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Predictors of Susceptibility to Peer Influence Regarding Substance Use in Adolescence

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Abstract

The extent to which peer influences on substance use in adolescence systematically vary in strength based on qualities of the adolescent and his or her close friend was assessed in a study of 157 adolescents (Age: $M = 13.35$, $SD = 0.64$), their close friends and their parents assessed longitudinally with a combination of observational, analogue, sociometric, and self-report measures from early to mid-adolescence. The degree to which adolescents changed their levels of substance use in accord with their peers' baseline levels of use was predicted by a range of theoretically-salient factors including: observed teen lack of autonomy and social support in prior interactions with mothers, low teen refusal skills, and the level of social acceptance of their close friend. Findings suggest the importance of both internal factors (e.g., autonomy and relatedness struggles) and external factors (e.g., social status of friends) in explaining why vulnerability to peer influence processes may be much greater for some adolescents than others.

Although peer relationships provide an essential milieu in which adolescents can develop social skills and learn appropriate social behavior, adolescent conformity to the negative norms of some of their peers also serves as a major risk factor for outcomes from delinquency and substance use to risky sexual behavior (DiIorio et al., 2001; Hops, Andrews, Duncan, Duncan, & Tildesley, 2000; Prinstein, Boergers, & Spirito, 2001; Urberg, Degirmencioglu, & Pilgrim, 1997). Yet, exposure to the peer world is crucial and unavoidable during adolescence, as failure to form strong bonds by the time one reaches adulthood has also been linked to a range of negative outcomes including depression, conflictual marital relationships, and even an increased likelihood of early mortality (House, Landis, & Umberson, 1988; Klerman, Weissman, Rounsaville, & Chevron, 1984; Miller, Smith, Turner, Guijarro, & Hallet, 1996).

Given the normative increase in deviant behavior that occurs in adolescence, virtually all teenagers can expect to be exposed to significant levels of problematic behavior within their broader peer groups (Moffitt, 1993). Among youth identified as at risk for delinquent behavior, peers can strongly support the development of each other's delinquent behavior in part by entraining one another in deviant behavior patterns (Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003; Bryant Ludden & Eccles, 2007; Dishion, Poulin, & Burraston, 2001; Dishion, Spracklen, Andrews, & Patterson, 1996). Even within relatively normal adolescent peer groups, however, behavioral susceptibility to negative peer influence is a source of great concern. Yet, we know strikingly little about which adolescents are most likely to join in vs. avoid the deviant behavior that is present to some degree in almost all adolescent peer groups (Fergusson, Woodward, & Horwood, 1999).

Hartup (2005) has noted both the importance of identifying characteristics of the individual that determine their likelihood of being influenced by peers, as well as the relative lack of research to date on this topic. Within any peer interaction, influences are potentially bi-directional in nature, and may have different valences for different parties in the interaction, in part reflecting the complex blend of friendship and dominance traits that are present in most peer relationships (B. Bradford Brown, 1999; Furman & Simon, 1998). We know that if a non-deviant adolescent is exposed to a deviant peer, for example, that adolescent may tend to become more deviant (Capaldi, Dishion, Stoolmiller, & Yoerger, 2001). Conversely, the deviant adolescent may also be influenced by their non-deviant peer to become *less* deviant over time (B. Bradford Brown, Clasen, & Eicher, 1986; Heliste, 2009). The critical factor in determining outcomes of such bi-directional interactions, however, may be the degree to which any given adolescent is susceptible to influence by his or her peers.

Recognizing that some adolescents may be more susceptible to peer influence than others may also be crucial to addressing the ongoing debate about the actual magnitude of peer influences in adolescence. Jaccard and colleagues (2005) note for example, that even strong research in this area has often been burdened by methodological confounds, such as reliance on adolescent reports of both self and peer substance use (Curran, Stice, & Chassin, 1997; Windle, 2000). They report consistent though modest peer influence effects in research that goes beyond single-reporter designs. It may be, however, that the real answer to the question: how important are peer influence processes in adolescent problem behavior, is that the magnitude of these influences may vary significantly depending upon the characteristics of the individual adolescent.

This study views peer influence processes within a comprehensive framework linked to the overarching developmental task of learning to establish autonomy in social interactions. Brown and colleagues note that influence processes can be arrayed along a continuum from individual factors to contextual factors (B. B. Brown, Bakken, Ameringer, & Mahon, 2008). This study builds upon this perspective by exploring a social-contextual model of autonomy development and peer influence processes in which peer influences are viewed as likely to be moderated by a factors ranging from distal family factors to individual skill levels. Thus we consider the extent to which a teen's autonomy in relation to a given peer is affected by: family factors (e.g., qualities of interactions within the family); peer factors (e.g., the social position of the adolescent's close friend, and the duration of the friendship); and the teen's own individual social skill in handling autonomy issues with peers. Together, these factors capture a continuum of key contextual and individual realms in which autonomy development plays out in adolescence.

In family studies, an adolescent's ability to develop autonomy while maintaining positive relationships with parents has been viewed as a critical task of social development (Allen, Hauser, Bell, & O'Connor, 1994), and such family relationships are now recognized as providing an important template for future peer relationships (Collins & Repinski, 1994; Sroufe, Egeland, & Carlson, 1999). Fuligni and Eccles' classic study shows, for example, that orientation toward peers (and thus potential peer influence) is more likely to be high when parents do *not* relax their power and restrictiveness and do not allow the adolescent to develop autonomy (Fuligni & Eccles, 1993). Over time, a supportive parent-teen relationship may also serve as a context in which a teen learns autonomy skills that may then transfer to peer relationships. The converse may also occur. Although they did not observe or assess support processes directly, Jaccard and colleagues (2005) found, for example, that peer influence appeared greater among adolescents who self-reported high levels of dissatisfaction with their maternal relationship.

