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Drinking buddies and their prospective influence on alcohol outcomes: Alcohol expectancies as a mediator

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Abstract

The process by which peers or the social network influence individual alcohol use, particularly among adults, remains a necessary area of research. The purpose of the present study was to examine the longitudinal influence of "drinking buddies" on alcohol outcomes (i.e., alcohol use, heavy drinking, and alcohol-related problems) as mediated by alcohol expectancies of social facilitation. Participants were 1347 (men = 660) newly married individuals recruited from the community. They were assessed at the time of marriage and through the 4th wedding anniversary. Longitudinal mediation across time was evaluated using latent growth modeling. Overall, the prospective association between the number of drinking buddies in the social network and all three alcohol outcomes were mediated by alcohol expectancies. In testing group invariance across genders, findings suggest that social facilitation expectancies may be more relevant to men as compared to women in predicting typical alcohol use and alcohol-related problems. Given that the social network may impact alcohol use at least in part through social expectancies, tailoring alcohol interventions to modify these specific beliefs may be particularly beneficial. In addition, strategies that target a drinker's social network or their drinking buddies specifically may be useful.

Keywords

Drinking buddies; alcohol use; peer influence; expectancies; longitudinal

Extensive research supports the association between peer relationships and substance use. This relationship has been consistently demonstrated among adolescents and, to a lesser extent, adult samples. Generally, cross-sectional research has shown a high correlation between individual substance use and the use of their social network (e.g., Ali & Dwyer, 2010; Leonard, Kearns, & Mudar, 2000; Urberg, Degirmencioglu, & Pilgrim, 1997). Similarity in drinking between peers could be explained by both socialization and selection processes. Peers could exert influence on personal drinking but individuals could select peers on the basis of their own drinking.

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Longitudinal studies with adolescents and adults have provided support for selection effects (Curran, Stice, & Chassin, 1997; Leonard & Mudar, 2003), although less frequently than for socialization effects (Andrews, Tildesley, Hops, & Li, 2002; Labouvie, 1996; Leonard & Mudar, 2004; Read, Wood, & Capone, 2005; Sieving, Perry, & Williams, 2000; Windle, 1997). In support of socialization, prospective studies of peer influence found that peers directly influence an individual's drinking even after controlling for selection effects (e.g., Henry, Slater, & Oetting, 2005; Jaccard, Blanton, & Dodge, 2005; Sieving et al., 2000). Still, others have argued that peer socialization and peer selection processes may actually occur concurrently with evidence for reciprocal influences (Bullers, Cooper, & Russell, 2001; Curran et al., 1997; Simons-Morton & Chen, 2006; Wiersma, Fischer, Harrington Cleveland, Reifman, & Harris, 2010).

While the direction of peer influence will likely remain a question of investigation for alcohol researchers, there is a need to further our understanding of the underlying process by which peers and personal drinking are related. Consequently, the primary goal of the present study was to investigate exactly how peers contribute to alcohol use behavior among adult populations, as such research is lacking. Research findings could have important implications for development and refinement of alcohol interventions for adults.

Peers and Alcohol Use

Much of the research on the influence of peers or social network on alcohol use has been focused on adolescent samples. Research has shown that drinking by peers predicts consequent drinking by adolescents (Sieving et al., 2000; Simons-Morton & Chen, 2006). Greater substance use within specific peer structures, such as best friendships, peer cliques, and social crowds, predicts an adolescent's own substance use (e.g., Graham, Marks, & Hansen, 1991; Hussong, 2002; Mounts & Steinberg, 1995). The influence of peers on substance use may increase developmentally across childhood to young adulthood (Krosnick & Judd, 1982).

There is empirical support that peers or the social network continues to influence drinking or other drug using habits beyond the adolescent developmental period and into early adulthood. Peer influence is a strong predictor of alcohol use and abuse among college drinkers (Wood, Read, Palfai, & Stevenson, 2001). One conceptualization of peer influence, perceptions of peers' alcohol use (i.e., perceived norms), has received much attention in the college drinking literature (e.g., Bosari & Carey, 2001, 2003; Lewis & Neighbors, 2004; Perkins, 2002). This body of research suggests that greater perceptions of alcohol use by peers is predictive of personal alcohol use and alcohol-related problems (e.g., Larimer, Turner, Mallett, & Geisner, 2004; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007).

Cross-sectional studies have shown that in young adults, the proportion of heavy drinkers in one's social network predicts personal drinking (Fondacaro & Heller, 1983), binge drinking (Delucchi, Matzger, & Weisner, 2008), and alcohol-related problems (Lau-Barraco and Collins, 2011). The influence of peers among young adults has been demonstrated in several prospective examinations. Specifically, in a longitudinal study of a community-based sample of 19-25 year-olds, researchers found similarities between young adults and peers' self-reported alcohol and tobacco use. Peer use predicted later binge drinking and cigarette use (Andrews et al., 2002). Another prospective study found that perceived substance use by peers was associated with changes in personal use among a sample in their 20's (Labouvie, 1996).

Studies examining romantic partnerships provide support for both peer and partner influence on drinking. The focus on individuals in marital relationships may be especially important as the development of intimate relationship and marriage is a critical life event for many adults.

