among adolescents is the group of peers who are considered to be "popular" (Prinstein, Meade, & Cohen, 2003; Cohen & Prinstein, 2006; Mayeux, Sandstrom, & Cillessen, 2008). Preliminary evidence indicates that these high-status adolescents engage in higher levels of alcohol use (e.g., Mayeux et al., 2008), which suggests that other youth may view these behaviors as normative among their popular peers.

Two interrelated theories provide models that may help explain how social reference groups, and high-status peers in particular, may influence the alcohol use of other adolescents. A *social norms* model, consistent with work by social psychologists (e.g., Cohen, 2003; Gibbons & Gerrard, 1995), proposes that adolescents may look to social reference groups to determine the attitudes and behaviors that exemplify the type of person they would like to be. A second, related theory, consistent with social learning theory (Bandura, 1974), explains that youth may be reinforced for conforming to the reference group's attitudes and behaviors with *social rewards* in the form of increased social status in the peer hierarchy. According to the social norms and social rewards models, if adolescents look to this high-status social reference group and determine that alcohol use is normative or representative of high status, they may be likely to mimic

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these behaviors in order to increase their own peer status. Moreover, those who are

themselves members of a group associated with substance use (e.g., perhaps, youth with

high social status) may feel pressure to conform to the behaviors that are perceived to be

the group's norms. These general ideas have not been stringently examined in the

literature, however.

The lack of research examining these fundamental hypotheses may be due to a

need for developmentally-sensitive measures of peer status that have been revealed only

in very recent years. Specifically, two forms of peer status are now discussed in the

literature – *likeability* (or "social preference"), which is assessed with sociometric

nominations of "who do you like the most?" and "who do you like the least?" (Coie &

Dodge, 1983); and *peer-perceived popularity* (or "social reputation"), a construct

associated with social dominance and visibility (Mayeux et al., 2008), which is measured

with sociometric nominations of "who is most popular?" and "who is least popular?"

(Parkhurst & Hopmeyer, 1998). The two constructs are only moderately correlated

(Parkhurst & Hopmeyer, 1998), yet for many years the field of peer relations treated

likeability as synonymous with popularity (e.g., Coie, Dodge, & Coppotelli, 1982), in

spite of research in other fields suggesting that youth view likeability and popularity as

two distinct constructs (e.g., sociology; Eder, 1985). Most peer relations researchers now

consider popularity to be a distinct construct from likeability (see Cillessen & Rose,

2005), and a conceptual and methodological distinction between the two constructs may

be necessary for a full understanding of how peer status is related to substance use

behaviors and the social norms surrounding them. The constructs of likeability and

popularity overlap, but only partially; both forms of peer status are associated with

prosocial characteristics, but popularity is associated with antisocial characteristics as well (Parkhurst & Hopmeyer, 1998). More specifically, while *low* levels of likeability are associated with aggression, *high* levels of popularity have been found to be associated with aggression and dominance, including both overt and relational aggression (Parkhurst & Hopmeyer, 1998; Prinstein & Cillessen, 2003; LaFontana & Cillessen, 2002).

Based on the social norms and social rewards models, in conjunction with Moffitt's theory of the maturity gap, longitudinal associations between high peer status and alcohol use are hypothesized. These theories suggest that adolescents who are *popular* may engage in higher levels of drinking in order to adhere to social norms associated with drinking and popularity (Cohen, 2003; Gibbons & Gerrard, 1995; Mayeux et al., 2008). More specifically, it is hypothesized that high popularity early in adolescence will be associated with increases in alcohol use over time. Although few studies have examined the longitudinal associations between popularity and drinking, preliminary evidence suggests a potential link. For example, findings suggest that adolescents who identify with stereotypically popular cliques or "crowds" engage in higher levels of alcohol use than their peers (Dolcini & Adler, 1994) and that those who self-report higher levels of popularity also report drinking more frequently (Diego, Field, & Sanders, 2003) and binge drinking more frequently (Pirkle & Richter, 2006) than their peers. Two prior studies of the longitudinal associations between *peer-perceived popularity* and alcohol use offer mixed findings (c.f., Mayeux, Sandstrom, & Cillessen, 2008; Lansford, Killeya-Jones, Miller, & Costanzo, 2009), perhaps due to important differences in how constructs were defined (e.g., Mayeux et al. measured alcohol use based on frequency and quantity, while Lansford et al. assessed whether adolescents had

"ever had a drink of alcohol, even just one sip"). Mayeux et al. found that higher popularity in 10th grade predicted increased 12th grade alcohol use, while Lansford et al. found that changes in popularity from 7th to 8th grade did not significantly predict 8th grade alcohol use.

Expected patterns of association between *likeability* and alcohol use are less clear. Based on links between low childhood likeability, high aggression, and higher rates of adolescent delinquency (e.g., Parker & Asher, 1987), it might be expected that adolescents *lower* in likeability will engage in higher levels of alcohol use over time, in comparison to their peers. Researchers have indeed demonstrated that low likeability in childhood is related to increased adolescent substance use in both boys (e.g., Dishion, Capaldi, & Yoerger, 1999) and girls (Prinstein & La Greca, 2004). On the other hand, the majority of these studies have focused on likeability in childhood rather than in adolescence, and the negative relationship between likeability and substance use may not apply during adolescence. Because substance use and other deviant behaviors are increasingly accepted by peers during adolescence (Moffitt, 1993), the pattern of associations between likeability and alcohol use among adolescents might instead be expected to be similar to that hypothesized for popularity and alcohol use. Under this hypothesis, it would be expected that high likeability early in adolescence will be associated with longitudinal increases in alcohol use. Lending empirical support to this hypothesis, Allen, Porter, McFarland, Marsh, and McElhaney (2005) found that higher likeability at age 13 predicted greater increases in alcohol use by one year later.

Importantly, no prior study design has allowed the opportunity to examine the relationship between peer status variables and adolescents' *trajectories* of alcohol use;

examining the growth of alcohol use across more than two time points, and examining how peer status predictors may influence this growth, may illuminate longitudinal associations not captured by regression analyses. Moreover, very few studies have examined peer status and drinking during the transition from middle school to high school, a developmental period highlighted by Moffitt (1993) as highly relevant to the understanding of adolescent delinquency and its relation to social reference groups. The current study examined trajectories across the transition to high school, examining associations among popularity, likeability, and drinking in grades 8, 9, and 10, using standardized peer status scores.

