

Measuring peer influence susceptibility to alcohol use: Convergent and predictive validity of a new analogue assessment

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Abstract

Research on peer socialization rarely examines individual differences in adolescents' susceptibility to peer influence, perhaps because few theories or methods have elucidated how susceptibility is operationalized. This study offers a new analogue measure of peer influence susceptibility in adolescence that is adapted from sociological theory. A preliminary examination of this new paradigm included the study of individual differences in susceptibility to peer influence, convergent validity correlates, and predictive validity by examining decision-making on the task as a moderator of the prospective association between friends' and adolescents' engagement in one form of real-world risk-taking. Participants included 714 adolescents (54% female; 46.1% White, 20.9% Black, 24.2% Hispanic/Latinx, 6.2% mixed race or other) aged 15–18 years ($M = 16.1$). Participants completed the Peer Analogue Susceptibility Task, peer nominations, and self-report measures at Time 1 and repeated an assessment of their own alcohol use 1 year later. Participants' friends also reported their own alcohol use. Results indicated concurrent associations with peer influence susceptibility, rejection sensitivity, perceived importance of peer status, peer-nominated popularity, and self-reported resistance to peer influence. Furthermore, among adolescents demonstrating average and high levels of peer influence susceptibility on the task, greater perceived alcohol use among friends was associated with their own alcohol use 1 year later. Findings offer preliminary evidence for the convergent and predictive validity of a new approach to study peer influence susceptibility.

Keywords

Adolescence, peer influence, susceptibility, alcohol use

Adolescence is often characterized as a period of heightened susceptibility to peer influence (Steinberg & Monahan, 2007). However, not all adolescents are equally likely to emulate their peers' behaviors or attitudes. Recent work has attempted to unpack individual differences in peer influence susceptibility in two ways. First, studies have examined moderators of peer influence, such as social anxiety and family dysfunction, identifying what individual or relationship factors affect adolescents' conformity to their peers' behaviors (see Brechwald & Prinstein, 2011 for a review). Second, research has begun examining peer influence susceptibility as a unique construct in its own right. This latter approach is particularly intriguing, offering the potential to understand individual differences in young peoples' psychological propensities to conform to peers. Studies of peer influence susceptibility could have notable applications, allowing investigators to understand both developmental precursors of susceptibility and the stability of susceptibility across time, peer contexts, or emotional states. However, currently very few theories or methods have elucidated how susceptibility is operationalized. The present study offers a novel analogue-based approach to measure peer influence susceptibility in adolescence that is informed by a sociological model of behavioral conformity. Preliminary evidence for the convergent validity of this new measurement approach was examined through concurrent correlations with constructs previously hypothesized to be associated with peer susceptibility, and predictive validity was explored by examining moderation of the prospective association

between friends-reported substance use and adolescents' own substance use.

Prior work examining peer influence susceptibility as a unique construct has relied on various operationalizations, each yielding distinct measurement approaches. For instance, self-report indices, such as the Resistance to Peer Influence Scale (Steinberg & Monahan, 2007), assess a trait-like conceptualization of peer influence susceptibility that adolescents can recognize and reflect upon themselves. Specifically, the Resistance to Peer Influence Scale asks participants to report their tendency to change their behaviors or attitudes, generally stated, following interactions with peers across contexts. Findings from prior studies have demonstrated associations between adolescents' and their peers' antisocial behaviors among adolescents with low resistance to peer influence (Monahan et al., 2009). Although there is evidence for the predictive validity of the Resistance to Peer Influence Scale, the measure relies on adolescents' limited self-awareness of their attitudes and behaviors, a limitation that could be ameliorated through the use of tasks

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capturing in-the-moment decision-making. Further, the measure refers to peers as a broad and vague entity, whereas previous research has shown that adolescents' susceptibility to peer influences varies across different peer groups (Brechwald & Prinstein, 2011).

In vivo performance-based measures of peer influence susceptibility address some of the limitations of the self-reported Resistance to Peer Influence Scale. These performance-based measures have conceptualized peer influence susceptibility as a factor that cannot be reported by adolescents themselves and that may vary across social contexts and attitudinal and behavioral outcomes (see Allen et al., 2005; Prinstein et al., 2011). For instance, one study examined susceptibility by asking youth to make choices alone during a hypothetical problem-solving task and then measured how much adolescents changed their decisions after discussions with a peer (Allen et al., 2006). Adolescents whose choices changed to align with that of the peer were characterized as being more susceptible to peer influence. Similarly, studies using simulated online chat rooms have examined youths' attitudes and behaviors toward deviance and substance use first when alone and then when ostensibly in the presence of peers, who were electronic confederates (Choukas-Bradley et al., 2015; Prinstein et al., 2011). Greater changes pre- to post-chat room were indicative of higher peer influence susceptibility. Indeed, susceptibility as indexed by this chat room paradigm moderates the longitudinal association between peers' and adolescents' own behavior (e.g., Choukas-Bradley et al., 2015). Such behavioral paradigms get closer to indexing in-the-moment decision-making, although they are focused on dyadic interactions with unknown peers. One aspect of peer influence susceptibility that is still missing from current assessments is how susceptibility to peer influence varies, within person, as a function of the social context. It is likely, for instance, that adolescents' susceptibility to the larger peer group varies depending on the behaviors of their close friends (Brechwald & Prinstein, 2011).