While the transition to marriage has been shown to serve as a protective factor against heavy drinking and alcohol-related problems for many drinkers (e.g., Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Childcoat & Breslau, 1996), a considerable percentage continue to experience or even develop new problems related to drinking after marriage. For instance, one study found that 11% of married men and 5% of married women met criteria for alcohol use disorder (National Institute on Alcohol Abuse and Alcoholism, 2006). Because peer network changes over the transition to marriage (Kalmijn, 2003) and because of the relative lack of research on peer influence in married individuals, a greater understanding of the influence of specific network members on drinking outcomes and factors explaining such relationships in this population is warranted.

Previous research on the impact of one's network on personal drinking among those in romantic relationships has focused on the role of one's partner, and to a much less extent, one's peers. Studies have demonstrated that in pre-marital couples, greater peer network drinking is significantly related to individual drinking (Leonard et al., 2000; Leonard & Mudar, 2000). It also has been shown that drinking by a spouse has prospective influence on their mate (Leonard & Mudar, 2003), although the direction of influence between husbands and wives varies through the first years of marriage (Leonard & Mudar, 2004). Similar results have been found among young adults in other relationship status. Drinking by romantic partner was predictive of changes in personal drinking within dating and cohabiting relationships, but the effect was not present for married relationships (Wiersma et al., 2010). Overall, these studies highlight the potential role of partners on alcohol use outcomes among adults but the role of specific peers that may promote risky drinking is lacking.

Drinking Buddies

It has been proposed that perhaps it is not necessarily the overall social network or the number of heavy drinkers in the network that impacts alcohol use, but instead, is the drinking of particular network members (e.g., Leonard & Mudar, 2003). Certain network members that may have strong influences on an individual's drinking are those identified as "drinking buddies." Drinking buddies may be considered a subset of peers from one's network designated as friends for the primary purpose of drinking (Leonard et al., 2000). The presence of drinking buddies in one's network has been linked to increased alcohol use. Among college students, the presence of drinking buddies predicted alcohol misuse one year later (Reifman, Watson, McCourt, 2006). This effect was detected even after controlling for baseline alcohol use by the peer network. This suggests that it is not necessarily the general drinking by peers that predict later alcohol use but it is drinking by certain individuals in the network that accounts for the relationship. Leonard and colleagues (2000) found that the number of drinking buddies in one's network varied across the type of drinker, with heavy drinkers' network consisting of more drinking buddies than regular drinkers (e.g., 73% vs. 32%). In prospective investigations of married couples, the number of drinking buddies in the social network is longitudinally predictive of heavy drinking and alcohol problems during the first years of marriage (Leonard & Homish, 2008).

Alcohol Expectancies

The mechanism by which peers or the social network exert influence on a person's alcohol use may be through alcohol expectancies. Alcohol expectancies are one of the key cognitive constructs of the Social Learning Theory (SLT) model of alcohol use and have been posited as mediating the relationship between socio-environmental factors and alcohol use (Abrams & Niaura, 1987; Maisto, Carey, & Bradizza, 1999). Alcohol expectancies are beliefs regarding the cognitive, affective, and behavioral consequences of drinking (see Jones,

Corbin, & Fromme, 2001) and are learned via direct and indirect experience with alcohol, particularly through the social influences of our environment, such as culture, media, family, and peers (Abrams & Niaura, 1987).

An ever-growing body of literature supports the causal role of alcohol expectancies in drinking initiation, development, and maintenance (see Jones et al., 2001). Expectancies develop in children prior to gaining substantial personal experience with alcohol (Dunn & Goldman, 1996, 1998) and predict drinking onset and development of drinking problems among adolescents (Christiansen, Smith, Roehling, & Goldman, 1989). Expectancies have been shown to partially mediate the influence of other antecedent variables and drinking (Sher, Walitzer, Wood, & Brent, 1991; Webb, Baer, Francis, & Caid, 1993) and may be manipulated with consequent changes in drinking (e.g., Darkes & Goldman, 1993; Lau-Barraco & Dunn, 2008).

Studies have examined the intervening role of alcohol expectancies on social influences and alcohol use. Research with adolescents has shown that greater perceptions of general peer use and peer attitudes have an indirect effect on alcohol use through the effects of alcohol expectancies. Specifically, in a cross-sectional study of adolescent drinking, expectancies and their valuations of these effects were found to mediate the influence of peer norms (through perceived peer use and approval) on lifetime alcohol use (Zamboanga, Schwartz, Ham, Jarvis, & Olthuis, 2009). In a prospective study of adolescent alcohol use, Scheier and Botvin (1997) demonstrated that social influence of perceived friends' alcohol use and alcohol attitude were significantly mediated through positive social reinforcement expectancies. While fewer studies have focused on these relationships beyond adolescents, Wood and colleagues (2001), in a cross-sectional study of college students, investigated active (i.e., alcohol offers) and passive (i.e., norms, social modeling) social influence on alcohol use outcomes and the extent to which positive alcohol expectancies mediate the associations. Findings provided support for the mediational role of expectancies between social modeling and alcohol use and problems. Overall, these studies provide support that in adolescents (Scheier & Botvin, 1997) and college students (Wood et al., 2001), expectancies account, at least partially, for the relations between social influence and drinking behaviors. However, research examining this issue beyond adolescent and college samples is lacking.

The purpose of the present study was to examine the longitudinal influence of drinking buddies on alcohol outcomes as mediated by alcohol expectancies in a community-based sample of married adults. Specifically, we tested the hypothesis that changes in the number of drinking buddies over time would be associated with changes in individual alcohol involvement (i.e., heavy drinking, typical drinking, and alcohol-related problems) through the mechanism of social facilitation alcohol expectancies. A greater understanding of this process is critical in prevention and intervention program development designed to specifically target alcohol use from a peer-influence perspective.