Examining drinking trajectories using multiple time points allows not only an assessment of associations across a longer period of time that spans both middle school and high school, but also allows the use of latent trajectory modeling (i.e., latent growth curve modeling). Latent curve analysis allows the assessment of relationships among time-varying variables, controlling for prior levels of those variables (Bollen & Curran, 2006). Past studies have used latent trajectory analysis to assess relationships between adolescents' and peers' substance use trajectories (e.g., Curran, Stice, & Chassin, 1997; Simons-Morton & Chen, 2006), but this statistical model has not yet been used to assess the longitudinal associations among popularity, likeability, and drinking. For example, studies by Mayeux et al. (2008) and Lansford et al. (2009) assessed relationships among popularity, likeability, and drinking, but with only two time points, the researchers were not able to assess whether baseline levels of peer status predicted longitudinal trajectories of alcohol use. The use of latent trajectory models also allows intercepts and slopes to vary over individuals (Bollen & Curran, 2006; Curran & Hussong, 2003). The current

study examined longitudinal associations among popularity, likeability, and two alcohol variables – a basic "alcohol use" variable (defined as having one or more drink) and a "moderate episodic drinking" variable (defined as having three or more drinks within a few hours). A measure of moderate episodic drinking was used in place of heavy episodic drinking due to low rates of binge drinking among early adolescent samples (Johnston et al., 2009; SAMHSA, 2009). Although a high correlation between the alcohol use variable and the moderate episodic drinking variable was expected (in part because adolescents who engage in moderate episodic drinking are, by definition, also engaging in alcohol use), it is important to examine the association between peer status and different levels of drinking. Research suggests that experimentation with substance use in adolescence is normative and may even be associated with healthier outcomes than complete abstinence (e.g., Shedler & Block, 1990; Hersh & Hussong, 2006), whereas using alcohol to excess has been found to be associated with a variety of significant negative consequences (e.g., Patrick & Schulenberg, 2010).

Prior to examining primary study hypotheses regarding associations between baseline peer status variables and longitudinal drinking trajectories, unconditional models of alcohol use and moderate episodic drinking were examined, with particular attention to differences in patterns of growth for boys' and girls' drinking trajectories. Based on consistent findings that males and females differ in their levels and patterns of alcohol use, with males drinking alcohol in larger quantities and with greater frequency (see Ham & Hope, 2003), it was expected that different patterns of growth would be observed for boys and girls (i.e., in the unconditional models of the alcohol variables) and that a multiple group framework would be needed to examine the moderating role of gender in

the associations between peer status variables and drinking trajectories. However, based on a lack of prior research regarding differential relationships by gender between alcohol use and these measures of peer status, no specific gender differences were hypothesized.

In addition to examining the relationship between baseline popularity and likeability and longitudinal drinking trajectories, an interaction term was computed between likeability and popularity and explored as a potential predictor of alcohol use and moderate episodic drinking. It may be that an adolescent's level of popularity in 8th grade moderates the relationship between his/her 8th grade likeability and trajectories of drinking, and/or that the initial level of likeability moderates the relationship between baseline popularity and drinking trajectories. However, based on the lack of previous research on the interaction between popularity and likeability, no specific hypotheses were proposed. The following four primary study hypotheses were examined using latent growth curve modeling: (1) higher baseline (i.e., 8th grade) popularity would be associated with higher levels of baseline drinking (i.e., intercept); (2) higher baseline popularity would be associated with increased drinking trajectories over time (i.e., slope); (3) higher baseline levels of likeability would be associated with higher levels of baseline drinking; and (4) higher baseline likeability would be associated with increased drinking trajectories over time.

METHOD

Participants

Participants included 165 adolescents (52% girls, 48% boys) in Grade 8 at study onset. All participants were between the ages of 12 and 14 ($M = 13.68$, $SD = .38$) at baseline. The ethnic composition of the sample included 87% White/Caucasian, 1% African American, 5% Asian American, 3% Latino American, and 4% mixed ethnic background. At baseline, participants were enrolled at a public middle school in a city of primarily middle-class socioeconomic status in the northeastern United States. Neighborhood and school records revealed that the average adult per-capita income was approximately $30,220, and 11% of children were eligible for free or reduced-priced lunch.

At the beginning of the study (i.e., Time 1), all students in Grade 8 from three classrooms were recruited for participation. 92% of families returned consent forms ($n = 261$); of these, 80% of parents consented to their child's participation ($n = 209$; 73% of the total population). Students who were absent on one or both of the testing days ($n = 9$), moved before the T1 assessment ($n = 5$) or refused to participate on one or both days ($n = 4$) were excluded from analyses, yielding a final sample of 191 participants at Time 1. Of these participants, 176 (92%) completed testing approximately 1 year after baseline (i.e., Time 2), when students were in Grade 9. Attrition was due to participants' moving away from the area ($n = 8$), absenteeism ($n = 2$), incomplete data ($n = 3$), and refusal to

continue to participate ($n = 2$), reasons common to this type of research. At Time 3, approximately one year later, a total of 165 participants (94% of Time 2 participants; 86% of Time 1 participants) completed testing. Attrition between Time 2 and Time 3 was due to participants' moving away from the area ($n = 4$) or being unavailable for testing ($n = 7$).

Measures

Sociometric nominations of peer status (i.e., likeability and popularity) were conducted at Time 1 (i.e., Grade 8). A self-reported instrument of alcohol use and moderate episodic drinking was collected at all three time points (Grades 8, 9, and 10).

Peer status. At Time 1, adolescents were presented with an alphabetized roster of all grademates, from which they were asked to nominate an unlimited number of peers whom they "like the most" and "like the least" (Coie & Dodge, 1983). The order of alphabetized names on rosters was counterbalanced (i.e., A through Z and Z through A) to control for possible order effects on nominee selection (e.g., Prinstein & Cillessen, 2003). For each participant, the sum of the number of nominations received was standardized, such that each participant received a standardized "like most" and "like least" score. A measure of likeability was then created by calculating the difference between each participant's standardized "like most" and "like least" scores. These difference scores were then restandardized, with higher scores indicating greater *likeability* among peers (Coie & Dodge, 1983). Adolescents also were asked at baseline to nominate peers who were "most popular" and "least popular" (e.g., Parkhurst & Hopmeyer, 1998). As with likeability, standardized nominations were computed for each of the items, and difference scores were computed and restandardized. Higher scores

indicate higher levels of *popularity* relative to peers. Sociometric nomination procedures are widely accepted as the most reliable and valid measures of peer status (Coie & Dodge, 1983; Parkhurst & Hopmeyer, 1998).

Alcohol use and moderate episodic drinking. Adolescents' alcohol use and moderate episodic drinking were assessed at Times 1, 2, and 3, using items adapted from the Youth Risk Behavior Surveillance System (CDC, 1998), as in previous research on adolescent health risk behaviors (e.g., Faden, 2006). Participants were asked to report the number of days, over the past 30 days, on which they had consumed at least one drink of alcohol *("alcohol use")*, and the number of days on which they had had three or more drinks on a single occasion, defined as "within a few hours" (*"moderate episodic drinking"*). A five-point Likert scale ranged from "0 days" to "10 or more days." As is typical in research on adolescents' substance use, the data were positively skewed for both the alcohol use variable and the moderate episodic drinking variable. Due to the highly skewed nature of both alcohol variables, the alcohol use and moderate episodic drinking variables were transformed using a logarithmic function (Cohen, Cohen, West, & Aiken, 2003).