Hartup (1999) has also noted that a comprehensive theory of peer socialization needs to account for the likelihood that some children exert greater influence over their contemporaries than others. Relatively few studies have examined peer influence from this perspective, however. Those that have done so suggest that whether peer influences are positive or negative in nature partly depends upon both partners' initial level of functioning (Adams, Bukowski, & Bagwell, 2005; Dishion & Owen, 2002; Vitaro, Tremblay, Kerr, Pagani, & Bukowski, 1997). Within an experimental paradigm, apparent peer status has been found to significantly moderate the degree of peer influence (G. L. Cohen & Prinstein, 2006). In the present study, we consider whether the extent to which a peer is well-liked within the broader social milieu enhances their influence with a target teen. Our expectation was that target teens would be more likely to adopt the behavior of their well-liked friends, both because well-liked friends would tend to be more socially skilled (and hence persuasive and influential) and because of the enhanced status and influence their social facility would bring.

We also considered the duration of a particular relationship as a factor that might be predictive of a given peer's influence. In terms of handling overt disagreements, stability in a friendship has been seen as likely to enhance teens' autonomy (Allen, Porter, & McFarland, 2006); conversely, more intimate relationships with peers have been cross-sectionally associated with drinking in order to get drunk (Palmqvist & Santavirta, 2006). Similarly, adolescent popularity—a marker of peer connection—has also been linked to increases in alcohol use over time (Allen, Porter, McFarland, Marsh, & McElhaney, 2005). And Jaccard and colleagues (2005) found no effect of measures of current intensity of friendships on degrees of peer influence, thus leaving unclear the role of stable long-term friendships on peer influence toward deviant behavior, but suggesting that this factor is important to examine.

Finally, in addition to considering predictors of susceptibility to peer influence in terms of autonomy promoting and inhibiting forces in the adolescent's family and peer contexts, we also assessed autonomy development directly in terms of adolescent peer refusal skills. In spite of the likely importance of such skills, most of the extant self-report measures of peer pressure and peer influence focus primarily on whether individuals *are pressured* by others, not on their level of susceptibility to such pressure. These measures have been characterized as suffering from fundamental psychometric problems, and/or have confounded the assessment of adolescents' susceptibility to peer pressure with their willingness to engage in deviant acts (Berndt, 1979, 1992; B. Bradford Brown, 1999; Santor, Messervey, & Kusumakar, 2000). Nevertheless, these measures suggest that self-reported experience of peer pressure is at least linked to self-reports of levels of problematic behavior (B. Bradford Brown et al., 1986; Santor et al., 2000). Allen and colleagues (2006) assessed this issue of susceptibility more directly, finding that individual differences in susceptibility could be identified in an experimental task that then predicted future increases in substance problems when around substance using peers. No research, however, has directly assessed the role of teens' skill levels in handling negative peer pressure as predictors of their susceptibility to peer influence.

This study used longitudinal, multi-method data obtained from adolescents, their parents, and their closest peer to examine the extent to which actual behavioral vulnerability to peer influence processes around substance use might vary based on the autonomy supporting or undermining qualities of an individual adolescent's family experiences, characteristics of close friends, and individual peer refusal skills. It was hypothesized that adolescents would be most vulnerable to peer influence processes when they: a) lacked a history of maternal support and had past experiences within the family undermining their sense of autonomy and relatedness; b) had friends who were very well-liked within the broader peer group; and

c) were lacking in social skill handling peer deviance. These risk factors were all considered within a diverse community sample that was followed longitudinally in early- and mid-adolescence. The role of adolescent gender and family income were also considered as potential moderators of effects observed.

Method

Participants

This report is drawn from a larger longitudinal investigation of adolescent social development in familial and peer contexts. The full sample included 184 seventh and eighth graders (86 male and 98 female; Age: $M = 13.35$, $SD = 0.64$) and their parents. The sample was racially/ethnically and socioeconomically diverse: 107 adolescents (58%) identified themselves as Caucasian, 53 (29%) as African American, 15 (8%) as of mixed race/ethnicity and 9 (5%) as being from other minority groups. Adolescents' parents reported a median family income in the \$40,000 - \$59,999 range. Adolescents were originally recruited from the 7th and 8th grades at a public middle school drawing from suburban and urban populations in the Southeastern United States. Students were recruited via an initial mailing to all parents of students in the school along with follow-up contact efforts at school lunches. Adolescents who indicated they were interested in the study were contacted by telephone. Of all students eligible for participation, 63% agreed to participate either as target participants or as peers providing collateral information. Interviews took place in private offices within a university academic building.

For the purposes of the present study, 157 (85%) of the original adolescents provided data on levels of substance use at the age 15 assessment ($M_{age} = 15.2$, $SD = .81$) and 148 provided data on substance use at the age 16 assessment ($M_{age} = 16.3$, $SD = .87$). These adolescents were also assessed at ages 13 in observed interactions with their mothers, and with analogue measures of social skills at ages 13 to 15.

At the age 15 assessment, adolescents' were also asked to nominate their "closest friend" of the same gender to be included in the study. Close friends were defined as, "people you know well, spend time with and who you talk to about things that happen in your life." For adolescents who had difficulty naming a closest friend, it was explained that naming their "closest" friends did not mean that they were necessarily very close to this friends, just that they were close to this friend *relative* to other acquaintances they might have. In all cases, adolescents were able to name at least one closest friend using these criteria. Close friends reported that they had known the adolescents for an average of 5.0 years ($SD = 3.2$) at the age 15 assessment.

Attrition analyses indicated no differences between the 157 adolescents who reported data on substance use at age 15 and the original 184 adolescents in the study, nor between these 157 adolescents and the 147 who provide substance use data at age 16 on any of the measures used.

To best address any potential biases due to attrition and missing data in longitudinal analyses, Full Information Maximum Likelihood methods were used, with analyses including all variables that were linked to future missing data (i.e., where data were not missing completely at random). Because these procedures have been found to yield less biased estimates than approaches (e.g., simple regression) that use listwise deletion of cases with missing data, the entire original sample of 184 for the larger study was utilized for these analyses. This analytic technique does not impute or create any new data nor does it artificially inflate significance levels. Rather it simply takes into account distributional characteristics of data in the full sample so as to provide the least biased estimates of

parameters obtained when some data are missing (Arbuckle, 1996). Alternative longitudinal analyses using just those adolescents without missing data (i.e., listwise deletion) yielded results that were substantially identical to those reported below.