Unlike the approaches discussed above, the present study developed a new analogue-based measure of peer influence susceptibility based on theories within the sociology literature. Intriguingly, decades ago, Granovetter (1978) proposed a *threshold model of collective behavior*, suggesting that peer influence susceptibility is based on the dynamic interplay between an individual and the ever-changing composition of the peer group. Specifically, Granovetter posited that each person holds a unique susceptibility "threshold," characterized by how willing they are to conform to a behavior given how many others in a group are also engaging in the same behavior. Within a mob of individuals vandalizing or looting public property, for instance, the likelihood of any given person engaging in a deviant act is based on the number of others who have already begun vandalizing, and whether that number exceeds the individual's threshold. An individual with a threshold of 0 (referred to as an "instigator") will vandalize regardless of how many others have done so (Granovetter, 1978). If someone with a threshold of 1 sees the instigator vandalize, they will theoretically be inclined to conform next. Individuals with a threshold of 2 are likely to follow, and so on. Thus, an individual's susceptibility to peer norms is based on an implicit comparison of the number of others engaging in deviance and their personal threshold. Within the sociological literature, the threshold model has been cited as a means for understanding socialization effects for various behaviors including co-offending among juvenile offenders (McGloin & Povitsky Stickle, 2011) and cohesion within adolescent peer groups (Fisher, 2018).

The new analogue measure used in this study was inspired by Granovetter's (1978) theory, offering a potentially new approach for quantifying adolescents' peer influence susceptibility. Like other analogue approaches that rely on fictional scenarios to estimate underlying traits or tendencies (e.g., imagining inflating balloons to measure risk-taking, Lejuez et al., 2002; receiving monetary rewards on an immediate or delayed schedule to measure delayed gratification, Green et al., 2005), this new instrument was not designed to measure adolescents' actual behavior within a mobile context, but rather to rely upon this conceptual framework to measure and extract a proxy score of peer influence susceptibility that might meaningfully vary across individuals.

Thus, the current study developed the Peer Analogue Susceptibility Task to capture individual differences in adolescents' susceptibility to peer influence. Unlike previous assessments of peer influence susceptibility, the task employed in this study assesses dynamic changes in adolescents' willingness to conform to their peers as a function of how many of their peers are engaging in a behavior. Developing this paradigm required some theoretical adaptation, however, to better represent developmental issues relevant in adolescence. Granovetter (1978) purported that individual differences in susceptibility to peer influence vary depending on the relationship between individuals and the people in their social contexts. Among adolescents, this issue may be paramount, as adolescents are especially likely to be influenced within close relationships (i.e., best friendships, friend cliques; Brechwald & Prinstein, 2011). Thus, the Peer Analogue Susceptibility Task was designed to account for adolescents' willingness to engage in a behavior as a function of the choices of their close friends when none, some, or all engage in a similar behavior.

Specifically, in this preliminary test of a new paradigm, adolescents participated in a behavioral decision-making task in which they were asked to make sequential decisions about their willingness to engage in substance use after learning about their peers' own substance use. To ensure that prior use of a specific drug would be less likely to influence results, adolescents were presented with a fictional opportunity to use a substance unfamiliar to U.S. adolescents (modeled after absinthe, a hallucinogenic alcoholic beverage). Adolescents were asked to report whether they would engage in substance use in a party context when between 0 and 25 high-status peers had done so, and when 0, 1, 3, or 5 of their closest friends had also elected to use the substance. High-status peers were chosen for this task in light of a large body of literature demonstrating that adolescents are especially likely to conform to the behaviors and attitudes of high-status peers whom they admire and whose behaviors they want to emulate (for a review, see Brechwald & Prinstein, 2011). By examining changes in adolescents' decisions across the four close-friend conditions, it was possible to examine individual differences in adolescents' susceptibility to their friends' influences.

Three central aims were addressed in the present study. The first aim was to determine whether the Peer Analogue Susceptibility Task could capture individual differences in peer influence susceptibility. It was expected that, within the experimental paradigm, adolescents would be more likely to conform as more of their close friends engaged in risk behavior (modeled as a latent slope) and that there would be significant variability among participants in their tendency to do so (captured by statistically significant variability around that slope). Second, to explore the convergent validity of the experimental task, correlations with other psychosocial factors that previously have been hypothesized to be associated with

adolescents' peer influence susceptibility were examined, including higher levels of adolescents' popularity (Parkhurst & Hopmeyer, 1998), higher levels of importance adolescents ascribe to peer status (i.e., peer importance; Prinstein & Aikins, 2004), higher levels of rejection sensitivity (Downey & Feldman, 1996), as well as a prevailing self-report measure of resistance to peer influence (Steinberg & Monahan, 2007).

Finally, to examine the predictive validity of the novel paradigm, we examined peer influence susceptibility on the task as a moderator of the prospective association between peers' and adolescents' own alcohol use—a sample risk behavior relevant to the developmental stage of participants. As a sensitivity analysis, analyses also examined whether moderating effects of peer influence susceptibility remained significant after controlling for the potential moderating effects of self-reported resistance to peer influence.

Method

Participants

The current study included 714 participants (aged 15–18 years at Time 1; $M_{\text{age}} = 16.1$ years) who initially were recruited from three rural public schools in the Southeastern United States (average median income = US\$40,943, $SD = US\$15,708$). All participants self-reported their gender (54.0% female) and racial/ethnic identity (46.1% White/Caucasian, 24.2% Hispanic/Latinx, 20.9% African American, 5.2% mixed race or other, 1.0% Asian American, 2.7% choosing not to report a racial or ethnic identity) at baseline.

Procedure

Eligible participants at the time of recruitment included all seventh- and eighth-grade regular-education students ($n = 1,463$), with 82.4% of potential participants returning consent forms ($n = 1,205$) and 74.7% of that subsample giving consent for participation ($n = 900$). The data collected for the present study were part of a larger school-based study annually examining adolescent peer relationships and health risk behaviors. Measures relevant to examine hypotheses were collected at the fourth and fifth years of data collection, when participants were in grades 10 and 11 (herein referred to as Time 1 and Time 2). A total of 714 students (79.3% of the original sample) participated at Time 1. Attrition included 96 students who moved to a different area or could not be located, 37 who had withdrawn from school, 34 who declined participation, 11 who were absent, 6 who were homeschooled, and 2 who were deceased. Independent samples t -tests yielded no significant differences on demographic variables between participants who were retained and those who had discontinued participation (all $ps > .05$). All participants completed measures during the school day using computer-assisted self-interviews with the assistance of trained research assistants and were compensated with US\$10 gift cards for their participation. A total of 648 of these participants (90.8% retained) completed follow-up measures at Time 2 for an additional US\$10 gift card. Participants with complete data across both time points did not differ from those missing data at Time 2 on any of the primary study variables (all $ps > .24$). Additionally, the Little's Test (conducted using SPSS 26) yielded a nonsignificant χ^2 statistic ($\chi^2(125) = 131.784, p = .321$), confirming the data were missing completely at random. Multiple imputation using Bayesian analysis was employed in Mplus to account for missing data across Time 1 and 2, resulting in a full sample of 714

participants for all analyses. The research institution's human subjects committee approved all study procedures prior to data collection.