Data Analytic Plan

Attrition Analyses. Attrition analyses were conducted to compare participants who have complete longitudinal data for all study variables (i.e., at all three time points) to those who do not. Specifically, analyses were conducted for possible differences between adolescents' mean levels of popularity, likeability, alcohol use, and moderate episodic drinking. Results revealed no significant differences between participants with and

without complete data, with the exception that those with incomplete data were lower in likeability, $t\ (189) = 2.28,\ p = .02$.

Descriptive Statistics. Descriptive statistics were conducted to examine the means and standard deviations on all study variables (i.e., popularity, likeability, alcohol use, moderate episodic drinking) at all three time points. Correlational analyses were also performed between all study variables.

Hypothesis Testing. Using multivariate latent growth curve modeling in AMOS 18.0, all hypotheses were examined using two sets of analyses. In each set of analyses, a growth curve was estimated for one of the two alcohol variables using indicators from the three time points; baseline popularity, likeability, and their interaction term were each tested as predictors of this alcohol trajectory. In one set of analyses, the alcohol variable used was the "alcohol use" variable, and in the second set, "moderate episodic drinking" was examined.

Growth curves were estimated for the alcohol variables in an identical manner. First, using all three exogenous variables for each construct (e.g., moderate episodic drinking at grades 8, 9, and 10), a latent intercept and slope were estimated. For each alcohol variable, a latent intercept factor was estimated using the three measures of the construct, and paths were set to 1 between each of these measures and the latent intercept factor. A latent slope factor was estimated with paths for each alcohol variable at Grades 8, 9, and 10 set to 0, 1, and 2, respectively (Bollen & Curran, 2006). Because data are missing at random, direct maximum likelihood methods could be used to impute missing data (Bollen & Curran, 2006).

For each of the two sets of analyses (i.e., the set using "alcohol use" as the alcohol variable, and the set examining "moderate episodic drinking"), prior to examining hypotheses, an unconditional model was examined for the alcohol growth curve. Once an adequate fit was achieved for each of the growth curves, conditional models were examined in a multivariate format to examine each of the study hypotheses (Bollen & Curran, 2006).

To test the hypotheses that higher baseline popularity and higher baseline likeability each would be associated with higher concurrent levels of 8th grade drinking, paths were estimated between popularity and likeability (respectively) and the alcohol intercept. To test the hypotheses that higher baseline popularity and higher baseline likeability would each be associated with increased drinking trajectories over time, paths were estimated between popularity and likeability (respectively) and the alcohol slope. Although no specific hypotheses were proposed for the interaction between popularity and likeability as a predictor, a path was estimated between the interaction and the alcohol intercept, to test whether there was a significant association between baseline drinking and the baseline interaction between popularity and likeability; and an additional path was estimated between the interaction and the alcohol slope, to test whether there was a significant association between the interaction at Time 1 and the growth of drinking over time.

In sum, two sets of analyses were conducted using multivariate latent growth curve modeling: In the first set, three predictors (popularity, likeability, and the interaction between popularity and likeability) were used to predict the alcohol use growth curve, and in the second set, the three predictors were used to predict the

moderate episodic drinking growth curve. Both sets of analyses were conducted using

multiple group analysis by gender.

RESULTS

Preliminary Analyses

   Means and standard deviations for all primary variables are presented in Table 1.
T tests revealed no significant gender differences in primary study variables, with the
exception that girls were higher in likeability.

   Pearson correlations were conducted to examine bivariate associations among all
study variables (see Table 2). At all three time points, results revealed highly significant
correlations between alcohol use and moderate episodic drinking. Significant
associations also were revealed between Time 1 popularity and both drinking variables at
each time point. No significant correlations were found between Time 1 likeability and
either of the drinking variables at any time point. Consistent with past literature, a
significant correlation was found between popularity and likeability at Time 1. Moderate
to high levels of stability were revealed for moderate episodic drinking and alcohol use
over time.

Course of alcohol use and moderate episodic drinking over time

   Prior to examining primary study hypotheses, unconditional models of alcohol
use and moderate episodic drinking were examined.

   Alcohol use. Analysis of unconditional growth curve models for the alcohol use
variable began with an examination of a single slope model including 8th grade, 9th grade,
and 10th grade measures of alcohol use, collapsed across gender. The model was a poor
fit, χ^2 (1) = 12.35, $p < .001$; χ^2/df = 12.35; comparative fit index (CFI) = .90; normed fit

index (NFI) = .89; root-mean-square error of approximation (RMSEA) = .24. The poor

model fit was attributed to the nonlinear growth of the means over time (see Table 1). As

was expected based on theory, different patterns of growth in alcohol use and differences

in variability were observed across gender. Additionally, it was anticipated that alcohol

use slopes may be nonlinear, given that the transition to high school may be associated

with steeper increases in drinking trajectories. Therefore, a multiple group analysis (by

gender) was conducted in order to allow for different patterns of growth by gender, and to

allow for non-linear growth. Sufficient degrees of freedom were available to test

nonlinear growth by allowing the path from the latent slope to the 9th grade indicator to

vary freely (Bollen & Curran, 2006). In examining multiple group models, I first fixed

all residual variances, covariances, factor means, and path weights across gender. Model

fit improved, but still was inadequate, χ^2 (9) = 34.93, $p < .001$; χ^2/df = 3.88; CFI = .78;

NFI = .73; RMSEA = .12.

The next step in the analyses was to systematically free individual gender

constraints for each parameter. First, I tested whether it was necessary to vary freely the

path from the latent slope factor to Time 2. A chi-square difference test suggested that

fixing the path from the latent slope to the 9th grade indicator significantly worsened

model fit, χ^2 (1) = 6.24, $p = .01$, indicating that the path must be allowed to vary freely

across gender. Next, I examined whether the model fit changed if I freely varied the

mean of the latent intercept; this model was compared to a model in which the mean for

the latent intercept factor was fixed across gender. Fixing the latent intercept mean did

not significantly change the model fit, χ^2 (1) = .98, $p = .32$, and thus the constraint was

retained for model parsimony. Next, gender differences in the latent slope mean were

examined. Again, no significant difference in model fit was observed, χ^2 (1) = 2.73, p =
.10. Next, I examined whether the model fit changed if I freely varied the covariance
between the latent factors (i.e., intercept and slope); this model was compared with a
model in which the covariance between the latent factors was fixed across gender. Fixing
the covariance between the latent factors did not significantly change model fit, χ^2 (1) =
3.84, p = .05, indicating that the covariance was comparable for boys and girls, and thus
the constraint was retained for parsimony. Last, I tested whether I could freely vary the
error variances across the three observed indicators of alcohol use, as well as between
and within gender. Results revealed that it was possible to set error variances to be fixed
across the three time points for boys, but not for girls. Constraining error variances across
the three time points did not significantly change model fit for boys, χ^2 (2) = 1.21, p =
.55, and thus constraints were retained for parsimony. However, with respect to girls,
fixing the residual variances across time significantly worsened model fit, χ^2 (2) = 18.66,
p < .001. Therefore, the error variances must be allowed to vary freely across time for
girls, and it was not possible to fix the error variance across gender. The final
unconditional model for alcohol use, using a multiple group analysis (by gender), yielded
a good fit, χ^2 (5) = 9.22, p = .10; χ^2/df = 1.84; CFI = .96; NFI = .93; RMSEA = .07. The
model fit indicates that the observed data are comparable to the expected model.