For all data collection, adolescents and their peers provided informed assent, and their parents provided informed consent before each interview session. Interviews took place in private offices within a university academic building. Adolescents, parents, and peers were all paid for their participation. Participants' data were protected by a Confidentiality Certificate issued by the U.S. Department of Health and Human Services, which further protects information from subpoena by federal, state, and local courts. If necessary, transportation and child care were provided to participants.

Measures

Substance Use—Adolescent and close friend use of alcohol and marijuana were assessed with the Alcohol and Drug Use Questionnaire (Johnston, O'Malley, & Bachman, 1987), a self-report measure that includes items assessing the frequency of adolescent use of alcohol and/or marijuana in the past 30 days. It was completed independently by both target teens and their closest friend at ages 15 and again by the target teen at age 16. This measure is based on the “Monitoring the Future” surveys (Johnston, O'Malley, & Bachman, 1987). Johnston and colleagues (1987) found high reliability from year to year and consistency between related measures within the same questionnaire administration. Construct validity in their research was demonstrated as self-reported substance use was related to attitudes, beliefs, and related behaviors and under-reporting appeared to be minimal.

Observed Autonomy Difficulties with Mothers—Adolescents and their mothers participated in a revealed differences task at the age 13 assessment in which they discussed a family issue that they had separately identified as an area of disagreement. Adolescents and their parents were then brought together, and the discussion began with the adolescent playing an audiotape that he or she had previously recorded with an interviewer in which he or she stated the problem, his or her perspective on it, and what the adolescent thought his or her parent's perspective was. Typical topics of discussion included money, grades, household rules, friends, and sibling issues. These interactions lasted eight minutes and were videotaped and then transcribed.

Autonomy difficulties were assessed using a rating system that captures adolescents' recantations of their original position, which were assessed as the degree to which adolescents were observed to back down from their position during the interaction without appearing to have actually been persuaded that their position was incorrect (Allen et al., 2000; Allen et al., 1994). Recantations in each interaction were reliably coded as the average of scores obtained by two trained raters blind to other data from the study. Inter-rater reliability was calculated using intraclass correlation coefficients was considered in the “good” range (Intraclass $r = .68$) (Cicchetti & Sparrow, 1981).

Maternal Support—Adolescents also participated in an 8-minute supportive behavior interaction task with their mothers at age 13, during which they asked for help with a “problem they were having that they could use some advice or support about.” Typical topics included problems with peers or siblings, raising money, or deciding about joining sports teams. These interactions were coded using the Supportive Behavior Coding System (Allen et al., 2001), which was based on several related systems (Crowell et al., 1998; Julien et al., 1997). Maternal support was reliably coded as the degree to which mothers expressed warmth, positivity, and valuing of the adolescent using an average of the scores obtained by

two trained raters blind to other data from the study, with excellent reliability (Intraclass correlation =.77).

Close Friend Social Acceptance—The degree to which a teen's close friend was well-liked was assessed using a limited nomination sociometric procedure. Each adolescent, their closest friend and two other target peers named by the adolescent were asked to nominate up to 10 peers in their grade with whom they would most like to spend time on a Saturday night and an additional 10 peers in their grade with whom they would least like to spend time on a Saturday night. This study used grade-based nominations (e.g., students could nominate anyone in their grade at school) rather than classroom based nominations due to the age and classroom structure of the school that all participants attended. As a result, instead of friendship nominations being done by 15 to 30 children in a given classroom, each teen's nominations were culled from among 72 to 146 teens (depending on the teen's grade level), these nominators comprised approximately 38% of the entire student population in these grades. Although this differs from the coverage achieved in classroom rating procedures, the large number of raters for each teen (in essence, each teen received a yes/no nomination from each nominator in his/her grade) means that this subsample of nominators is likely to yield fairly reliable estimates of social acceptance for each teen. Preliminary analyses of the stability of social acceptance ratings over time (indicating a 1-year stability coefficient of $r = .75$, $p < .0001$) further suggest that this procedure was indeed reliably capturing the social acceptance of the teens in our study. Other data indicate that social acceptance assessed in this manner is strongly linked to other theoretically relevant indices such as attachment security and quality of close friendship (Allen, Porter, McFarland, McElhaney, & Marsh, 2007). The raw number of nominations each teen received was standardized within grade level before being added to the main data set following the procedure described by Coie et al (1982).

Social Skill Handling Deviance—A modified version of the Adolescent Problem Inventory (API) for boys and the parallel Problem Inventory for Adolescent Girls (Freedman, Rosenthal, Donahoe, Schlundt, & McFall, 1978; Gaffney & McFall, 1981) was used to assess adolescents' social skill in handling deviance. Adolescents self-reported their most likely responses to a series of problematic hypothetical situations, which were then rated for their competence not only in resolving the situation at hand but also in making future problematic situations less likely using a 0 to 10 scale. Situations included conflicts with peers, parents, and teachers, and situations in which adolescents might be tempted to engage in delinquent behaviors.

This assessment proceeded in two steps: For the first five situations, adolescents provided their responses without any indication as to how others would respond. For the second five situations, adolescents were first told of a hypothetical peer's deviant response (e.g., “One teen stated that they would take the sweater from the store and run.”). The degree to which adolescents' rated skill levels *declined* from the first five situations to the second five situations (e.g., after hearing another teen's deviant response) was used as a marker of presence or absence of skills in the face of deviant peer behavior. This measure was obtained repeatedly at each of the first 3 waves of data collection (ages 13, 14, and 15) using different items at each wave, and the mean of scores across three waves was used in analyses. Overall reliability for this final measure, calculated using the intraclass correlation coefficient, was $r = .87$, which is considered in the “excellent” range for this statistic (Cicchetti & Sparrow, 1981).

Results

Preliminary Analyses

Means and standard deviations for all substantive variables are presented in Table 1. The increase in teens' level of soft substance use from age 15 to age 16 was highly significant ($t = 3.79, p < .001$). For descriptive purposes, Table 1 also presents the results of simple univariate (or point-biserial where relevant) correlations among the key variables of interest in the study. These reveal a significant overall relation between teen substance use at both ages and peer reports of their own substance use at age 15. Adolescent gender and family income were also related to several variables in the study and hence were included as covariates in all analyses below.