Measures

Participants completed the Peer Analogue Susceptibility Task at Time 1. Participants also completed measures of peer importance, rejection sensitivity, resistance to peer influence, perceptions of their friends' alcohol use, and peer nominations to assess popularity at Time 1. Measures assessing adolescents' substance use were administered at both time points. Time 1 and Time 2 assessments were 1 year apart for all participants.

Peer influence susceptibility. The Peer Analogue Susceptibility Task was administered on individual laptop computers with privacy screens. At the start of the task, participants were told they were at an unchaperoned party with 5 of their closest friends and 25 other grademates from their high school that the participant “likes and wants to be better friends with” (visually depicted using 5 stick figures on the left side of the screen and 25 stick figures on the right side of the screen, respectively; see Figure 1). Participants were told that the party offered an opportunity to use an illegal and potentially dangerous hallucinogenic beverage that was being consumed by some of their peers at the party. In a series of trials, adolescents were told how many of their classmates and how many of their closest friends had chosen to try the substance (with accompanying shading of stick figures indicated on screen to depict the number of peers who were drinking). Participants then responded whether they would try the drink as well.

Participants completed four counterbalanced conditions of this task. In each condition, participants were told that a fixed number of close friends had chosen to drink the beverage (0, 1, 3, or 5 friends), and a series of titrating trials were presented indicating a variable number between 0 and 25 of their grademates at the party who had also chosen to use the substance. Using standard procedures for delay discounting tasks (e.g., Green et al., 2005), the first trial within each condition randomly presented a number between 0 and 25 grademates who were trying the substance at the party. For each trial, participants indicated whether they would or would not try the substance given how many of the close friends and grademates were also trying the substance. For participants who responded they would use the substance in the initial trial, the number of grademates using the substance presented in subsequent trials was the midpoint between 0 and the number presented in the prior trial. Conversely, for participants responding they would refrain from substance use in the initial trial, the number of grademates engaging in substance use in subsequent trials was the midpoint between 25 and the number presented in the prior trial. Participants were continuously presented with trials (typically between 2 and 7) until their response identified the minimum number of peers engaging in substance use before they indicated they also would try the substance. Once participants completed all trials within a given condition, the procedure repeated in a new condition. Unlike traditional delay discounting tasks, this paradigm did not require a forced choice between two rewards at varying time intervals but used the “indifference point” algorithm to identify the point at which participants believed their behavior would change. The task took no more than 5 min to complete.

Note that the task was not designed to literally measure adolescents' likelihood to use this particular substance or to estimate a

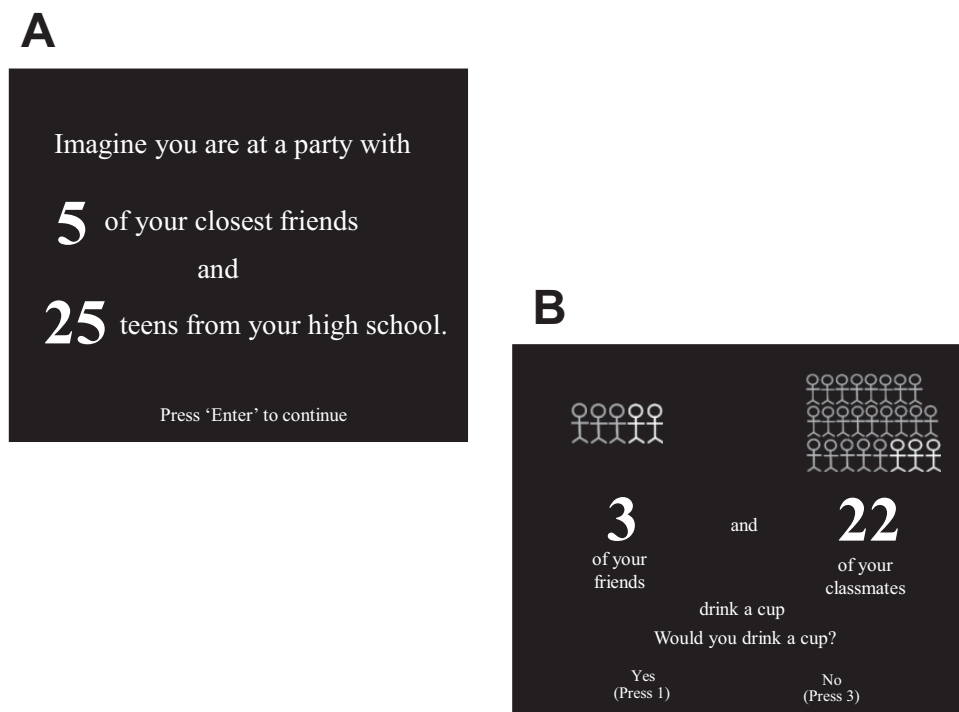


Figure 1. Peer Analogue Susceptibility Task.