The estimated unstandardized path weight for alcohol use at 9th grade on the slope
factor was .10 (p = .12) for boys and .43 (p < .001) for girls. Estimated intercept
parameters indicated that alcohol use was significantly greater than 0 at baseline (M =
.08, p < .001) with significant variability around this mean for both boys (.03, p < .001)
and girls (.02, p < .001). Estimated slope parameters indicated that the alcohol use slope

was significantly greater than zero ($M = .17$, $p < .001$) with significant variability around this mean for both boys (.05, $p < .001$) and girls (.05, $p = .01$).

Moderate episodic drinking. As with the alcohol use variable, analysis of unconditional growth curve models for the moderate episodic drinking variable began with an examination of a single slope model including 8th grade, 9th grade, and 10th grade measures of moderate episodic drinking, collapsed across gender. The model was a poor fit, χ^2 (1) = 12.12, $p < .001$; χ^2/df = 12.12; CFI = .88; NFI = .88; RMSEA = .24. The poor model fit was attributed to the nonlinear growth of the means over time (see Table 1). Additionally, as was expected based on theory, and as was the case with the alcohol use variable, different patterns of growth in moderate episodic drinking were observed across gender. Therefore, a multiple group analysis (by gender) was conducted in order to allow for different patterns of growth by gender. In examining multiple group models, I first fixed all residual variances, covariances, latent factor means, and path weights across gender. Model fit was again poor, χ^2 (9) = 29.19, $p = .001$; χ^2/df = 3.24; CFI = .79; NFI = .73; RMSEA = .11.

The next step in the analyses was to systematically free individual gender constraints for each parameter. First, I tested whether it was necessary to vary freely the path from the latent slope factor to Time 2. A chi-square difference test suggested that fixing the path from the latent slope to the 9th grade indicator significantly worsened model fit, χ^2 (1) = 4.28, $p = .04$, indicating that the path must be allowed to vary freely across gender. Next, I examined whether the model fit changed if I freely varied the mean of the latent intercept; this model was compared to a model in which the mean for the latent intercept factor was fixed across gender. Fixing the latent intercept mean did

not significantly change the model fit, χ^2 (1) = 1.29, $p = .26$, and thus the constraint was retained for model parsimony. Next, gender differences in the latent slope mean were examined. Again, no significant difference in model fit was observed, χ^2 (1) = 1.20, $p = .27$. Next, I examined whether the model fit changed if I freely varied the covariance between the latent factors (i.e., intercept and slope); this model was compared with a model in which the covariance between the latent factors was fixed across gender. Fixing the covariance between the latent factors did not significantly change model fit, χ^2 (1) = 3.27, $p = .07$, indicating that the covariance was comparable for boys and girls, and thus the constraint was retained for parsimony. Last, I tested whether I could freely vary the error variances across the three observed indicators of moderate episodic drinking, as well as between and within gender. Results revealed that it was possible to set error variances to be fixed across the three time points for boys, but not for girls. Constraining error variances across the three time points did not significantly change model fit for boys, χ^2 (2) = .55, $p = .76$, and thus constraints were retained for parsimony. However, with respect to girls, fixing the residual variances across time significantly worsened model fit, χ^2 (2) = 13.87, $p = .001$. Therefore, the error variances must be allowed to vary freely across time for girls, and it was not possible to fix the error variance across gender. The final unconditional model for moderate episodic drinking, using a multiple group analysis (by gender), yielded a good fit, χ^2 (5) = 8.94, $p = .11$; χ^2/df = 1.79; CFI = .96; NFI = .92; RMSEA = .07.

The estimated unstandardized path weight for moderate episodic drinking at 9th grade on the slope factor was .12 ($p = .05$) for boys and .38 ($p < .001$) for girls. Estimated intercept parameters indicated that moderate episodic drinking was significantly greater

than 0 at baseline ($M = .06$, $p < .001$) with significant variability around this mean for boys (.02, $p < .001$) and for girls (.01, $p < .001$). Estimated slope parameters indicated that the moderate episodic drinking slope was significantly greater than zero ($M = .16$, $p < .001$) with significant variability around this mean for boys (.05, $p < .001$), and marginally significant variability around this mean for girls (.03, $p = .07$).

Baseline likeability and popularity as predictors of drinking trajectories

The next goal of analyses was to build upon the unconditional growth curve models described above in order to examine central study hypotheses related to the prospective prediction of drinking trajectories. Three exogenous predictors were added to each of the models: (a) popularity, (b) likeability, and (c) the interaction between popularity and likeability. These predictors were centered prior to the computation of the interaction term and prior to being entered in the models.

Alcohol use. For the alcohol use model, paths were estimated between all predictors and the alcohol use latent intercept and slope. Model fit was good, $\chi^2 (11) = 11.22$, $p = .43$; χ^2/df $= 1.02$; CFI $= 1.00$; NFI $= .96$; RMSEA $= .01$. I next tested whether I would be able to fix all three covariances among the predictors across gender. The chi-square difference test indicated that constraining the covariances did not significantly change model fit, $\chi^2 (3) = 1.31$, $p = .73$, and thus constraints were retained for parsimony. Next, I examined whether each path predicting the alcohol use intercept or slope might be moderated by gender. I first tested whether it was possible to fix (across gender) the freely varying path from popularity to the alcohol use intercept. The chi-square difference test indicated that fixing the path across gender significantly worsened model fit, $\chi^2 (1) = 4.87$, $p = .03$. In other words, the relationship between popularity and baseline alcohol

use appears to be moderated by gender, and the path must be allowed to vary freely. An additional chi-square difference test indicated that fixing the path between likeability and the alcohol use intercept also worsened model fit, χ^2 (1) = 3.76, p = .05, and this path was also allowed to vary freely. However, fixing the path predicting the alcohol use intercept from the interaction between popularity and likeability did not significantly worsen model fit, χ^2 (1) = .78, p = .38, indicating that this relationship was not moderated by gender; the path was therefore fixed for parsimony. The paths between all three predictors and the alcohol use slope were fixed across gender for parsimony: The relationship between popularity and the alcohol use slope was not found to be significantly moderated by gender (χ^2 (1) = 1.51, p = .22), and neither were the relationships between the alcohol use slope and likeability (χ^2 (1) = .002, p = .96) or the interaction between likeability and popularity (χ^2 (1) = 1.91, p = .17). Final model fit was good, χ^2 (18) = 16.75; p = .54; χ^2/df = .93; CFI = 1.00; NFI = .94; RMSEA = .00.