Primary Analyses

Analyses were designed to assess the extent to which a teen's future levels of substance use could be predicted from baseline levels of peer substance use, after controlling for baseline levels of teen substance use. This approach of predicting the future level of a variable while accounting for predictions from initial levels (e.g., stability), yields one marker of change in that variable: increases or decreases in its final state relative to predictions based upon initial levels (J. Cohen & Cohen, 1983). Analyses focused upon the question of whether predictions from baseline peer substance use to future teen substance use would be stronger for some teens than for others (i.e., would teen characteristics moderate the predictive strength of peer substance use on their own future changes in substance use).

Moderating Effects of Maternal Support and Adolescent Recantations in Interactions

Analyses first examined the moderating effects of the target teen's prior experience of support from their mothers, and of their observed tendency to recant their own position while appearing unconvinced in disagreements with their mothers. Hierarchical regression analyses predicted age 16 teen substance use from teen use at age 15, followed by teen gender and family income, level of peer substance use at 15, maternal support and adolescent recantations, and the interaction of peer use with both maternal support and adolescent recantations. Results are presented in Table 2. As expected, a significant effect of peer use at 15 in predicting future teen substance use was found. Also as hypothesized, both familial experience variables moderated the effect of peer substance use on relative changes in teen substance use over the following year. Results are depicted in Figure 1, which presents regression lines for teens one standard deviation above and below the mean in maternal support and adolescent recantations, using standardized scores on the x- and y-axes. As Figure 1 shows, peer substance use was more likely to predict future relative changes in teen substance use for teens who had experienced less maternal support in interactions and for teens who were more likely to recant their positions in disagreements with their mothers in early adolescence.

Moderating Effects of Peers' Popularity and Friendship Duration

Analyses next examined the moderating effects of the popularity of the target teen's closest peer and the duration of the friendship using the same approach described above. Results are presented in Table 3. Peer popularity was found to be a significant moderator of the relation between peer substance use and relative changes in teen substance use over the following year. Duration of friendship did not display any moderating effects. Figure 2 depicts the moderating effect of peer popularity, and shows that relative increases in teen substance use are much more likely to be predicted by high baseline levels of peer substance use when that peer is popular among other adolescents.

Moderating Effects of Adolescent Social Skill Handling Deviance

Analyses next examined the extent to which adolescent social skill handling deviance would moderate the relation between peer substance use and relative changes in teen use over the following year. Adolescents' skill handling deviant peer behavior significantly moderated the relation between peer substance use and relative changes in target teen substance use over the following year, as shown in Table 4. Figure 3 depicts the moderating effect of adolescent social skills, and shows that peer substance use became a stronger predictor of relative increases in teen substance use over time when teens were relatively low in social skill handling peer deviance.

Creating and Testing a Summary Measure of Susceptibility to Peer Influence

Finally, on a post-hoc basis, we created a composite of the susceptibility measures by standardizing then summing the variables that interacted with peer substance use in the models above (adding social acceptance and teen recantations directly, and reverse-scoring and adding teen social skills and maternal support). As shown in Table 5, this factor, which might be considered as a composite of the risks of susceptibility to peer influence, strongly interacted with peer substance use to predict relative changes in future teen substance use ($\beta = -.33, p < .001$) and accounted for 11% of the total variance in adolescent substance use at age 16, even after accounting for baseline use and demographic factors.

Post-hoc test of Peer Social Acceptance Relative to Teen Acceptance

We also considered the possibility that friend social status might be an even stronger moderator if it was considered relative to target participant status. We thus created a score that reflected the degree to which friend status was higher or lower than participant status (by subtracting the latter from the former), however this alternative measure was not found to be a moderator of peer influence processes.

Post-hoc test of demographic moderators

Finally, we considered whether potential moderating effects of teen gender and family income might add to explained variance in predicting future teen substance use. However, when interactions of gender and family income with peer substance use were added to the final model above, no moderating effects were found for either of these demographic factors.

Discussion

Using a multi-method, multi-reporter, longitudinal design, this study explored a social-contextual model of autonomy development and peer influence processes and was able to identify several factors that predicted the extent to which an adolescent's relative change in levels of substance use over a one-year period could be predicted by a close friend's level of use at baseline. As hypothesized, close friend use was a significant overall predictor of change in the target adolescent's use over this period. More importantly, though, a number of theoretically-predicted factors moderated this relationship, reflecting the broad impact of both contextual and individual factors linked to adolescent autonomy development in explaining peer influence processes. Results suggest that peer influence regarding adolescent substance use is maximized in social contexts in which adolescents approach autonomy issues from a relatively weak family base (lacking autonomy with their mothers and feeling less supported by their mothers); possess weak social skills in handling peer deviance, and are confronted with a peer who is well-liked within the broader peer group. Each of these findings, along with their limitations, is discussed in turn below.

Peer influence processes appeared linked to several indicators of adolescents' prior experiences within their own families of origin. Adolescents who were observed in a revealed differences task to easily back away from their initial positions in disagreements with their mothers in early adolescence—a marker of problematic autonomy development—were most likely to have their future substance use predicted by their friend's use at baseline. This finding is consistent with the notion that these adolescents were struggling with the basic developmental task of establishing autonomy vis a vis parents, and that this pattern of autonomy struggles displayed continuity to qualities of peer relationships, as has been previously suggested (Allen, Hauser, O'Connor, & Bell, 2002). In short, autonomy difficulties in the family domain in early adolescence do not appear to remain confined to that domain, but rather appear to reflect difficulties that leave the adolescent set up to more easily adopt peer deviant behaviors as adolescence progresses.