Note. (a) Introduction to the hypothetical scenario. Participants were asked to imagine they are at a party where people were trying an illegal beverage (invented for the task). (b) Sample trial. Participants were told a fixed number of close friends chose to drink the beverage (0, 1, 3, and 5 friends) along with a variable number (0–25) of additional classmates per trial. The task titrated the number of additional classmates based on the participant's response.

true number of a specific peers that participants rely upon to make their own behavioral decisions. As an analogue measure, the task was designed simply to provide a compelling framework to quantify a phenomenon that has been discussed within the literature and inspired by a theoretical model that suggested a possible approach for measurement. Also note that the focus of our analyses was on the extent to which adolescents' *changed their responses* across close-friend conditions, perhaps revealing the extent to which adolescents were influenced by the behaviors of their closest friends.

Participants reported their willingness to try the substance when anywhere between 0 and 25 of their same-aged grademates were also trying the substance. The task was designed with this level of specificity to explore variability in participants' responses. However, inspection of the data indicated three clusters of responses. Based on this distribution of the data, participants' responses for each of the four close-friend conditions were coded into three categories: participants who were not willing to try the substance even if all of their grademates were using it (assigned a score of 0), participants who were willing to try the substance if at least one of their grademates was using it (assigned a score of 1), and participants who were willing to try the substance even if none of their grademates were using it (assigned a score of 2). Data for adolescents with scores of 2 in the 0-friend condition ($n = 41$) were eliminated from all analyses because these youth (i.e., those who indicated they would try the substance even if none of their grademates and none of their close friends were trying it) represented a unique group of unsusceptible individuals who may have led to biases in the results. To index changes in decision-making across the four close-friend conditions, a latent *susceptibility to peer influence* slope was estimated using participants' responses from each of

Table 1. Percent of Participant Responses Within the Four Task Conditions on the Peer Analogue Susceptibility Task.

Response category	Task condition			
	0 Friends	1 Friend	3 Friends	5 Friends
(0) Would not try the drink even if everyone else at the party was trying it	87	78	67	62
(1) Would try the drink if at least one other person at the party was trying it	13	14	18	20
(2) Would try the drink even if no one else at the party was trying it	n/a	8	15	18

Note. Total $n = 714$. Participants were asked to decide their willingness to try the drink if 0, 1, 3, or 5 of their closest friends were also drinking the substance. The response categories represent participants' decisions on the task. Data for adolescents with scores of 2 in the 0-friend condition ($n = 41$) were eliminated because these youth represented a unique group of unsusceptible individuals who may have led to biases in the results. For the analyses, a latent susceptibility to peer influence slope score was estimated using participants' responses from each of the four task conditions.

the four task conditions as categorical indicators. More positive slopes indicated higher susceptibility to peer influence. Slopes closer to zero indicated no susceptibility to the influence of close friends (i.e., decisions to conform to the larger peer group were not affected by close friends' behavior). Negative slopes were not expected as they are not interpretable. The distribution of participant responses across all conditions is presented in Table 1.

Adolescent and friend alcohol use. Alcohol use over the past year was assessed using selected items from the Youth Risk Behavior

Surveillance Survey (YRBS; Centers for Disease Control and Prevention, 2019). Alcohol use over the past year was assessed with a single item (“In the past year, on how many days have YOU had at least one drink of alcohol”), with responses coded 0–4 for 0 times, 1–2 times, 3–5 times, 6–9 times, and 10 or more times, respectively.

Friend alcohol use was measured in two ways. First, participants reported the perceived alcohol use of their best friend in the past year. Responses were coded 0–4 for 0 times, 1–2 times, 3–5 times, 6–9 times, and 10 or more times used in the past year, respectively.

Additionally, all participants completed sociometric nominations using a complete grade-wide roster in counterbalanced alphabetized order (A–Z or Z–A) to identify their closest friends. Participants could make an unlimited number of nominations and the nominations were not required to be reciprocal. Previous work has suggested that nonreciprocated friends may be equally or more influential than reciprocated friends (Veronneau & Dishion, 2010). Namely, adolescents may be motivated to imitate the behavior of desired but nonreciprocated friends as a means of demonstrating their willingness to conform to the norms of the clique (Veronneau & Dishion, 2010). Because participants nominated friends who were also participants in the study, friends’ self-reported alcohol use was computed using friends’ actual reports of days of alcohol use in the past year from the YRBS. Participants nominated an average of eight friends ($SD = 11$). Data were available for an average of four friends ($SD = 5$) for each participant. Of participants who nominated at least one friend, 67% of the total sample ($n = 464$) had data for at least half of their nominated friends, while 11% of the total sample ($n = 76$) had data for all of their nominated friends.

The present study focuses on the influence of multiple friends rather than close-friend dyads. Thus, averaging peers’ scores affords a more complete picture of the characteristics of the participants’ friendship networks (Vitaro et al., 2007). For this reason, the average frequency of all nominated friends’ self-reported alcohol use was computed for each participant. This approach is consistent with similar studies of peer influence (e.g., Veronneau & Dishion, 2010; Vitaro et al., 2007). Although it was possible for friends’ scores to be used across multiple participants, each friend’s score would be used only as one constituent part of the overall average of friends’ drinking. Therefore, unless adolescents only nominated a single friend, an individual friend’s score would not itself be used as a predictor more than once in the model. While 18% of the sample ($n = 114$) nominated only one friend, redundancy occurred in less than 3% ($n = 17$) of the sample. The primary analyses were rerun without these cases and produced an identical pattern of results to the original models, confirming the minimal effect of redundancy. Furthermore, previous work has suggested that overlap within peer groups is not a systematic issue when groups are identified separately for each individual, as is the case in this study (Kindermann & Gest, 2008).

Peer importance. Adolescents’ cognitions regarding the importance of peer status were assessed using an established self-report measure (Prinstein & Aikins, 2004). Participants responded to four statements on the importance of peer evaluations (e.g., “It is important for me to be popular with kids my age”) using a 7-point Likert-type scale (1 = *not at all true* to 7 = *very true*). A mean score was computed ($\alpha = .86$).

Popularity. Popularity was assessed using the aforementioned peer-nomination sociometric procedure and adolescents’ nominations of

those they perceived to be “most popular” and “least popular.” A standardized difference score between standardized (within grade) most popular and least popular nomination tallies was computed for each participant, with higher scores reflecting higher levels of popularity.