Method

Participants

Participants (660 men, 687 women) were drawn from a large multi-wave prospective study of newly married adults recruited from New York State. The current study represents data collected through the first four years of marriage. For inclusion in the study, both members of the couple were required to be in their first marriage, at least 18 years of age, English-speaking, and literate. The present analyses were based on self-report data collected from individuals at the time of marriage (Wave 1) and at their first (Wave 2), second (Wave 3), and fourth anniversaries (Wave 4). Of the 660 men, $n = 566$ (86%) completed wave 2, $n = 516$ (78%) completed wave 3, and $n = 474$ (72%) completed wave 4. Of the 687 women, $n =$

609 (89%) completed wave 2, $n = 571$ (83%) completed wave 3, and $n = 549$ (80%) completed wave 4.

At Wave 1, the average ages for men and women were 28.62 ($SD = 6.13$) and 26.65 ($SD = 5.53$) years, respectively. The sample was largely European American (60.8%), followed by African American (32%). Another 6.3% of the sample consisted of Hispanics, Asians, and Native Americans. Sixty-nine percent (69%) of the couples were living together prior to marriage. Many of the couples were parents at the time of marriage (38.5% men; 43.7% women). About 11.8% of men and 10.2% of women did not graduate from high school. Thirty-seven percent (37.1%) of men and 32.0% of women did not receive any education beyond high school. Approximately 47.7% of men and 54.7% of women were college graduates or were attending college at Wave 1. Most were employed at least part time (89.7% men; 74.9% women). The research protocol was approved by the institutional review board of the University at Buffalo, State University of New York.

Procedures

Couples were recruited over a 3-year period (1996-1999) for a brief, 5-10 minute, paid ($10) interview at city hall after applying for a marriage license. The interview assessed general demographic variables (e.g., age, race, education), family and relationship factors (e.g., number of children, length of engagement), and substance use (e.g., tobacco use, alcohol use, times intoxicated in the past year). Of the 1,050 couples approached about the brief recruitment interview, less than 8% refused; thus, 970 eligible couples were interviewed.

Following the brief interview, couples were recruited into the longitudinal study. A more complete account of the recruitment process may be found elsewhere (see Leonard & Mudar, 2000, 2003). Of the 970 eligible couples that participated in the brief interview, 7.2% ($n = 70$ couples) declined to participate in the longitudinal study, and 13 couples did not marry. This resulted in 877 couples who agreed to participate in the larger study. The current study is based on the data of individual members of the couple who completed at least 2 or more assessments across the duration of the study (i.e., Waves 1 to 4). This resulted in an overall sample size of 1347 participants for the present analysis.

Couples who agreed to participate in the longitudinal study were given identical questionnaires to complete independently at home and asked to return them in a separate postage-paid envelope within 3 weeks (Wave 1 assessment). Couples were asked not to discuss their answers with each other. The questionnaires took approximately 2-3 hours to complete. At the couples' first (Wave 2), second (Wave 3), and fourth (Wave 4) wedding anniversaries, they were mailed questionnaires similar to the one from Wave 1. Again, participants were asked to complete the questionnaire and return via pre-paid envelopes. Each individual received $40 for his or her participation for the first three assessments and $50 for the fourth assessment.

Measures

Number of drinking buddies—At each assessment, participants were asked to provide a list of members in their social networks. These individuals were defined as people who provided emotional support to the participants, people who helped with practical or financial matters, or people with whom they socialized. For each identified person in the network, participants were asked to report on a variety of general factors (e.g., demographics, rate/type of contact), and specific alcohol-related questions, including whether the person would be considered a "drinking buddy." Participants were provided with a definition of drinking buddy, which was someone "that you got together with on a regular basis to do activities that centered around drinking and/or going to bars or nightclubs."

Alcohol expectancies—The Social/Physical Pleasure subscale of the Alcohol Effects Questionnaire (AEQ; Rohsenow, 1983) was used in this study. The true/false response format of the original scale was changed to a 5-point agree/disagree scale. Participants responded according to their own personal beliefs about the effects of alcohol. Coefficient alphas ranged from .87 to .89 for men and .86 to .90 for women.

Alcohol use—At each wave, heavy drinking was assessed with two items. Frequency of past year intoxication was assessed on a 9-point scale with responses ranging from "didn't get drunk last year" (0) to "everyday" (8). The frequency of drinking 6 or more drinks on an occasion in the past year was assessed using the same 9-point scale.[1] Consistent with previous work (Homish & Leonard, 2007; Leonard & Homish, 2008), heavy drinking was defined as the maximum of these two responses (i.e., the most severe response between the two items was used as the indicator of individual heavy drinking). The rationale for this decision was based on results showing a gender difference in the way men and women responded to the two items (Homish & Leonard, 2007). Men more frequently endorsed drinking 6 or more drinks while women were more likely to endorse drinking to intoxication. Due to this gender discrepancy, heavy drinking was operationalized as the highest of these two items.

To assess average alcohol consumption, standard quantity and frequency variability questions (Cahalan, Cisin, & Crossley, 1969) were asked pertaining to the past year at each wave of assessment. Answers to these beverage-specific (beer, wine/wine coolers, hard liquor) questions were used to compute the average daily volume of alcohol consumption. These variables served as alcohol outcome in the models.