In addition, however, maternal behaviors in interactions with adolescents were also linked to apparent susceptibility to peer influence. Teens who were observed to experience high levels of support from their mothers at age 13 were less likely to adopt levels of substance use consistent with their friends' use later on in mid-adolescence. Notably, maternal support was assessed in a different observational task than the recanting behaviors assessment above—a task designed to capture, not autonomy struggles, but rather qualities of attachment relationships and supportive behavior. It may be that teens who are secure in their ability to turn to their mothers under stress are less likely to end up feeling overly dependent upon their close friends, and thus less likely to be influenced by their friend's behavior. Further research would be needed, of course, to begin to assess whether this sort of mechanism was actually functioning and could account for the findings observed. It is noteworthy, however, that predictions from maternal support were found over and above predictions from adolescent recanting behavior with mothers, thus suggesting that family autonomy and support processes may each have unique contributions to make in understanding teen-peer interactions, just as they have been found to uniquely explain other adaptive outcomes in adolescence (Allen, Hauser et al., 2002; Allen, Marsh et al., 2002; Jaccard et al., 2005).

The degree to which teens adopt their friends' behavior regarding substance use was not just linked to qualities of the teen's family environment, but also to qualities of the close friend involved. Specifically, adolescents with close friends who were well-liked within the broader peer group were far more likely to have their future substance use predicted by their friend's current level of use. One explanation for these findings is that friends who are well-liked have both a high degree of social caché and a high degree of social skill. This would make them particularly attractive as potential role models to other teens, and such a modeling process may underlie the effects observed. Notably, the particular sociometric measure used was a preference-based (as opposed to a status-based measure). This is relevant in that status-based measures (i.e., who teens think of as being the 'popular kids') have previously been associated with dominance-behaviors, whereas preference-based measures (i.e., who teens name as teens with whom they would actually like to spend time) have not (Prinstein, in press). Thus, the phenomenon observed does not appear to be particularly likely to be linked to dominance-seeking behaviors on the part of well-liked peers. Nonetheless, the potential influence of well-liked peers with respect to substance use may be particularly important to attend to, particularly given findings that well-liked peers are themselves more likely to engage in higher levels of substance use as adolescence progresses (Allen et al., 2005).

On the individual level, we also identified lack of social skills in the face of peer deviant behavior as a marker of susceptibility to apparent peer influence. This study modified a long-established analogue measure for assessing adolescent social skills (Freedman et al., 1978; Gaffney & McFall, 1981) so that adolescents were asked to respond to challenging

peer situations under two conditions: one in which they did not know how others would respond, and a second in which they were first told of another hypothetical peer's relatively deviant response. The degree to which adolescent skill levels *decreased* from their baseline level after the adolescent heard another teen's deviant response was used as a marker of lack of social skills *in the face of deviant peer behavior* (as opposed to a lack of skills overall). Teens lacking such skills were found more likely to change their level of substance use over time in accord with their closest friend's level of substance use (e.g., to report relative increases when friend use was high at baseline, and relative decreases when friend use was low). The development of this measure continues a line of research suggesting that adolescent vulnerabilities to peer influence processes can be effectively assessed via hypothetical and analogue procedures (Allen et al., 2006). It also further extends past questionnaire studies of susceptibility by identifying a predictor that was explicitly constructed so as not to be simply a measure of general deviance proneness (Berndt, 1992).

The nature of the specific analogue measure used also suggests that for some adolescents, simply *hearing* about a *hypothetical* peer's deviant behavior was associated with providing less competent responses to hypothetical problems, which in turn predicted greater apparent peer influence. This raises the possibility that even very common and relatively non-coercive peer processes (e.g., an adolescent simply being exposed to deviant peer behavior and then choosing to behave in more deviant fashion) may potentially account for a significant degree of actual peer influence. Prior research has identified general processes by which individuals at-risk for deviant behavior may entrain each other in such behavior (Dishion et al., 2001; Dishion et al., 1996; Poulin, Dishion, & Haas, 1999); analogue findings from this study suggest that such entrainment may in some cases require little more than simple exposure to deviant behavior.

Because the social contextual approach taken suggests that the factors examined would act together to moderate peer influence, on a post-hoc basis, a composite measure of potential susceptibility factors was created from the constructs described above. This combined measure predicted a very substantial portion of the variance in teen substance use at age 16, even after accounting for substance use at 15. Although the amount of variance predicted suggests some degree of overlap or redundancy among the observed specific markers of susceptibility (i.e., the variance predicted by the combined marker was less than the sum of variance accounted for by the individual markers), this combined measure nonetheless predicted quite substantial variance in apparent susceptibility to peer influence. Whereas the simple main effect of baseline peer substance use only accounted for 5% of the change in teen substance use over time, an *additional* 11% of this variance could be explained when the moderating effect of teen susceptibility to influence was taken into account. Given that simple stability of substance use accounted for almost half of the variance in age 16 use, this means that the composite marker of apparent susceptibility to teen influence was accounting for almost 20% of the residual or change variance in substance use over time. Given likely noise and error variance in this substance use measure, this suggests a potentially quite strong process being tapped by this factor. Notably, prior research on potential peer influences in adolescence has generally found only modest effects, and rightly noted that much apparent peer influence is simply due to selection of similarly behaving peers (Dishion & Owen, 2002; Ennett & Bauman, 1994). The present results suggests that we may be in danger of substantially underestimating the importance of peer influence processes if we do not account for the likelihood that such processes are far more applicable to some teens than to others.

The overarching conclusion from these findings is that apparent peer influence processes may be moderated by both individual and contextual factors in the adolescent's life, particularly those related to adolescent autonomy development, and that peer influences are

not always in the direction of encouraging more deviant behavior. Nor do all influences appear to reflect the behavior of disturbed and dominant peers; we find teens most likely to adopt friends' behavior when those friends are well-liked. Further, we found that an analogue measure that assessed the degree to which teens adopted less competent behaviors after simply being *exposed* to less competent options was also predictive of apparent susceptibility to peer influence. If these correlational findings are borne out in further research, they would suggest that interventions in adolescence might focus not simply upon helping adolescents resist overt, forceful efforts at peer pressure, but rather upon more subtle, but perhaps more pervasive modeling, support, and exposure processes. These findings also suggest that a great deal of the variance in peer influence processes can be explained without any consideration of whether a given peer was or was not using highly pressuring influence tactics. Peer influences, rather than simply being determined by the caricatured behavior of a highly pressuring teen, appear to reflect complex transactional processes involving adolescents' family, peer, and developmental backgrounds.