All unstandardized and standardized path weights from the alcohol use model are listed in Table 3. Associations consistent with study hypotheses were revealed for popularity, but not for likeability. Among boys, higher levels of baseline (i.e., Grade 8) popularity were significantly associated with higher levels of baseline alcohol use (i.e., intercept), as well as with increased alcohol use trajectories (i.e., slope). Among girls, however, higher levels of baseline popularity only were significantly associated with increased alcohol use trajectories and not with Grade 8 alcohol use; the path weight between popularity and the alcohol use intercept approached but did not reach significance (p = .09). Contrary to hypotheses, *lower* levels of baseline likeability among boys were significantly associated both with higher levels of initial alcohol use and with

increased alcohol use trajectories. Among girls, lower levels of baseline likeability were also significantly associated with increased alcohol trajectories, but no relationship was found between likeability and Grade 8 alcohol use. Additionally, no relationships were found between the interaction of popularity and likeability, and either baseline alcohol use or alcohol use trajectories, for either boys or girls.

Moderate episodic drinking. For the moderate episodic drinking model, paths were estimated between all predictors and the moderate episodic drinking latent intercept and slope (hereafter referred to in this section as the "alcohol intercept" and "alcohol slope"). Model fit was good, χ^2 (11) = 11.27, p = .42; χ^2/df = 1.02; CFI = 1.00; NFI = .96; RMSEA = .01. I next tested whether I would be able to fix all three covariances among the predictors across gender. The chi-square difference test indicated that constraining the covariances did not significantly change model fit, χ^2 (3) = 1.31, p = .73, and thus constraints were retained for parsimony. Next, I examined whether each path predicting the alcohol intercept or slope might be moderated by gender. I first tested whether it was possible to fix (across gender) the freely varying path from popularity to the alcohol intercept. The chi-square difference test indicated that fixing the path across gender significantly worsened model fit, χ^2 (1) = 4.44, p = .04. In other words, the relationship between popularity and baseline moderate episodic drinking appears to be moderated by gender, and the path must be allowed to vary freely. However, none of the other five paths from the predictors to the intercept and slope were found to be moderated by gender. Fixing the following five paths did not significantly worsen model fit: the path between likeability and the alcohol intercept, χ^2 (1) = 2.42, p = .12; the path predicting the alcohol intercept from the interaction between popularity and likeability, χ^2 (1) = .51,

$p = .47$; the path between popularity and the alcohol slope, $\chi^2 (1) = .84$, $p = .36$; the path between likeability and the alcohol slope, $\chi^2 (1) = .12$, $p = .73$; or the path predicting the alcohol slope from the interaction between popularity and likeability, $\chi^2 (1) = .92$, $p = .34$. Thus, each of these five paths was fixed across gender for parsimony. Final model fit was good, $\chi^2 (19) = 17.40$; $p = .56$; $\chi^2/df = .92$; CFI = 1.00; NFI = .93; RMSEA = .00.

 All unstandardized and standardized path weights from the moderate episodic drinking model are listed in Table 4. Associations consistent with study hypotheses were revealed for popularity, but not for likeability. Similar, but not identical, relationships were found between the predictors and the moderate episodic drinking latent factors, as compared to the relationships between the predictors and the alcohol use latent factors. Among both boys and girls, higher levels of baseline (i.e., Grade 8) popularity were significantly associated both with higher levels of baseline moderate episodic drinking (i.e., intercept), as well as with increased drinking trajectories (i.e., slope). Contrary to hypotheses, *lower* levels of baseline likeability were significantly associated both with higher levels of initial moderate episodic drinking and with increased drinking trajectories, for both girls and boys. Additionally, no relationships were found between the interaction of popularity and likeability, and either baseline moderate episodic drinking or drinking trajectories, for either boys or girls.

DISCUSSION

Although initial research on the associations between peer status and alcohol use suggested that children who are rejected (i.e., low in *likeability*) may be at higher risk for increased substance use in adolescence, recent advances in our understanding of different forms of peer status, as well as advances in statistical methods used to study trajectories, now allow a more complex and nuanced assessment of the longitudinal associations between adolescent peer status and drinking. Recent studies of the longitudinal link between adolescents' *popularity* and drinking have yielded mixed results (c.f., Mayeux et al., 2008; Lansford et al., 2009). The current study addressed gaps in the literature by examining the relationships between peer status (i.e., popularity and likeability) and drinking, across the developmentally significant transition to high school. Among adolescents, drinking may be viewed as a symbol of both maturity (Moffitt, 1993) and high peer status (Mayeux et al., 2008), and the transition to high school is a particularly critical time for the development and transmittance of peer norms regarding risky behaviors (Moffitt, 1993). This study examined the relationships between peer status at 8th grade and alcohol trajectories from 8th to 10th grade, using latent growth curve modeling to capture the nature of these longitudinal relationships. The interaction between popularity and likeability was also explored as a potential predictor of drinking trajectories. It was hypothesized that higher popularity in 8th grade would be associated with higher baseline drinking and increased drinking trajectories over time, and also that higher likeability in 8th grade would predict such increases. Findings provided mixed

support for study hypotheses; higher levels of popularity, but *lower* levels of likeability, were associated with higher levels of concurrent and longitudinal drinking.

The trajectories of two different alcohol variables were examined in this study: alcohol use (defined as having one or more drinks) and moderate episodic drinking (defined as having three or more drinks within an episode). A very strong correlation was found between alcohol use and moderate episodic drinking, which is not surprising given that adolescents who engage in moderate episodic drinking must by definition also be consuming at least one drink within an episode. The patterns of results for unconditional and conditional models were similar for the two variables, and except where explicitly noted, references to "drinking" or "alcohol" will apply to results for both alcohol variables. However, in cases where differences emerged in the associations between the peer status variables and the two different alcohol variables, these differences will be explicitly noted and speculations about possible explanations for the differences will be proposed.

Prior to examining the primary study hypotheses, unconditional trajectories of alcohol use and moderate episodic drinking were examined. As expected based on well-established findings of increases in drinking over the course of adolescence (e.g., Johnston et al., 2009), growth in drinking was observed from 8th to 10th grade. Nonlinear patterns of growth were observed for both boys and girls, with steeper increases observed in drinking between 9th and 10th grade, as compared to the increase observed between 8th and 9th grade. Researchers (e.g., Moffitt, 1993) have highlighted the importance of the transition to high school in the adoption of new peer norms related to alcohol use and other risky behaviors; it may be that data collected in the fall of 9th grade (i.e., Time 2)

did not yet reflect participants' changes in attitudes toward alcohol use associated with the high school transition. Over the course of 9th grade, as adolescents become immersed in the high school culture and exposed to older youth who are already engaging in alcohol use, they may increase in their own frequency of drinking; these increases would be reflected in their use reported at the beginning of 10th grade (i.e., Time 3).