Alcohol-related problems—Alcohol-related problems in the previous year were assessed using 25-items that were modified from the National Alcohol Survey (Clark & Hilton, 1991), the Drinker Inventory of Consequences (Miller & Tonigan, 1995), and the work of Polich and Orvis (1979). The measure consisted of both alcohol-related marital problems (e.g., "hit or got into a physical fight with your partner while you were drinking," "said harsh or cruel things to your partner while you were drinking.") and alcohol-related other problems ("driven a car after drinking enough to be in trouble if a police officer has stopped you," "hit or gotten into a physical fight with someone other than your partner while you were drinking," "had your friends complain or express concern about your drinking"). Participants were asked to rate how often each of these problems had occurred. Responses ranged from "never occurred" or "it had not occurred in the past year" to occurring "once," "twice," "three times," or "four or more times" in the past year. These items were summed, leading to potential scores between 0 to 100, with higher scores indicating a greater number of total occurrences of alcohol problems. Coefficient alphas ranged from .90 to .93 for men and .86 to .93 for women across the waves. Alcohol-related problems was modeled as one alcohol outcome variable.

Demographic factors—During the initial brief screening interview, each participant reported his or her age, race/ethnicity, income, and highest level of education.

[1]The now widely accepted operational definition of binge drinking as four/five drinks in one sitting for women/men actually occurred after the first several assessments of this study. While the 4/5 criteria was added in subsequent assessment points, the first four assessments reported here asked participants to report the frequency of drinking six or more on an occasion.

Results

Analysis Approach

Latent growth models within the structural equation modeling framework were fitted using Mplus (Version 6.1; Muthén & Muthén, 1998-2010). Parameter estimates were bootstrapped with 5,000 bootstrap samples to accommodate the non-normality of some of the outcomes and to conduct mediation hypothesis testing. Bias-corrected bootstrapped confidence intervals (CIs) were used to assess significance. To test the significance of the indirect effects, the confidence interval approach was used as described by MacKinnon, Lockwood, & Williams (2004). Missing data were replaced using expectation maximization imputation. The sample size allowed for longitudinal mediation analysis to account for growth over time. This passage of time allowed mechanisms of change to occur, and provided more accurate estimates of mediation compared to cross-sectional designs (Maxwell & Cole, 2007).

Longitudinal growth models were conducted, with intercepts and piecewise growth slopes fitted to each construct of interest (i.e., number of drinking buddies, alcohol expectancies, and alcohol outcomes; see Table 1 for correlation of study variables). As shown in Figure 1, the loadings of the piecewise growth slope were set to 0, 1, 1, and 1 for slope 1; 0, 0, 1, and 1 for slope 2, and 0, 0, 0, and 1 for slope 3 to capture incremental growth from one timepoint to the next. As shown in subsequent figures (2-4), paths for each type of effect were constrained to equality (e.g., slope 1 growth in buddies to slope 1 growth in expectancies was constrained to be equal to slope 2 growth in buddies to slope 2 growth in expectancies). This was done to allow underlying growth to be free (i.e., the piecewise growth models) but to assess the consistent influence of growth (e.g., the influence of growth of number of buddies on the growth of alcohol expectancies). The latent intercept and slopes for each construct were allowed to correlate, as were all latent intercepts. The number of friends in one's social network was included as a time-varying covariate predicting number of drinking buddies. The rationale for this was to distinguish between participants who had fewer drinking buddies because few of their friends drink, compared to participants who had fewer drinking buddies because they had a smaller number of friends overall.

Group invariance analyses were conducted across men and women to examine if the mediation effects significantly differed. This was done by comparing models in which hypothesized mediation paths were constrained to equality across groups to models in which the paths were allowed to be freely estimated. Significant differences between the models as assessed by a chi-square difference analysis would indicate significant misfit by constraining the paths, meaning the mediational effects significantly differ across groups.

Typical Alcohol Use

For typical alcohol use, model fit was acceptable (CFI = .90, RMSEA = .08, SRMR = .08). The indirect effect for social facilitation alcohol expectancies was significant, $B = 0.003$, bias-corrected bootstrapped 95% CI: 0.002 to 0.006, $\beta = 0.007$, with growth of number of drinking buddies significantly predicting growth of alcohol expectancies and expectancies in turn predicting growth of alcohol use. The indirect effect for social facilitation alcohol expectancies was significant, $B = 0.052$, bias-corrected bootstrapped 95% CI: 0.014 to 1.249, $\beta = 0.128$, with growth of number of drinking buddies significantly predicting growth of alcohol expectancies and expectancies in turn predicting growth of alcohol use. The direct effect between drinking buddies and alcohol use was still significant after accounting for alcohol expectancies, indicating partial mediation. Parameter estimates for individual paths can be seen in Figure 2. Group invariance analyses indicated that there was not significant decrement in model fit when constraining the paths to equality across men and women,

$\Delta\chi^2(3) = 6.198$, $p = .102$. These results suggest that the hypothesized paths function relatively similarly across men and women.