It is also noteworthy that this study identified predictors of susceptibility to peer influences that were potentially bi-directional in nature, and which had different valences for different parties in peer interactions. For example, if the friend of a susceptible teen was relatively low in substance use, than that teen's use was *less* likely to increase over time. This suggests that susceptibility to peer influence might only be maladaptive with respect to substance use if a susceptible teen had selected a substance-using peer as a close friend. Susceptible teens might also be influenced in positive directions by their more competent friends. Thus, susceptibility to peer influence, as identified in this study, would primarily operate as a risk-factor for deviant behavior in the context of selection of peers who engaged in such behavior. Indeed, it might act as a protective factor for teens who selected peers with more prosocial behavioral profiles. The findings of this study, then, indicate likely risks for susceptibility to peer influence broadly and not simply to peer influence toward deviant behavior. Susceptible teens might be as susceptible to positive influences from peers as to negative influences. Thus factors, such as maternal support, that predict low susceptibility to peer influence would predict low susceptibility to positive influences as well—perhaps reflecting a social context in which the teen was simply more influenced by family factors than by peers, regardless of the type of peer influence.

One important limitation to the interpretation of study findings is that although we identified numerous predictors of teens adopting levels of substance use over time that were predicted by their friends initial levels of use, becoming more like one's friends in terms of substance use does not automatically equate to being directly influenced by them. For example, while direct influence processes may indeed operate, it could also be that teens select friends whose behaviors they would like to emulate, and then simply do so over time. For ease of description, we refer to both these direct and indirect processes by which teens adopt levels of substance use consistent with their friends' levels of use as peer influences. One finding in this study that supports this usage is that the predictive factors we identified were non-directional in nature (e.g., they predicted teens becoming more like their peers, whether that meant adopting higher *or* lower levels of substance use over time). This means that the predictive factors we identified were *not* simply indicators of a predilection toward higher substance use, but rather toward levels of substance use that were more in accord with peers' levels. This in turn increases the likelihood that what we observed was in fact the result of some sort of influence process, albeit potentially an indirect one. Nonetheless, the caveat remains that when we discuss peer influences, it is with recognition that such influences may take any of a variety of forms, some more direct than others.

A second limitation of the study was that its time frame did not permit examination of reciprocal teen-peer and peer-teen influence processes. In all likelihood, however, peer

influence is a transactional and reciprocal process, with peers shaping one another's behavior, and in turn, one another's prospective influence on their own future behavior, over time in a tightly-linked dance. This study was able to assess only one facet of this transactional process. Thus transactional factors, such as the stability and intensity of a friendship during the potential influence period (rather than prior to it, as was assessed in this study) would be potentially important to consider in future research.

This study also deliberately assessed apparent susceptibility to peer influence in one highly specific and ecologically relevant context (a current close friendship), and with regard to one type of behavior (substance use). From this perspective, susceptibility to peer influence should not be viewed as a personality trait that exists in a psychosocial vacuum any more than any other important social-interactional characteristic. Rather this study considered susceptibility to peer influence as one potentially important aspect of the developing person-within-social-context matrix of behavioral responses of the adolescent. Future research will be needed to understand the extent to which the susceptibility within a primary peer relationship observed in this study reflects a more generalized pattern of susceptibility to influence by other peers, and with regard to other behaviors.

Finally, this study focused entirely upon early and mid-adolescence—a period during which peer pressure and peer influence are believed to be rapidly peaking. This may well account for the stronger influence findings obtained in this study as compared to other similar studies that assessed adolescents across a much broader age range (e.g., Jaccard et al., 2005). Whether and how these findings might generalize to other phases of adolescent development clearly warrants consideration in future research.

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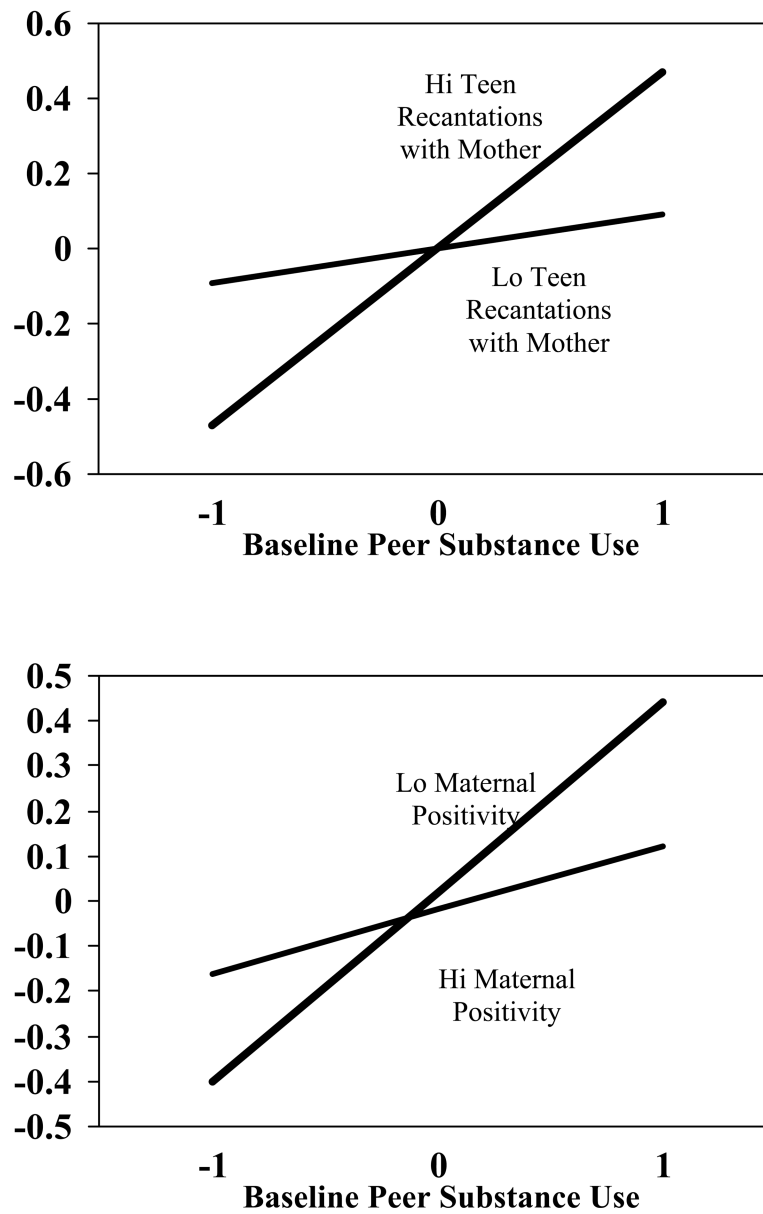