Rejection sensitivity. An adapted version of the Rejection Sensitivity Questionnaire (Downey & Feldman, 1996) assessed sensitivity to peer rejection. Participants read seven hypothetical situations with possibility for rejection (e.g., picking groups for a project in class) and indicated their level of concern about potential rejection using a 6-point Likert-type scale (1 = *very unconcerned* to 6 = *very concerned*). Participants also estimated their perceived likelihood of being rejected using a 6-point Likert-type scale (1 = *very unlikely* to 6 = *very likely*). As in prior work (Downey & Feldman, 1996), the product between participants’ concern and perceived likelihood of rejection was computed for each item, and a mean score across all product scores was computed with higher scores indicating greater rejection sensitivity ($\alpha = .90$).

Resistance to peer influence. Resistance to peer influence was assessed using the 10-item Resistance to Peer Influence Scale (Steinberg & Monahan, 2007). Participants indicated which of two opposing statements best described them (e.g., “For some people, it’s pretty easy for their friends to get them to change their mind BUT for other people, it’s pretty hard for their friends to get them to change their mind”) and whether the statement was “really true” or “sort of true,” yielding a 1–4 score on each item. A mean score was computed with higher scores reflecting greater self-reported resistance to peer influence ($\alpha = .73$).

Analysis Plan

Before conducting the primary analyses, a test of multicollinearity among all primary study variables was conducted in SPSS 26 by referencing the Variance Inflation Factor (VIF). Results indicated VIF scores lower than 4 for all variables, well below the suggested cutoff of 10, indicating no issues of multicollinearity (Robinson & Schumacker, 2009, p. 7).

All primary analyses were conducted using Mplus v8. First, we estimated a latent intercept and slope using participants’ responses in each of the four task conditions (0 friends, 1 friend, 3 friends, and 5 friends) as categorical indicators. Factor loadings for the 0-friend and 1-friend condition were constrained to 0 and 1, respectively, and the factor loadings for the 3-friend and 5-friend condition were unconstrained. The latent slope is herein referred to as peer influence susceptibility. Variance around this slope indexed the presence of significant individual differences in peer influence susceptibility. Next, as a general test of convergent validity, we examined the correlation between peer influence susceptibility with peer importance, rejection sensitivity, sociometric popularity, and self-reported resistance to peer influence.

For the primary analyses designed to examine predictive validity, two negative binomial regression models were conducted to predict adolescents’ self-reported drinking at Time 2. In one model, friends’ drinking was measured using adolescent-reported perceptions of their best friends’ drinking. In the second model, friends’ drinking was measured using the mean score of adolescents’ nominated close friends’ self-reported drinking. The negative binomial framework was used because adolescents’ self-reported alcohol use was heavily skewed toward 0, which is commonly observed in

measures of substance use. All analyses controlled for self-reported drinking at Time 1. In the first step of the model, the latent peer influence susceptibility slope and friends' drinking from Time 1 were included as independent variables. In the second step of the model, the interaction term for the latent peer influence susceptibility slope and friends' drinking was entered. Significant interactions were probed by examining the association between peer influence susceptibility and self-reported drinking at low (0 days), moderate (1–2 days), and high (3+ days) levels of friends' drinking. These groups were chosen in the interest of maintaining equal group sizes. A third step of the model was included as a sensitivity analysis. In this third step, the main effect of self-reported resistance to peer influence and the interaction between friends' drinking and resistance to peer influence was added.

Results

Results from the model estimating the intercept and linear slope of participants' responses across the four conditions of the Peer Analogue Susceptibility Task indicated a significant positive linear slope ($B = 0.765$, $SE = 0.206$, 95% CI [0.426, 1.105], $p < .001$) with significant variability in both the intercept (variance estimate = 7.95, $SE = 1.964$, 95% CI [4.718, 11.182], $p < .001$) and slope (variance estimate = 1.13, $SE = 0.46$, 95% CI [0.374, 1.886], $p = .014$). The significant positive slope indicates that adolescents

were more willing to endorse using the substance as more of their close friends were also trying it. Adolescents' peer influence susceptibility scores did not differ between males ($M = 0.728$, $SD = 0.687$) and females ($M = 0.793$, $SD = 0.718$) ($t(712) = 1.231$, 95% CI [-0.039, 0.169], $p = .219$) and were not associated with age ($r = -.028$, $p = .46$). Descriptive statistics for the primary study variables are recorded in Table 2.

Correlates of Peer Influence Susceptibility

Table 3 presents correlations among adolescents' susceptibility to peer influence on the Peer Analogue Susceptibility Task with various self-report measures thought to relate to peer influence susceptibility. As anticipated, results revealed that higher levels of peer importance, rejection sensitivity, sociometric popularity, and lower levels of resistance to peer influence were all significantly associated with greater peer influence susceptibility, offering preliminary support for convergent validity of the task.

Prospective Associations Among Peer Influence Susceptibility, Friends' Alcohol Use, and Adolescents' Alcohol Use

In the model using adolescent-reported perceptions of their best friends' alcohol use, results indicated that greater best-friend alcohol use and higher peer influence susceptibility were associated with greater self-reported alcohol use among adolescents 1 year later. Further, there was a significant interaction between friends' alcohol use and peer influence susceptibility (see Table 4). Examination of the simple slopes indicated that higher peer influence susceptibility as indexed by the task was associated with greater self-reported alcohol use among youth who perceived that their best friends engaged in medium ($B = 1.642$, $SE = 0.308$, $\beta = .962$, 95% CI [1.135, 2.149], $p < .001$) and high ($B = 0.157$, $SE = 0.047$, $\beta = .361$, 95% CI [0.08, 0.234], $p = .001$) levels of drinking. Peer influence susceptibility was not associated with self-reported alcohol use among adolescents who perceived low levels of drinking in their best friends ($B = 0.272$, $SE = 0.192$, $\beta = .58$, 95% CI [-0.045, 0.588], $p = .158$). For descriptive purposes, the interaction between peer influence susceptibility and best-friend drinking was plotted using SPSS PROCESS (see Figure 2). This interaction was significant even after accounting for the main effect of self-reported resistance to peer influence and the interaction between resistance

Table 2. Descriptive Statistics for Main Study Variables.