Heavy Alcohol Use

For heavy alcohol use, model fit was acceptable (CFI = .92, RMSEA = .08, SRMR = .08). The indirect effect for social facilitation alcohol expectancies was significant, $B = 0.005$, bias-corrected bootstrapped 95% CI: 0.003 to 0.155, $\beta = 0.009$, with growth of number of drinking buddies significantly predicting growth of alcohol expectancies and expectancies in turn predicting growth of heavy alcohol use. The indirect effect for social facilitation alcohol expectancies was significant, $B = 0.078$, bias-corrected bootstrapped 95% CI: 0.037 to 0.155, $\beta = 0.159$, with growth of number of drinking buddies significantly predicting growth of alcohol expectancies and expectancies in turn predicting growth of heavy alcohol use. The direct effect between drinking buddies and heavy alcohol use was still significant even when accounting for alcohol expectancies, indicating partial mediation. Parameter estimates for individual paths can be seen in Figure 3. Group invariance analyses indicated that there was not significant decrement in model fit when constraining the paths to equality across men and women, $\Delta\chi^2(3) = 3.850$, $p = .278$. These results suggest that the hypothesized paths function relatively similarly across men and women.

Alcohol-Related Problems

For alcohol-related problems, model fit was adequate (CFI = .83, RMSEA = .10, SRMR = .15). In the mediation assessment for alcohol-related problems, heavy alcohol use was controlled for at each time wave to examine the unique effect of peers on problems beyond their effect on heavy drinking. The indirect effect for alcohol expectancies was also significant, $B = 0.008$, bias-corrected bootstrapped 95% CI: 0.002 to 0.019, $\beta = 0.003$, with growth of number of drinking buddies significantly predicting growth of alcohol expectancies and expectancies in turn predicting growth of alcohol-related problems. The direct effect between number of drinking buddies and alcohol-related problems was not significant when accounting for alcohol expectancies, indicating full mediation. Parameter estimates for individual paths can be seen in Figure 4. Group invariance analyses indicated that there was significant decrement in model fit when constraining the paths to equality across men and women, $\Delta\chi^2(3) = 14.877$, $p = .002$. These results suggest that the unconstrained model fits the data better than the constrained models and that there are significant differences across men and women. Their individual path coefficients can be found in Table 2.

Selection Effects

To compare our hypothesized socialization model to an alternative selection effects explanation, we examined cross-lagged correlations between number of drinking buddies and alcohol outcomes. As seen in Table 1, the lagged correlations supporting the hypothesized socialization effects model of earlier drinking buddies variables with later alcohol outcomes (e.g., time 1 drinking buddies with time 2 typical drinking, time 2 drinking buddies with time 3 typical drinking), range from .07 to .16 for typical drinking, .24 to .27 for heavy drinking, and .11 to .13 for alcohol-related problems. Comparatively, the lagged correlations supporting the competing selection effects model of earlier alcohol variables with later drinking buddies (e.g., time 1 typical drinking with time 2 drinking buddies, time 2 typical drinking with time 3 drinking buddies), range from .07 to .18 for typical drinking, .26 to .28 for heavy drinking, and .09 to .17 for alcohol-related problems. The similarity of correlations across socialization and selection effects suggests that both processes may be present and both offer explanatory value.

Discussion

The present study examined the underlying process by which the specific peer structure of drinking buddies prospectively influences alcohol outcomes. We tested the hypothesis that a change in the number of drinking buddies in the social network over time is related to changes in the individual's alcohol involvement, including alcohol use, heavy drinking, and alcohol-related problems. We hypothesized that relations between drinking buddies and alcohol outcomes would be mediated by alcohol expectancies of social facilitation. Overall, the current results confirmed our hypotheses.

Consistent with SLT, alcohol expectancies emerged from our analyses as playing a significant intervening role in the link between peers and alcohol use. The prospective association between drinking buddies and the participants' heavy drinking, typical drinking, and alcohol-related problems were mediated by alcohol expectancies of social facilitation. This means that a change in drinking buddies predicted a change in subsequent social facilitation beliefs, which then predicted a change in later alcohol outcomes. Across all three outcomes, there was evidence for partial or full mediation. When mediational relationships were examined by gender, findings showed that the mediated relationship was stronger for men than for women on one of the outcomes. In the prediction of typical and heavy drinking, men and women were not significantly different. However, for models predicting alcohol-related problems, mediation effects differed between genders. For women, the indirect effect was not significant due to the non-significant association between alcohol expectancies and alcohol-related problems. For men, the indirect effect was significant. Social facilitation expectancies fully mediated associations between drinking buddies and alcohol-related problems. This may suggest that beliefs regarding the social effects of drinking may be more salient to men as compared to women.

This study confirms previous research demonstrating the importance and utility of social expectancies. Our findings suggest that a key process in peer influence involves the social aspects of alcohol. The changes in social behavior one expects from drinking have been shown to predict concurrent and longitudinal alcohol use among adolescents (e.g., Smith, Goldman, Greenbaum, & Christiansen, 1995) and young adult samples (e.g., Lundahl, Davis, Adesso, & Lukas, 1997). Social expectancies also help account for the association between various risk and alcohol use (Darkes, Greenbaum, & Goldman, 2004). Consistent with this previous research, our study findings demonstrated that social facilitation expectancies help explain how specific drinking peers impact prospective individual alcohol use and problems. Further, results support that drinking buddies directly help shape the development of one's cognitions regarding the anticipated social effects of alcohol.

This study adds to research on the utility of looking specifically at drinking buddies in one's social network as a risk factor for later heavy drinking. An individual's alcohol use may be differentially influenced by key members of the social network rather than simply the drinking by the entire peer network. Our findings indicate that peers designated as drinking buddies may be particularly important. This is consistent with the results from several studies including a study by Reifman and collegues (2006), as well as in other analyses of the current data (Leonard & Homish, 2008), that greater presence of drinking buddies in the network predicts greater later alcohol misuse or problems. In particular, Reifman and colleagues (2006) found that even after controlling for actual network drinking, the number of drinking buddies in the social network was predictive of subsequent heavy drinking during the first year of college. In another study, researchers examined alcohol-related factors that predict changes in the number of drinking buddies over time in married couples (Homish & Leonard, 2008). Personality factors emerged as a significant factor for husbands and alcohol expectancies related to changes for both husbands and wives.