Gender differences emerged in the initial levels of drinking and in the growth of drinking trajectories. Consistent with findings that males engage in higher frequencies of drinking and consume greater amounts of alcohol (e.g., Wechsler et al., 1995), 8th grade boys reported higher levels of drinking than girls, although the difference was not statistically significant. Interestingly, while the overall latent slope factor did not significantly differ by gender, girls showed a sharper increase in drinking from 8th to 9th grade than did boys (i.e., the path weight from the slope to the 9th grade indicator was moderated by gender). It may be that for girls, norms surrounding alcohol use may differ more significantly between middle school and high school, whereas for boys, drinking in middle school may be more accepted or reinforced in the peer culture. However, these theories are speculative, and more research is needed regarding how gender may moderate the relationship between peer norms and adolescents' alcohol use in middle school and high school.

Following the examination of unconditional drinking trajectories, conditional latent curve models were used to test relationships between the predictors of popularity, likeability, and their interaction, and the longitudinal trajectories of alcohol use and moderate episodic drinking. Findings provide mixed support for the primary study hypotheses. Consistent with hypotheses, among both boys and girls, higher levels of

popularity in 8th grade were significantly associated with higher levels of 8th grade drinking and with increased longitudinal drinking trajectories from 8th to 10th grade (however, among girls, the relationship between popularity and the baseline alcohol use variable approached but did not reach significance). These findings suggest that youth who are considered by their peers to be higher in popularity (relative to grademates) at the end of middle school, may be at higher risk for drinking at the transition to high school.

Various theories may help explain the relationship between 8th grade popularity and drinking trajectories from 8th to 10th grade. For example, it may be that popular youth feel pressure to maintain their dominant status, and that they experience social rewards in the form of maintained status when they engage in deviant behaviors such as drinking (Mayeux et al., 2008; Bandura, 1974). It is also possible that popular youth are especially influenced by the maturity gap described by Moffitt (1993); eager to maintain their socially powerful status, they may drink to prove their maturity (Mayeux et al., 2008) and to demonstrate to peers that they are rejecting parental norms (Allen et al., 2005). Mayeux et al. (2008) suggest that popular adolescents' drive to prove and maintain their dominant status through substance use may increase during the transition to high school, a time when the social hierarchy may be redefined. Additionally, Moffitt's (1993) observation that the entrance into high school exposes adolescents to older role models and changing social norms regarding alcohol use, suggests that youth concerned with proving their maturity may be especially susceptible to risky drinking behaviors during the early high school years.

Another theory that may help explain the longitudinal association between popularity and drinking has been proposed by Allen and colleagues (2005), who tested a *popularity-socialization hypothesis* in which "popular" adolescents are particularly likely to be socialized to engage in drinking and other mild to moderate forms of deviance that are endorsed by peers (however, of note, "popularity" was based on nominations of peers with whom the participants would most like to spend time on a Saturday night). These researchers found that "popular adolescents were indeed more likely than less popular adolescents to move in the direction of perceived peer norms over time," in terms of engagement in alcohol use and other mild to moderate risk behaviors (Allen et al., 2005; p. 757). Additionally, the *prototype willingness model,* proposed by Gibbons, Gerrard, and colleagues (Gibbons & Gerrard, 1995; Gibbons, Gerrard, Blanton, & Russell, 1998), posits that if adolescents associate a particular health risk behavior with a specific prototype, and if their associations with that prototype are positive, their willingness to engage in that behavior will increase. Gerrard et al. (2002) found that when adolescents were instructed to "think for a minute about the type of person your age who drinks (alcohol) frequently," participants endorsed "popular" as describing that drinker prototype. Perhaps adolescents who are considered popular feel pressure to engage in drinking in order to match the prototype of the popular drinker and to reassert their social status, especially at the transition to high school, when the social hierarchy may be redefined.

As previously stated, it may be that popular youth desire to engage in drinking in order to prove their maturity (Moffitt, 1993), demonstrate their engagement in adult behaviors (Mayeux et al., 2008), and conform to peer norms (Allen et al., 2005). An

additional possible explanation to consider is that popular adolescents may find themselves in a higher number of situations in which drinking is an option. This idea has been proposed as a possible partial explanation of the observed association between higher levels of social contact and higher levels of alcohol use among college students (Ham & Hope, 2003), and it may be even more applicable for high school students. Due to its being illegal for those under age 21, adolescent alcohol consumption depends in part on the availability of alcohol, and drinking tends to occur at gatherings where alcohol is easily accessible to underage youth (Kobus & Henry, 2010). According to the Substance Abuse and Mental Health Services Administration, in 2008, only 5% of current drinkers aged 12 to 20 were alone the last time they drank, and a striking 82% of drinkers were with two or more people (SAMHSA, 2009). Compared to the 82% of adolescents who were with at least two people, only 14% of adolescents were with exactly one other person during their last drinking episode (SAMHSA, 2009); this statistic suggests that adolescent alcohol use may be especially likely to occur in the context of groups or social gatherings. Nationally representative data on heavy episodic drinking in a sample of 8th to 10th graders found that spending more evenings out with peers and the perceived availability of alcohol were two of the peer factors most strongly predictive of higher levels of drinking (Patrick & Schulenberg, 2010). Additionally, factors found to be associated with higher levels of alcohol use among young adults include larger social networks, greater amounts of social contact, and greater social competence (see Ham & Hope, 2003), characteristics that may be highly correlated with popularity among high school students.

Insofar as popularity is associated with larger social networks and higher levels of social contact, it may be that popular adolescents are more frequently in situations in which alcohol is available, as compared to their less popular peers. In particular, indirect evidence suggests a connection between popularity and attendance at social parties, and parties have been cited as a common setting in which high school drinking occurs (e.g., Hussong, 2000). Theory and research regarding the importance of behavioral *willingness* (e.g., Gibbons et al., 1998) provide potential support for the idea that the relationship between popularity and drinking may in part be related to popular youths' increased exposure to alcohol use. According to theories of behavioral willingness, adolescents' engagement in health risk behaviors such as alcohol use may not involve rational planning or forethought, but rather may constitute "reactions to risk-conducive circumstances that most adolescents are likely to encounter from time to time" (Gibbons et al., 1998, p. 1165). For example, although an adolescent may not plan to drink, he/she may end up in a "risk-conducive" situation (e.g., a social party) in which the opportunity to do so is presented and socially endorsed; the question then becomes whether an adolescent is *willing* to consume alcohol, now that the opportunity is present (Gibbons et al., 1998). It may be that many adolescents would be willing to experiment with alcohol and perhaps to engage in heavier levels of drinking if given the opportunity (or if socially pressured) to do so, but that popular adolescents are the ones who are more frequently involved in such circumstances. Alternatively, it may be that some popular youth would rather *not* drink, but may find it harder to abstain from drinking due to the frequency of their exposure to alcohol, as well as their own social visibility in the peer hierarchy. Additionally, research suggests that by adolescence, youth associate their popular peers

with higher levels of deviance and health risk behaviors (e.g., Prinstein, Meade, & Cohen, 2003; Xie, Li, Boucher, Hutchins, & Cairns, 2006). Because popularity may confer increased pressure to conform to social norms (Allen et al., 2005), popular adolescents may be more willing to engage in alcohol use once the opportunity is presented, in order to match the prototype (e.g., Gibbons & Gerrard, 1995) associated with popularity. Importantly, these theorized relationships between popularity, party attendance, and willingness to engage in drinking are speculative; research is needed to rigorously examine possible mediators of the relationship between popularity and drinking.