Variable	<i>n</i>	Min.	Max.	<i>M</i>	<i>SD</i>
Self-reported alcohol use, Time 2	628	0	4	1.116	1.481
<i>Time 1 variables</i>					
Self-reported alcohol use	707	0	4	0.859	1.307
Youth-reported friend alcohol use	633	0	4	0.899	1.309
Friend-reported alcohol use	646	1	5	1.921	0.928
Resistance to peer influence	713	1.5	4	2.977	0.493
Peer importance	710	1	5	1.875	0.768
Rejection sensitivity	705	1	31.8	9.733	5.622
Popularity	714	-1.12	7.21	0.147	1.143
Susceptibility to peer influence ^a	714	-0.07	2.38	0.763	0.704

Note. Multiple imputation using Bayesian analysis was employed in Mplus to account for missing data across Time 1 and 2, resulting in a full sample of $n = 714$ participants for the primary analyses.

^aLatent slope score estimated from participant responses on the Peer Analogue Susceptibility Task.

Table 3. Correlations Among Main Study Variables.

	1	2	3	4	5	6	7	8	9
1. Peer influence susceptibility, Time 1	—	.351**	.394**	.288**	.121**	-.261**	.198**	.093*	.137**
2. Alcohol use, Time 2		—	.592**	.487**	.289**	-.123**	.164**	.044	.321**
3. Alcohol use, Time 1			—	.732**	.309**	-.132**	.103**	.047	.238**
4. Perceived friend alcohol use, Time 1				—	.326**	-.066	.100*	.073	.243**
5. Close friend alcohol use, Time 1					—	.006	.111**	.077	.220**
6. Resistance to peer influence, Time 1						—	-.384**	-.107**	-.007
7. Peer importance, Time 1							—	.199**	.158**
8. Rejection sensitivity, Time 1								—	.05
9. Sociometric popularity, Time 1									—

Note. Total $n = 714$. Peer influence susceptibility represents the latent slope estimated from participant responses on the four conditions in the Peer Analogue Susceptibility Task where higher values indicate greater peer influence susceptibility.

* $p < .05$. ** $p < .01$.

Table 4. Regression Results Predicting Adolescents' Time 2 Alcohol Use for the Model with Adolescent-Reported Perceptions of their Best Friend's Drinking.

Time 1 variables	Model 1					Model 2 ^a				Model 3 ^a			
	B	SE	Std. β	95% CI (lower bound, upper bound)	p	B	SE	95% CI (lower bound, upper bound)	p	B	SE	95% CI (lower bound, upper bound)	p
Self-reported alcohol use	0.348	0.05	.725	0.265, 0.431	<.001	0.306	0.054	0.216, 0.395	<.001	0.304	0.055	0.214, 0.393	<.001
Perceived best friend alcohol use	0.1	0.05	.208	0.018, 0.182	.045	0.613	0.084	0.475, 0.750	<.001	0.605	0.047	0.529, 0.682	<.001
Peer influence susceptibility	0.285	0.1	.458	0.121, 0.45	.004	1.31	0.144	1.073, 1.547	<.001	1.278	0.104	1.107, 1.448	<.001
Perceived best friend alcohol use \times Susceptibility						-0.385	0.07	-0.5, -0.271	<.001	-0.378	0.042	-0.447, -0.308	<.001
Resistance to peer influence										-0.02	0.11	-0.202, 0.161	.854
Best friend alcohol use \times Resistance to peer influence										-0.003	0.059	-0.1, 0.094	.958

Note. Total $n = 714$. Peer influence susceptibility represents the latent slope estimated from the four conditions in the task where higher values indicate greater peer influence susceptibility. Simple slopes for the interaction are reported in-text.

^aStandardized output is not available in Mplus for random-effects models with count variables.

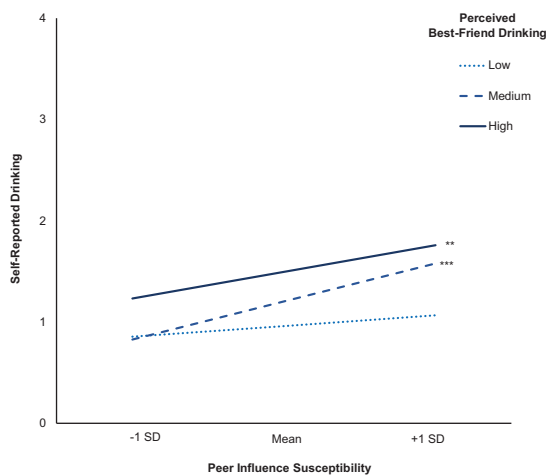


Figure 2. Simple Slopes of the Association Between Peer Influence Susceptibility and Self-reported Drinking Frequency as a Function of Perceived Best-Friend Drinking.

Note. Values for self-reported drinking range from 0 (no drinking in the past year) to 4 (drinking 10 times or more in the past year). For the purposes of this figure only, best-friend drinking was binned into three groups: low/0 days of drinking ($n = 372$); medium/1–2 days of drinking ($n = 101$), and 3/3 or more days of drinking ($n = 160$). Best-friend drinking was plotted at low (–1 SD), average, and high (+1 SD) levels of peer influence susceptibility. Peer influence susceptibility and perceived best-friend drinking were measured at Time 1. Self-reported drinking was measured at Time 2. Simple slopes are adjusted for self-reported drinking at Time 1.

** $p < .01$; *** $p < .001$.

to peer influence and best-friend alcohol use. Neither resistance to peer influence nor the interaction between resistance to peer influence and best-friend alcohol use were significantly associated with adolescent alcohol use.