The focus of the present study was to examine drinking buddies' influence on later drinking as explained by alcohol expectancies. It was hypothesized based on SLT, Expectancy Theory, and previous research that peers contribute to the development of a person's beliefs regarding alcohol and it is through this pathway that drinking buddies exert their influence. The primary aim of the present study was to offer an explanation of how specific network members (i.e., drinking buddies) impact alcohol involvement. While our findings support the importance of peers and that peer modeling of drinking behavior may influence an individual's future drinking through expectancies, other researchers have argued that selection processes are at play or that the relationship between peer and individual drinking may be bidirectional (Bullers et al., 2001; Read et al., 2005; Reifman et al., 2006). In this alternative view point, it is argued that a drinker seeks out peers or partners whose drinking behaviors are similar to their own, and these peers or partners in turn reinforce the person's drinking. We explored this alternative explanation by examining the cross-lagged correlations between drinking buddies and alcohol outcomes. Results showed that both selection and socialization effects yielded similar correlations over time. Thus, these findings suggest that both processes are at play when examining the directionality of peer influence without consideration of expectancies in the relationship.

Given the intervening role of alcohol expectancies, specifically manipulating or disconfirming these beliefs may be a promising intervention strategy for this population. Expectancy challenge interventions, whereby beliefs regarding the positive effects of alcohol are challenged through an experiential procedure, has been designated as one of only several empirically supported approaches to target heavy drinking by college students (National Institute on Alcohol Abuse and Alcoholism, 2002). Administration and evaluation of expectancy challenge interventions has been largely limited to college samples (e.g., Darkes & Goldman, 1993, 1998; Dunn, Lau, & Cruz, 2000; Lau-Barraco & Dunn, 2008), with one study adapting the program to a prevention program for children (Cruz & Dunn, 2003). The potential usefulness of this particular approach with adult samples beyond college students awaits future investigation.

Current findings support a basis for future intervention and treatment development that specifically targets a drinker's social network (e.g., Litt, Kadden, Kabela-Cormier, & Petry, 2009). Interventions and treatments incorporating the social network has been limited but has been applied to different populations (e.g., dependent users, college students) and substances (e.g., alcohol, smoking). In a study of alcohol dependent patients, researchers tested a 12-week individual treatment program designed to change a patient's social network to one that promotes sobriety rather than drinking (Litt et al., 2009). Findings showed that modifying the drinker's social network leads to improvement in drinking outcomes, self-efficacy, and coping at two-year follow-up. In a mandated college student sample, a supportive peer was included as part of a brief motivational intervention (BMI), which resulted in greater reductions in drinking and alcohol-related problems then students assigned to a BMI group without a supportive peer (Tevyaw, Borsari, Colby, & Monti, 2007). Peer or partner involvement also has been tested in treatments for smoking behavior (e.g., Kviz, Crittenden, Madura, & Warnecke, 1994; May, West, Hajek, McEwen, & McRobbie, 2006) and drinking among pregnant women (Chang, McNamara, Orav, Koby, Lavigne, Ludman et al., 2005) with favorable outcomes. Overall, previous studies and the current findings suggest that social-network based approaches to intervention may prove beneficial to reducing substance use. Future research to further develop social network-based strategies may focus on tailoring or adapting the intervention to other populations. Further, to capitalize on the potential robust influence of peers on substance use, future intervention research may explore the inclusion of one's drinking buddies or network members in a group expectancy challenge program. Finally, exploring the person- or peer-

level factors that moderate or mediate the intervention effect is necessary to maximize intervention effectiveness.

There are limitations to the present study that warrant discussion. First, while both husband and wife data were available, the present paper focused specifically on drinking buddies as the source of socialization and thus, analysis of the dyadic data was excluded as to avoid an overly complex model. Further, because our model and data was complex, not all intricacies including the dyadic data could be investigated simultaneously while still accommodating other essential issues of our analyses including mediation test, non-normality, and even timepoints. Exclusion of dyadic analysis violates the assumption of independence of observations. This may lead to biased significance tests; however, our point estimates should be unaffected by this violation, and the directions of the recorded effects should be accurate (Cohen, Cohen, West, & Aiken, 2003). Additionally, our use of bias-corrected bootstrapped confidence intervals as the method of significance testing, rather than traditional standard error calculations, may obviate any bias in the significance testing process as confidence intervals are created using a series of point estimates. Second, the study sample consists of newly married men and women in their 20's and 30's (approximate mean age = 27.5). It is unclear as to how the current findings will generalize to adults who are not married or in a committed relationship. Third, the assessment of the number of drinking buddies in the social network was reported by the individual participant and was not verified independently with the network members themselves. Another limitation is that some participant attrition occurred over the four data collection waves. We maintained 80% of the wives and 71% of the husbands from Wave 1 to Wave 4. Some differences were found between completers and non-completers on study variables; however, any group differences on study variables were included in the models. Thus, any systematic differences due to completer status were accounted for and should not have biased the findings. Finally, participant recruitment for the current longitudinal study occurred between 1996 and 1999. Although evidence do not support cross-generational differences in heavy drinking practices (McCoy & Nieland, 2011), it is possible that the social culture of drinking has shifted since the time of recruitment, and thus, the relevance of the our findings to present day should be considered in light of this potential issue.