Figure 1. Interaction of Peer Substance Use and Maternal Relationship Qualities Predicting Relative Change in Adolescent Substance Use (all measures are standardized).

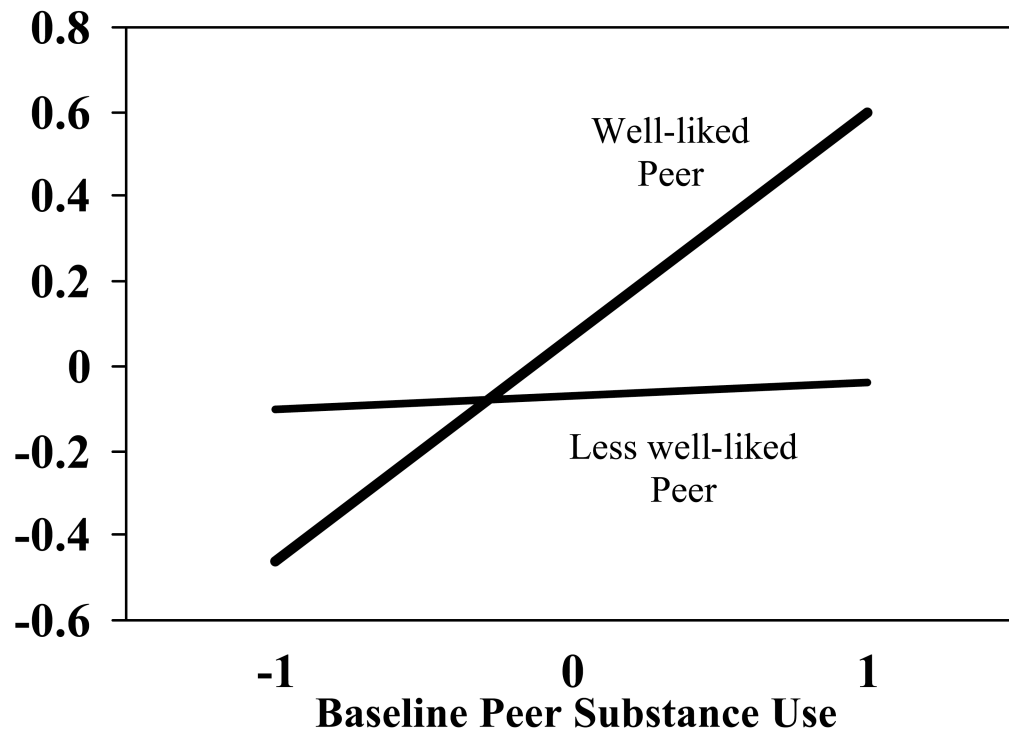


Figure 2. Interaction of Peer Substance Use and Peer Social Acceptance Predicting Relative Change in Adolescent Substance Use (all measures are standardized).

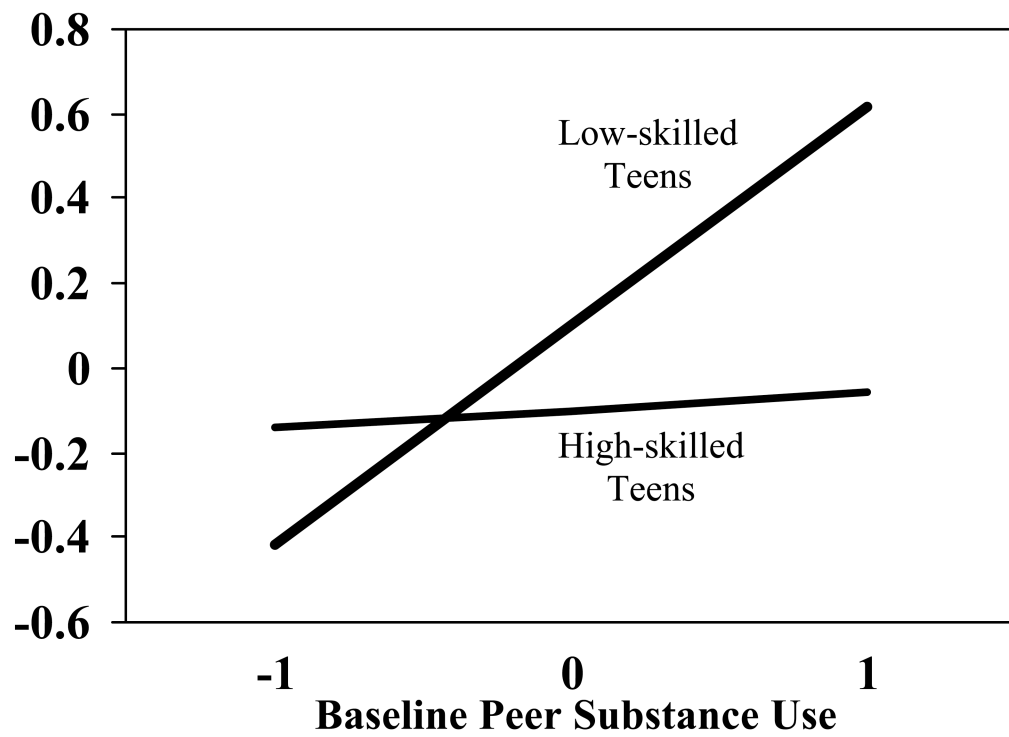


Figure 3. Interaction of Peer Substance Use and Adolescent Social Skills Handling Peer Deviance Predicting Relative Change in Adolescent Substance Use (all measures are standardized).