Results from the model using adolescents close friends' self-reported alcohol use indicated that greater close-friend alcohol use

was associated with higher self-reported alcohol use among adolescents. Consistent with the previous model, the association between peer influence susceptibility and self-reported alcohol use remained significant. However, the interaction between close-friend alcohol use and peer influence susceptibility was only marginally significant. As with the previous model, these results did not change when adding resistance to peer influence in the model. Again, neither resistance to peer influence nor the interaction between resistance to peer influence and close-friend alcohol use were significantly associated with adolescent alcohol use. All statistics are reported in Table 5.

Discussion

Adolescents are strongly influenced by their peers, yet few effective strategies have been developed to capture individual differences in peer influence susceptibility. The measurement and study of individual differences in peer influence susceptibility may support research aimed at understanding why some youth are more likely to emulate their peers' behavior than others and identify when this normative characteristic of adolescent development is detrimental and when it is adaptive. The present study adds to a growing literature on self-report measures and performance-based tasks designed to measure peer influence susceptibility by adapting a sociological theory that may have interesting utility in developmental psychology research. Based on this sociological theory, peer influence susceptibility might be quantified by measuring how willing individuals are to engage in a behavior given how many others in their peer group are engaging in the same behavior (Granovetter, 1978). Inspired by this theory, we developed the Peer Analogue Susceptibility Task to measure the extent to which adolescents' decisions to conform to their peers were influenced by the number of their closest friends engaging in similar behaviors. Findings from this study revealed significant individual differences in adolescents' susceptibility to peer influence on the task. Importantly, results also suggested that these individual differences were

Table 5. Regression Results Predicting Adolescents' Time 2 Alcohol Use for the Model with Adolescents' Close Friends' Self-Reported Drinking.

Time 1 variables	Model 1						Model 2 ^a				Model 3 ^a					
	B	SE	Std. β	95% CI (lower bound, upper bound)		p	B	SE	95% CI (lower bound, upper bound)		p	B	SE	95% CI (lower bound, upper bound)		P
Self-reported alcohol use	0.386	0.035	.796	0.328, 0.444		<.001	0.38	0.035	0.322, 0.438		<.001	0.377	0.035	0.319, 0.435		<.001
Friend-reported alcohol use	0.154	0.048	.225	0.074, 0.233		.001	0.279	0.085	0.14, 0.419		.001	0.283	0.085	0.143, 0.424		.001
Peer influence susceptibility	0.287	0.1	.457	0.122, 0.452		.004	0.361	0.126	0.154, 0.568		.004	0.345	0.124	0.142, 0.549		.005
Friend-reported alcohol use \times Susceptibility							-0.118	0.065	-0.225, -0.01		.072	-0.127	0.068	-0.239, -0.014		.063
Resistance to peer influence												-0.065	0.099	-0.228, 0.097		.508
Friend-reported alcohol use \times Resistance to peer influence												-0.072	0.114	-0.26, 0.117		.532

Note. Total $n = 714$. Peer influence susceptibility represents the latent slope estimated from the four conditions in the task where higher values indicate greater peer influence susceptibility. Simple slopes for the interaction are reported in-text.

^aStandardized output is not available in Mplus for random-effects models with count variables.

associated with psychological constructs relevant to peer influence and with the relation between adolescents' perceptions of their friends' alcohol use and adolescents' own alcohol use.

Supporting convergent validity of this new Peer Analogue Susceptibility Task, higher peer influence susceptibility was associated concurrently with several psychosocial correlates. Higher levels of peer popularity, rejection sensitivity, and greater levels of importance ascribed to peer status each were associated with greater susceptibility to peer influence. These significant correlates are consistent with two bodies of prior work, which support the utility of the novel paradigm as an index of peer influence susceptibility. Results suggesting that popular youth are more likely to demonstrate high peer influence susceptibility are consistent with theories regarding susceptibility as a marker of high social skill and acuity toward the social environment (Allen et al., 2020). Results regarding rejection sensitivity and peer importance are broadly consistent with prior theories suggesting that those most concerned about their social standing may be most likely to emulate peers' deviant behavior (Rudolph & Bohn, 2014). Associations between peer influence susceptibility on the Peer Analogue Susceptibility Task with these psychosocial correlates preliminarily supports the validity of the task as an index of individual differences in peer influence susceptibility.

Results from this study also revealed an association between decision-making on the Peer Analogue Susceptibility Task and self-reported resistance to peer influence, supporting the concurrent validity of this new assessment approach. However, the modest correlation between these two measurements suggests there may be important differences that emerge from discrete conceptualizations of and methods used to examine susceptibility. Self-report scales such as the Resistance to Peer Influence Scale generally assess adolescents' attitudes about the appropriateness of conformity or how likely youth feel they are to change their behaviors when receiving pressure from their peers to do so. In contrast, the peer influence susceptibility task employed in this study asked participants to make in-the-moment decisions based on changes in their social context. Although our task also required adolescents to speculate on their willingness to engage in a risk behavior, by

dynamically and quickly changing the decision-making context, it did not tap into the deliberative type of decision-making that likely occurs with self-report measures such as the measures such as the Resistance to Peer Influence questionnaire. Further, whereas the Resistance to Peer questionnaire. Further, whereas the Resistance to Peer Influence Scale asks individuals to reflect on their willingness to conform to peers more broadly, the Peer Analogue Susceptibility Task centered on the extent that close friends influence adolescents' conformity to the broader peer group. Thus, this study has introduced an additional way of conceptualizing peer influence susceptibility based on adolescents' changing reports of their willingness to engage in a discrete risk as the context of close friends doing similarly is changed across experimental conditions.