In summary, our findings provide evidence that certain members of one's social network, drinking buddies, exert influence on personal alcohol-related outcomes and may serve as a risk factor for later heavy drinking and problems. These specific peers influence drinking through their impact on one's beliefs regarding the social enhancement aspects of alcohol use. Future research efforts may focus on developing interventions capitalizing on the significance of specific network peers on alcohol use and challenging social enhancement beliefs related to drinking.

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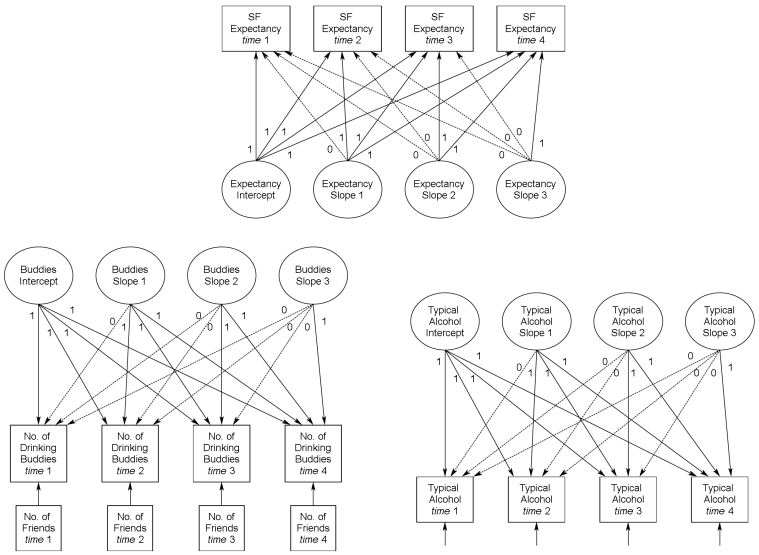

Figure 1.

Piecewise growth modeling for each construct, where the intercept factor captures the baseline values for the construct, slope 1 captures growth to time 2, slope 2 captures growth to time 3, and slope 4 captures growth to time 4. Though not pictured, the intercept and slopes were allowed to correlate within a construct, as well as all intercepts across constructs.

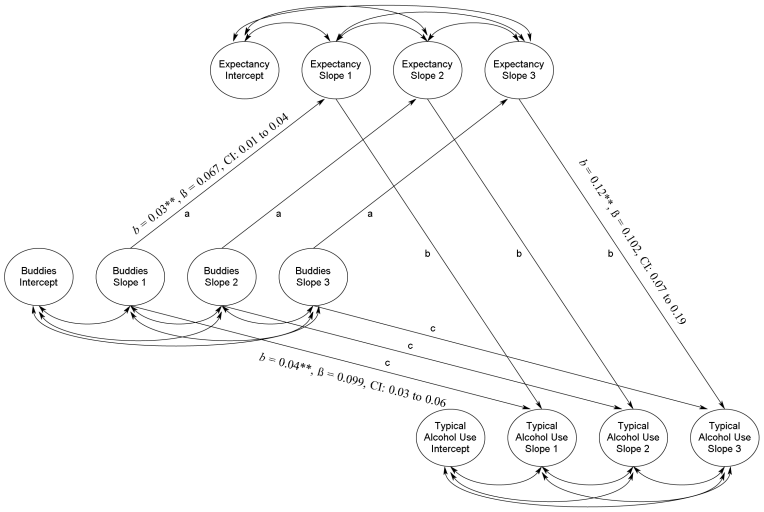

Figure 2.

Longitudinal mediation across four time waves: Examining alcohol expectancies as a mediator on the relationship between number of drinking buddies and typical alcohol use. CI = 95% bias-corrected bootstrapped confidence intervals. Though not pictured, intercepts were allowed to correlate. *$p < .05$. **$p < .01$.

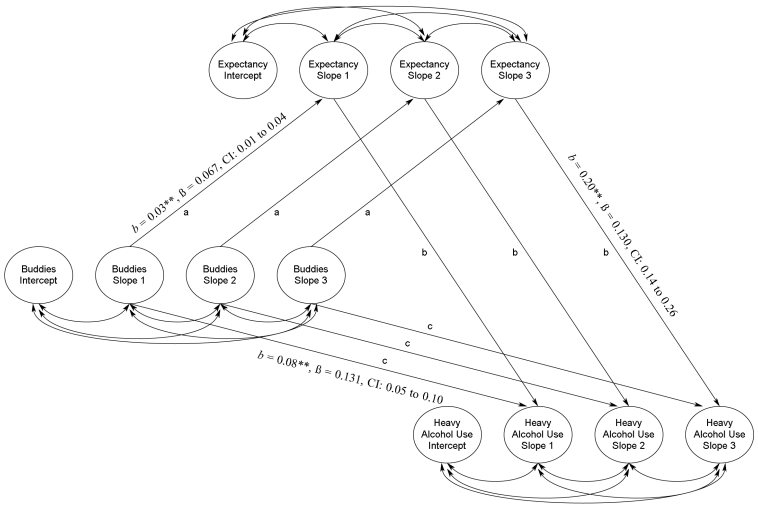

Figure 3.