Interestingly, examinations of the relationships between *likeability* and drinking yielded results contrary to study hypotheses and in the opposite direction of the relationship observed between popularity and drinking. Among both girls and boys, *lower* levels of baseline likeability were associated both with higher levels of initial drinking and with increased drinking trajectories; the exception was that for the alcohol use variable, there was no relationship between 8th grade likeability and 8th grade alcohol use among girls. Overall, the findings of this study suggest that adolescents who are disliked by their peers at the end of middle school are at increased risk for drinking in 8th grade and across the transition to high school.   It seems that in spite of the high correlation between popularity and likeability in 8th grade (r=.61), higher popularity, and not likeability, confers unique risk for alcohol use. The finding that *lower* likeability is associated with increases in concurrent drinking as well as longitudinal drinking trajectories, raises the question of whether disliked youth are using alcohol for similar or different reasons as their popular peers. It is possible that adolescents low in likeability

are engaging in alcohol use in attempts to demonstrate their maturity, rebel against adult-prescribed norms, and fit in with their peers, perhaps to improve their standing in the social hierarchy – reasons that are theorized to contribute to popular youths' drinking. Alternatively, it is possible that rejected adolescents are using alcohol as a coping mechanism (e.g., self-medicating; Hussong, 2007). Additionally, it may be that lower likeability in 8th grade is associated with more global problems, such as academic and family difficulties, which may contribute to the increased risk for alcohol use. The results of this study suggest a complex relationship between peer status and drinking, and underscore the need for further research into the differential relationships between these two forms of status and the risk for alcohol use.

The finding that lower 8th grade likeability is significantly associated with higher longitudinal increases in drinking, differs from the findings of previous studies that examined associations between adolescent likeability and alcohol use. For example, Mayeux et al. (2008) found that 10th grade likeability had no unique predictive effect on drinking two years later; Lansford et al. (2009) found that changes in likeability from 7th to 8th grade were unassociated with changes in alcohol use over that one-year period; and Allen et al. (2005) found that *higher* 7th grade levels of a variable similar to likeability predicted increased alcohol use one year later. It may be that the current study's examination of trajectories from 8th to 10th grade captured unique processes involving likeability and drinking across the transition from middle school to high school. It is also possible that this study's use of latent growth curve modeling with three years' worth of data may have better captured the nature of these longitudinal relationships than was possible with linear regression analyses using data from two time points. Additional key

methodological differences among the studies must also be considered when comparing findings. For example, Lansford and colleagues examined *changes* in likeability from one year to the next, rather than examining the relationship between baseline likeability and concurrent and longitudinal increases in drinking. Additionally, in the Allen et al. study, although the peer status variable is more similar to likeability than to popularity (the researchers emphasize that their variable is a "liking-based" measure rather than a "status-based" measure), the measurement of the peer status variable differed from the current study's construct of likeability in several key ways. Specifically, Allen et al. asked adolescents to nominate grademates with whom they would most like to spend time on a Saturday night (defined as "like" nominations), and the calculation of their peer status variable did not incorporate "dislike" nominations. It may be that adolescents who are actively *dis*liked by their peers are at higher risk for alcohol use than are adolescents who simply receive a low number of "like" nominations. It is also important to note that differences in the measurement of alcohol use in these studies may have contributed to the different findings observed. For example, the alcohol use variable in Lansford and colleagues' study was based on responses to the question "Have you ever had a drink of alcohol, even just one sip?" In summary, the conflicting findings of the current study and past studies linking adolescent likeability and drinking may be due in part to the ages of the participants and the time periods studied, to the differences in the constructs and their measurements, and/or to other methodological differences.

Interestingly, the findings of the current study are more in accord with findings from studies examining the associations between *childhood* likeability and later adolescent substance use, than with findings from the three previously discussed studies

that measured likeability once participants had already reached adolescence. Early studies of the connection between childhood rejection (i.e., low likeability) and later negative adolescent outcomes found connections between lower childhood likeability and higher rates of adolescent delinquency (e.g., Parker & Asher, 1987). Additionally, researchers have specifically demonstrated that low likeability in childhood is related to increased substance use in adolescence (e.g., Prinstein & La Greca, 2004; Dishion et al., 1999). The findings of the current study add further complexity to our understanding of the possible associations between likeability and alcohol use, suggesting that adolescents who are disliked by their peers at the transition to high school may be at risk for increased drinking trajectories, whereas findings from previous studies of likeability and alcohol use in adolescence have not indicated this association. Clearly, further research on the longitudinal relationship between likeability and drinking will be needed to clarify the risk factors associated with high and low levels of peer acceptance.

Given this study's findings that higher levels of popularity are associated with concurrent and longitudinal increases in drinking, yet *lower* levels of likeability are associated with these increases, it might be expected that the *interaction* between popularity and likeability would be associated with baseline levels of drinking and drinking trajectories. If a significant interaction had been found, this finding would have indicated that among adolescents particularly high or low in popularity or likeability, differences in the level of the other peer status variable would have an influence on those adolescents' levels of drinking. However, no relationship was found between the interaction of likeability and popularity, and either concurrent or longitudinal levels of drinking. This lack of association is interesting given the high correlation between

popularity and likeability observed in this sample at Time 1, combined with the finding of opposite patterns of association between the alcohol variables and the two respective peer status variables. The finding suggests that the risk factors of high popularity and low likeability may independently confer risk for drinking during adolescence, not necessarily co-occurring within the same individuals.

It is interesting to note that although the correlation between alcohol use and moderate episodic drinking was high at each time point, stronger patterns of results were found for the moderate episodic drinking variable. For moderate episodic drinking, higher levels of baseline popularity predicted increased baseline drinking and increased drinking trajectories for both boys and girls, and lower levels of baseline likeability predicted these increases. In contrast, for the alcohol use variable, for girls, the relationship between 8th grade popularity and 8th grade alcohol use was in the expected direction but did not reach significance, and no relationship was found between 8th grade likeability and 8th grade alcohol use. It is interesting to consider possible explanations for why girls' 8th grade popularity was significantly associated with concurrent moderate episodic drinking but not with alcohol use. One possible speculation involves differences in the contexts in which these types of drinking may occur: Whereas lower levels of drinking may occur in a wider variety of contexts (e.g., within the home; Komro, Maldonado-Molina, Tobler, Bonds, & Muller, 2007), heavier drinking is more likely to occur at social gatherings with peers (e.g., Ham & Hope, 2003), and as previously noted, popular adolescents may be exposed to these gatherings more frequently.