Furthermore, consistent with previous self-report (e.g., Steinberg & Monahan, 2007) and performance-based (e.g., Allen et al., 2006; Prinstein et al., 2011) assessments of peer influence susceptibility used in prior work, susceptibility to peer influence as indexed by the novel paradigm used in this study significantly moderated the association between adolescents' perceptions of their friends' substance use and adolescents' own substance use 1 year later, yielding initial support for the predictive validity of this novel performance-based assessment. This association remained significant even when accounting for the effect of self-reported resistance to peer influence, demonstrating that peer influence susceptibility on the Peer Analogue Susceptibility Task accounts for additional variability in adolescents' and their peers' (perceived) behaviors over and above prevailing measurements. Results also approached significance in models including friends' own reports of their alcohol use, offering promising preliminary support for predictive validity in this initial study, yet requiring caution given that findings from this model remained only marginally significant.

The results from this study offer a compelling new direction for identifying why some youth are more susceptible—or resilient—to peer influences in adolescence. Among the strengths of the Peer Analogue Susceptibility Task are its ability to capture in-the-moment decision making. Similar analogue tasks such as the Balloon Analogue Risk Task (Lejeuz et al., 2002) and delay discounting task (Green et al., 2005) have demonstrated reliability and

validity in predicting real-world behaviors because of their ability to capture underlying psychological propensities in ways that are not limited by contextual confounds such as opportunity. To this end, tasks such as the one used in this study may allow researchers to identify individual differences in peer influence susceptibility while minimizing differences in adolescents' personal experiences. Further, by applying some of the conceptualizations of peer influence susceptibility proposed by the threshold model of collective behavior (Granovetter, 1978), the task indexed behavioral change as a function of two important factors: how many others are engaging in the behavior, and who specifically is engaging in the behavior. This approach has afforded additional information about the complex nature of peer influence susceptibility. Namely, some adolescents are highly susceptible to the influence of their close friends (as indexed by higher slopes on the task), whereas other adolescents are susceptible to the broader peer group independent of their friends' behaviors (as indexed by lower slopes on the task).

Despite the strengths of the preliminary assessment of peer influence susceptibility used in this study, there are several limitations that warrant consideration in future research. For example, note that in this study only a single item retrospective report of past-year alcohol use was utilized, which may not have accurately captured the extent of alcohol use within our sample. Further, asking participants to recall events over a lengthy time period may have implicitly communicated to participants that we expected alcohol use to be infrequent, perhaps contributing to under-reporting (Dirghangi et al., 2014). Additionally, this study did not distinguish between selection and socialization effects on adolescents' and their peers' behaviors. It is likely that adolescents who drink alcohol themselves select friends who also drink alcohol. Similarly, although findings from our study suggest adolescents' drinking was influenced by their friends' drinking, the reverse association may also be true.

A related limitation is that because participants were not restricted in the number of friends they could nominate, scores for friends' self-reported alcohol use was determined by an unequal number of friends across participants. In future research, limiting participant reports to one or a fixed number of relationships could ameliorate this issue. Further, some friends were nominated by multiple participants, resulting in nonindependence across participants. Although it was possible for any given friend's score to be used for multiple participants, each friend's score was used only as one constituent part of the overall average of friends' drinking. Thus, predictor variables were not redundant across participants. Nevertheless, future research should carefully consider other approaches for addressing issues of nonindependence among participants. One way to resolve the interdependence of the data is to use actor-partner interdependence modeling that pairs adolescents and their peers into mutually exclusive reciprocal dyads (e.g., Popp et al., 2009). This would be an intriguing adaptation for future research assessing the predictive validity of our novel index of peer influence susceptibility.

Additionally, as with many analogue measures, the Peer Analogue Susceptibility Task may have conveyed a scenario some adolescents regarded as unrealistic, thus affecting results. Furthermore, although this study is strengthened by the use of a behavioral decision-making paradigm, it is still limited by its self-report nature. Although previously validated peer influence paradigms have also been based in self-report (e.g., Allen et al., 2006), to reduce potential confounds with other self-report assessments, the Peer Analogue Susceptibility Task could be improved by an

experimental design that captures peer influence susceptibility more implicitly. It also may be useful to adapt this paradigm to examine how adolescents' susceptibility varies when presented with alternate sources of influence, such as parents or teachers. Findings also may reveal that correlates of peer influence susceptibility vary based on different behavioral outcomes depicted within the paradigm. Indeed, our results likely benefitted from the use of a measure that depicted a drinking scenario and our assessment of alcohol use as an outcome. Finally, it would be useful to explore peer influence susceptibility to a wider range of behaviors, both positive (e.g., prosocial) and negative (e.g., deviant).

Although not possible in this study, future work should examine the test-retest reliability of the new performance-based assessment introduced in this study. In addition, it would be interesting to further explore subgroups of adolescents who did not demonstrate any susceptibility to peers in this study, either by reporting they would engage in substance use even with no peers doing so or by reporting they would refrain from substance use in all conditions. Further examination of these adolescents may be useful to identify targets for prevention efforts. Finally, although our study could not distinguish between positive and negative peer influences, future iterations of this work may consider examining when peer influence serves a positive or protective role (i.e., adolescents being influenced not to drink because their peers are not drinking) and when it serves a negative or harmful role (i.e., adolescents being influenced to drink because their peers are drinking).


Finally, more work is needed to discuss how susceptibility is best conceptualized and whether existing instruments adequately capture the construct in a manner that mirrors youths' actual experiences. For instance, it may be that under some conditions, individuals are aware of the influence of peers and can accurately report how much others' attitudes or behaviors are influential. However, when engaging in more subtle attitudinal shifts or behavioral choices, such as those made impulsively, through social mimicry, or among adolescents eschewing self-characterizations of being "conformists," individuals may be unable or reluctant to acknowledge they are susceptible to peers' influence. Future work on susceptibility may benefit from greater attention to the types of behaviors subject to influence and the most appropriate measurement approaches to capture these potentially distinct processes.

Overall, this study offers an innovative and new approach for measuring peer influence susceptibility with promising support for its convergent and predictive validity. Research designed to better understand whether some adolescents are more or less likely to be influenced by peers is needed to understand how to promote adaptive social development.

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