Longitudinal mediation across four time waves: Examining alcohol expectancies as a mediator on the relationship between number of drinking buddies and heavy alcohol use. CI = 95% bias-corrected bootstrapped confidence intervals. Though not pictured, intercepts were allowed to correlate. *$p < .05$. **$p < .01$.

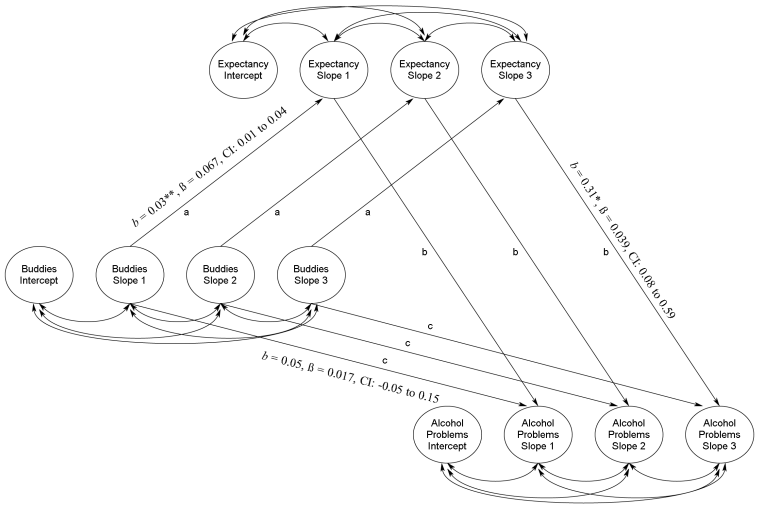

Figure 4.

Longitudinal mediation across four time waves: Examining alcohol expectancies as a mediator on the relationship between number of drinking buddies and alcohol-related problems. CI = 95% bias-corrected bootstrapped confidence intervals. Though not pictured, intercepts were allowed to correlate. *$p < .05$. **$p < .01$.

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Table 1

Intercorrelations of Study Variables

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. T1 DB	--																			
2. T2 DB	.44**	--																		
3. T3 DB	.33**	.44**	--																	
4. T4 DB	.29**	.26**	.38**	--																
5. T1 AE	.31**	.26**	.18**	.19**	--															
6. T2 AE	.25**	.27**	.22**	.18**	.69**	--														
7. T3 AE	.27**	.26**	.27**	.19**	.69**	.73**	--													
8. T4 AE	.25**	.25**	.22**	.24**	.62**	.69**	.73**	--												
9. T1 AU	.23**	***.18***	.17**	.11**	.30**	.23**	.23**	.23**	--											
10. T2 AU	***.16***	.19**	*.17*	.14**	.21**	.25**	.21**	.22**	.54**	--										
11. T3 AU	.10**	***.07***	.14**		***.07***	.17**	.18**	.19**	.13**	.42**	.44**	--								
12. T4 AU		.08*	.10**	***.14***	.15**	.11**	.16**	.18**	.23**	.35**	.54**	.29**	--							
13. T1 HD	.35**	***.27***	.26**	.24**	.41**	.36**	.34**	.35**	.65**	.49**	.38**	.35**	--							
14. T2 HD	***.27***	.30**	***.28***	.21**	.32**	.35**	.31**	.31**	.56**	.63**	.36**	.39**	.65**	--						
15. T3 HD	.24**	***.24***	.33**	***.26***	.32**	.35**	.38**	.33**	.50**	.46**	.58**	.46**	.60**	.63**	--					
16. T4 HD	.21**	.23**	***.27***	.32**	.26**	.29**	.29**	.36**	.44**	.52**	.32**	.67**	.56**	.60**	.61**	--				
17. T1 AP	.23**	***.17***	.13**	.13**	.28**	.22**	.21**	.24**	.53**	.36**	.30**	.30**	.54**	.44**	.36**	.43**	--			
18. T2 AP	***.13***	.14**	***.15***	.10**	.14**	.18**	.14**	.19**	.36**	.56**	.33**	.44**	.40**	.58**	.42**	.47**	.53**	--		
19. T3 AP	.12**	***.12***	.17**	***.09***	.17**	.17**	.17**	.18**	.35**	.40**	.46**	.37**	.40**	.44**	.52**	.46**	.49**	.67**	--	
20. T4 AP	.13**	.13**	***.11***	.18**	.12**	.18**	.18**	.24**	.24**	.36**	.27**	.56**	.35**	.35**	.40**	.60**	.44**	.54**	.55**	--

Note. T1 = time 1; T2 = time 2; T3 = time 3; T4 = time 4; DB = number of drinking buddies; AE = alcohol expectancies; AU = typical alcohol use; HD = heavy alcohol use; AP = alcohol-related problems. Cross-lagged correlations are in bold and italics.

*$p < .01$.

**$p < .05$.

Table 2

Parameter Estimates from Unconstrained Group Invariance Models for Alcohol-Related Problems

Hypothesized	Men		Women	
Effect	*B*	95% CI	*B*	95% CI
Buddies to AE	0.021*	0.005 to 0.037	0.034*	0.016 to 0.054
AE to Problems	0.622*	0.261 to 1.007	−0.058	−0.289 to 0.197
Buddies to Problems	−0.006	−0.170 to 0.136	0.110	−0.016 to 0.555
Indirect Effect	0.013*	0.003 to 0.031	−0.002	−0.013 to 0.006

Note. CI = bias-corrected bootstrapped confidence intervals; Buddies = number of drinking buddies; AE = alcohol expectancies; Problems = alcohol-related problems.

* $p < .05$.