The observed relationship between popularity and drinking in adolescence is potentially important not only because of its implications for the psychosocial wellbeing

and developmental trajectories of highly popular youth, but also because popular youth likely serve as reference groups and models for other students' behavior (Moffitt, 1993; Cohen & Prinstein, 2006; Mayeux et al., 2008). It is well established that peers' alcohol use can influence adolescents' perceptions of its acceptability and desirability (e.g., Cumsille et al., 2000). Additionally, in a study using social network analysis at 19 schools, Ennett and colleagues found that, after controlling for the effects of close friends' problematic drinking, adolescents' alcohol misuse was influenced by more "distant" peer relationships at their school (i.e., alcohol misuse was significantly predicted by the mean level of misuse in the social network) (Ennett et al., 2008). Moffitt (1993) also observed that adolescents could be influenced toward delinquency simply by observing peers model deviant behaviors "from afar." These peer influence effects may be stronger if the adolescents who engage in drinking are popular. Indeed, it is likely that popular students help define the social norms for substance use in their schools (Prinstein et al., 2003; Cohen & Prinstein, 2006), dictating what is "cool" (Pirkle & Richter, 2006) and modeling socially desirable substance use for other youth (Moffitt, 1993). Cohen and Prinstein's (2006) work provides empirical support for the hypothesis that adolescents will be more heavily influenced to engage in deviant behavior such as substance use if the behavior is endorsed by popular peers. In a "chat room" in which adolescent boys believed they were conversing with popular or unpopular peers from their school, the participants were more likely to conform to risky attitudes regarding drinking and other health risk or aggressive behaviors, when those attitudes were endorsed by the popular "e-confederates" (Cohen & Prinstein, 2006). The findings of the current study and past studies suggest that alcohol abuse prevention efforts and social

norms campaigns could benefit from considering the potentially significant impact of popular adolescents' attitudes towards substance use; perhaps interventions targeting popular high school students could indirectly influence the attitudes and behaviors of the wider student body.

Although this study provided an important initial exploration of the relationships between likeability, popularity, and trajectories of alcohol use across the transition to high school, future studies should aim to investigate these relationships over more than three years, including when adolescents are older and engaging in higher levels of drinking. Additionally, because the latent growth curve framework cannot be used to examine changes in standardized scores (i.e., because scores at each time point have a mean of zero), alternative statistical models should be explored that could allow for the examination of reciprocal longitudinal influences between peer status and alcohol use. Another limitation of this study is the lack of sufficient ethnic diversity to allow for ethnicity analyses; little is known about the importance of ethnicity in the determination and meaning of popularity (Mayeux et al., 2008), and future research should aim to understand the role of popularity in schools that primarily serve minority students or are ethnically diverse. Another important direction for future research will be to examine the potential interaction between popularity and other variables (e.g., family variables, adolescent characteristics such as impulsivity) in relation to substance use. Furthermore, although this study examined longitudinal associations among variables, the lack of a controlled experimental design precludes conclusions related to causation. Carefully designed experiments can help to establish causal relationships, and can also be used in the development of preventive interventions. For example, the "chat room" studies of

Cohen and Prinstein (2006) have provided empirical evidence for a relationship between popularity and influence on risk behaviors, and future work with this chat room paradigm could help to "actively manipulate" social norms surrounding substance use and other health risk behaviors (Prinstein et al., 2003).

In summary, the current study addressed gaps in the literature by using latent growth curve modeling to examine the relationships between two forms of peer status (i.e., popularity and likeability) and longitudinal trajectories of drinking across the transition to high school. Higher popularity in 8th grade was associated with higher baseline drinking and increased drinking trajectories from 8th to 10th grade, while *lower* likeability in 8th grade predicted such increases. These findings underscore the importance of studying the risk behavior correlates of these two distinct peer status constructs, and results suggest the value in considering preventive interventions that target popular youth; these adolescents may be at higher risk for alcohol use and also may be in a unique position to influence the attitudes and behaviors of their peers.

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Table 1. Means (and Standard Deviations) for Primary Variables at Time 1 - Time 3

	Boys	Girls	t (df)
Time 1			
Alcohol Use	.09 (.20)	.06 (.15)	t (161) = 1.19
Moderate Episodic Drinking	.08 (.17)	.05 (.13)	t (161) = 1.35
Popularity	.08 (.98)	.11 (.87)	t (163) = -0.22
Likeability	.04 (.86)	.33 (.93)	t (163) = -2.12*
Time 2			
Alcohol Use	.08 (.19)	.15 (.22)	t (159) = -1.92
Moderate Episodic Drinking	.07 (.17)	.12 (.19)	t (158) = -1.83
Time 3			
Alcohol Use	.21 (.27)	.28 (.29)	t (157) = -1.62
Moderate Episodic Drinking	.19 (.25)	.24 (.26)	t (157) = -1.09

* $p < .05$; ** $p < .001$

Table 2. Bivariate Associations Among Primary Variables

	1	2	3	4	5	6	7
Time 1							
1. Alcohol Use	-						
2. Moderate Episodic Drinking	.98**	-					
3. Popularity	.26**	.25**	-				
4. Likeability	.07	-.02	.66**	-			
Time 2							
5. Alcohol Use	.53**	.52**	.27**	.01	-		
6. Moderate Episodic Drinking	.48**	.48**	.30**	.01	.97**	-	
Time 3							
7. Alcohol Use	.29**	.28**	.35**	.08	.48**	.46**	-
8. Moderate Episodic Drinking	.31**	.31**	.38**	.08	.50**	.48**	.97**

$* p < .05; ** p < .001$

Table 3. Longitudinal Prediction of Alcohol Use Trajectories by Popularity, Likeability, and the

Interaction between Popularity and Likeability (*n* = 165)

Predictors	Intercept		Slope	
	b (se b)	β	b (se b)	β
Boys' Alcohol Use				
Popularity	.09 (.02)	.57**	.09 (.03)	.38**
Likeability	-.07 (.02)	-.38*	-.06 (.03)	-.21*
Popularity x Likeability	-.01 (.01)	-.03	.01 (.02)	.05
Girls' Alcohol Use				
Popularity	.04 (.02)	.22	.09 (.03)	.39**
Likeability	-.01 (.02)	-.09	-.06 (.03)	-.28*
Popularity x Likeability	-.01 (.01)	-.04	.01 (.09)	.07

* *p* < .05; ** *p* < .001

Table 4. Longitudinal Prediction of Moderate Episodic Drinking Trajectories by Popularity, Likeability, and the Interaction between Popularity and Likeability (*n* = 165)

Predictors	Intercept		Slope	
	b (se b)	β	b (se b)	β
Boys' Moderate Episodic Drinking				
Popularity	.07 (.02)	.54**	.09 (.02)	.43**
Likeability	-.04 (.01)	-.27*	-.05 (.03)	-.22*
Popularity x Likeability	-.01 (.01)	-.04	.01 (.02)	.05
Girls' Moderate Episodic Drinking				
Popularity	.05 (.02)	.38*	.09 (.02)	.51**
Likeability	-.04 (.01)	-.32*	-.05 (.03)	-.29*
Popularity x Likeability	-.01 (.01)	-.06	.01 (.02)	.08

* $p < .05$; ** $p < .001$