Table 1
Univariate Statistics and Intercorrelations Among Primary Constructs

	<u>Mean</u>	<u>s.d.</u>	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Teen Substance Use (Adol.; Age 15)	.76	1.43	70***	46***	09	11	-11	12	-10	-15	13
2. Teen Substance Use (Adol.; Age 16)	1.24	1.89	--	54***	-10	22*	-13	09	-06	-13	22**
3. Peer Substance Use (Peer; Age 15)	.93	1.64	--	--	-07	24**	10	13	-05	-26**	12
4. Social Skill (Test; Ages 13-15)	-.76	3.62	--	--	--	-36***	10	-10	13	-02	-04
5. Peer Social Acceptance (Sociometric; Age 15)	1.12	1.43	--	--	--	--	13	16	-08	33***	35***
6. Duration of Friendship (Adol.; Age 15)	5.04	3.24	--	--	--	--	--	-01	06	-10	09
7. Maternal Support (Obsvd; Age 13)	1.99	1.01	--	--	--	--	--	--	-20**	-01	21**
8. Adolescent Autonomy Struggles with Mother (Obsvd; Age 13)	0.37	0.50	--	--	--	--	--	--	--	04	-05
9. Adolescent Gender (1 - Male; 2-Female)	--	--	--	--	--	--	--	--	--	--	-10
10. Family Income	43,600	22,400	--	--	--	--	--	--	--	--	--

Note: Assessment Method and target adolescent age at time of assessment are in parentheses.

p < .001.

**
p < .01.

*
p < .05.

Table 2
Predicting Relative Change in Substance Use from Peer Use Interacting with Maternal Positivity and Adolescent Recantations in Interactions

	Teen Substance Use (Age 16)			
	β entry	β final	ΔR^2	Total R^2
Step I.				
Target Teen Substance Use (Age 15)	.70 ***	.66 ***	.484 ***	.484 ***
Step II.				
Gender (Male=1; Female =2)	-.06	.02		
Family Income	.09	.06		
<i>Summary Statistics for Step</i>			.013	.497 ***
Step III.				
Peer Substance Use (Age 15)	.28 ***	.28 ***	.054 ***	.551 ***
Step IV.				
Maternal Support (Age 13)	-.02	-.02		
Adolescent Recantations with Mother (Age 13)	-.00	.01		
<i>Summary Statistics for Step</i>			.001	.552 ***
Step V.				
Maternal Support \times Peer Substance Use	-.14 **	-.14 **		
Recantations \times Peer Substance Use	.19 **	.19 **		
<i>Summary Statistics for Step</i>			.059 ***	.611 ***

Note.

 $p < .001$.

**
 $p < .01$.

*
 $p < .05$.

Table 3
Predicting Relative Change in Substance Use from Peer Use Interacting with Peer Social Acceptance and Duration of Friendship

	Teen Substance Use (Age 16)			
	β entry	β final	ΔR^2	Total R^2
Step I.				
Target Teen Substance Use (Age 15)	.70 ***	.61 ***		.485 ***
Step II.				
Gender (Male=1; Female =2)	-.06	-.03		
Family Income	.09	.05		
<i>Summary Statistics for Step</i>			.013	.498 ***
Step III.				
Peer Substance Use (Age 15)	.28 **	.15 *	.054 **	.552 ***
Step IV.				
Peer Social Acceptance (Age 15)	.07	.08		
Duration of Friendship (Age 15)	-.07	-.07		
<i>Summary Statistics for Step</i>			.005	.557 ***
Step V.				
Peer Social Acceptance X Peer Substance Use	.25 **	.25 **		
Duration of Friendship X Peer Substance Use	.12	.12		
<i>Summary Statistics for Step</i>			.081 ***	.638 ***

Note.

 $p < .001$.

**
 $p < .01$.

*
 $p < .05$.

Table 4
Predicting Relative Change in Substance Use from Peer Use Interacting with Youth Social Skill Handling Peer Deviance

	Teen Substance Use (Age 16)			
	β entry	β final	ΔR^2	Total R^2
Step I.				
Target Teen Substance Use (Age 15)	.69***	.67***	.483***	.483***
Step II.				
Gender (Male=1; Female =2)	-.06	-.02		
Family Income	.08	.05		
<i>Summary Statistics for Step</i>			.012	.495***
Step III.				
Peer Substance Use (Age 15)	.28***	.17*		
Step IV.				
Social Skill (Age 15)	-.10	-.16*	.057***	.552***
<i>Summary Statistics for Step</i>			.001	.553***
Step V.				
Skill X Peer Substance Use	-.24**	-.24**		
<i>Summary Statistics for Step</i>			.034**	.587***

Note.

 $p < .001$.

**
 $p < .01$.

*
 $p < .05$.

Table 5
Predicting Relative Change in Substance Use from Composite Variable Summarizing Peer Susceptibility Measures

	Teen Substance Use (Age 16)			
	β entry	β final	ΔR^2	Total R^2
Step I.				
Target Teen Substance Use (Age 15)	.70 ^{***}	.71 ^{***}	.484 ^{***}	.484 ^{***}
Step II.				
Gender (Male=1; Female =2)	-.06	-.01		
Family Income	.09	.05		
<i>Summary Statistics for Step</i>			.013	.497 ^{***}
Step III.				
Peer Substance Use (Age 15)	.28 ^{***}	.18 ^{**}	.054 ^{***}	.551 ^{***}
Step IV.				
Composite of Risk Factors for Susceptibility	-.05	-.02		
<i>Summary Statistics for Step</i>			.001	.552 ^{***}
Step V.				
Composite Susceptibility Risk X Peer Substance Use	.33 ^{***}	-.33 ^{***}		
<i>Summary Statistics for Step</i>			.106 ^{***}	.658 ^{***}

Note.

^{***}
 $p < .001$.

^{**}
 $p < .01$.

^{*}
 $p < .05$.