

The Influence of Drinking Buddies: A Longitudinal Investigation of Drinking Motivations and
Drinking Behaviours in Emerging Adults

Kehayes, I. L., Mackinnon, S. P., Sherry, S. B., Leonard, K. E., & Stewart, S. H.

Notice: This is an electronic post-print of an article published in the Substance Use and Misuse. This article may not exactly replicate the final version published in the journal but does reflect the article's content after the final peer review.

Kehayes, I. L., Mackinnon, S. P., Sherry, S. B., Leonard, K. E., & Stewart, S. H. (2021). The influence of drinking buddies: A longitudinal investigation of drinking motivations and drinking behaviors in emerging adults. *Substance Use and Misuse*, 56, 286-296.

<https://doi.org/10.1080/10826084.2020.1861631>

Abstract

Background: Heavy alcohol consumption and frequent alcohol use are associated with many adverse social and physical consequences. The different motivations underlying why people drink predict different patterns of alcohol consumption. A drinking buddy (i.e., a friend with whom a person drinks alcohol) influences a person's drinking via social learning, leading to escalations in drinking over time. **Purpose:** Few studies have investigated drinking motives among peers and none have studied whether the drinking motives of a drinking buddy can influence another person's drinking behaviour; we sought to fill that gap. **Method:** Same-sex drinking buddies ($N = 174$; 66.1% female) were assessed once monthly for four months using self-report questionnaires. Participants were on average 18.66 years-old ($SD = 1.17$). **Results:** Indistinguishable actor-partner interdependence models using multilevel path analysis were conducted, with each drinking motive predicting drinking frequency and quantity, respectively. There were significant actor effects for social, enhancement, conformity, and coping motives; moreover, the enhancement, social, and coping-anxiety motives of the drinking buddy influenced the individual's drinking frequency across the four months of the study. Conversely, only the enhancement motives of the buddy predicted drinking quantity in the individual when averaged across time. Sex was not a significant moderator of these effects. **Importance:** When targeting risky drinking behaviour in a therapeutic context, assessing and addressing a person's reasons for drinking, as well as their drinking buddy's reasons for drinking, may reduce the risk of escalations in either friend's drinking frequency over time.

Keywords: alcohol use; drinking buddies; drinking motives; social learning theory; longitudinal

The Influence of Drinking Buddies: A Longitudinal Investigation of Drinking Motivations and Drinking Behaviours in Emerging Adults

Alcohol use is common among young people, with 82.8% of emerging adults (17-25 years) drinking alcohol in the past year (Health Canada, 2016). Excessive alcohol use peaks during this period (Patrick et al., 2019) and is associated with over 200 adverse health consequences, including cardiovascular and gastrointestinal diseases, and cancers (World Health Organization, 2014). Social costs of alcohol misuse are also high, including damaged relationships, violence, and impaired driving (Public Health Agency of Canada, 2016). Alcohol consumption has many determinants, including underlying motivations (Cooper, 1994), and the social environment (Bandura, 1971). Given the negative outcomes associated with alcohol misuse, investigating how such individual and social factors contribute to drinking behaviour is crucial.

Drinking Motives Theory

According to drinking motives theory (Cox & Klinger, 2004), people drink to achieve desired outcomes. Drinking motivations can be described in terms of their valence (i.e., positively or negatively reinforcing), and source (i.e., internal or external). Crossing these dimensions yields four core drinking motivations: social (positive-external; to increase affiliation), conformity (negative-external; to avoid social rejection), enhancement (positive-internal; to increase positive affect), and coping (negative-internal; to reduce negative affect; Cooper, 1994). More recently, Cooper's (1994) four-factor model of motives was modified where the generic coping motive was split into distinct coping-depression and coping-anxiety factors (Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). Some drinking motives are

riskier than others in terms of their associations with alcohol outcomes. Enhancement motives are the most stable predictors of heavy alcohol consumption (Cooper, 1994). When controlling other motives, social motives are modestly associated with drinking quantity and frequency (Kuntsche, Knibbe, Gmel, & Engels, 2005). Coping-depression and coping-anxiety motives are positively associated with alcohol-related problems (Grant, Stewart, & Mohr, 2009; Grant et al., 2007). Conformity motives are negatively associated with alcohol frequency/quantity, but positively associated with alcohol-related problems (Cooper, Kuntsche, Levitt, Barber, & Wolf, 2016). Drinking motives are theorized to be the most proximal influence on drinking behaviour and are the route by which other more distal variables (e.g., social influences) predict alcohol consumption (Cooper, 1994; Kuntsche, von Fischer, & Gmel, 2008). It is therefore important to investigate how the motives of others influence individual drinking behaviour since motives have a direct impact on individual frequent and heavy drinking behaviour.

Social Learning Theory

Drinking motivations are strong predictors of alcohol use within individuals; the social context in which drinking occurs is also highly influential. Alcohol use in emerging adults is embedded within a social context (Christiansen, Vik, & Jarchow, 2002); most drinking occurs with others. Social learning theory (SLT; Bandura, 1971) proposes individuals observe the behaviour of models in their environment and adopt models' behaviours themselves through vicarious reinforcement. Thus, SLT proposes it is not only personally experienced consequences that regulate behaviour, but also consequences observed in others (Akers, 1985; Bandura, 1977). Similarly, others' motivations may be inferred and adopted when witnessing the consequences of others' overt behaviour. This theoretical framework suggests emerging adults indirectly learn to drink to obtain the same rewards from drinking they have observed among others in their social

environment. Thus, it is important to investigate how peers might influence individual drinking motives from within a SLT framework to prevent escalations in risky drinking behaviours.

Why Study Drinking Buddies?

In emerging adulthood, peer relationships are one of the most influential factors when it comes to college drinking (Borsari & Carey, 2001); being surrounded by heavy drinkers increases the amount of alcohol a student drinks over time (DeMartini, Prince, & Carey, 2013). It might not be the overall network or number of drinkers in the network that results in alcohol use, but rather the drinking of particularly influential network members. A “drinking buddy” (i.e., a friend with whom one goes drinking; Reifman et al., 2006), may be especially influential with respect to emerging adult drinking (Lau-Barraco & Linen, 2014). In fact, heavy drinkers’ social networks consist of more drinking buddies than regular drinkers’ networks (Leonard, Kearns, & Mudar, 2000). Moreover, the presence of drinking buddies predicts alcohol misuse one year later (Reifman et al., 2006) and the number of drinking buddies in the social network predicts heavy drinking and alcohol problems over a one year period (Leonard & Homish, 2008). Given peers (particularly drinking buddies) influence alcohol consumption, the present study focuses on the specific peer relationship of drinking buddies.

Literature Review

SLT (Bandura, 1971) predicts that the observation of drinking motives rewarded in valued peers would result in adoption of those same motivations, and the behaviours that follow. This could occur via active exchange (e.g., a friend verbalizing how alcohol enhances positive emotions) or via passive learning (e.g., a person witnesses their friend drink after expressing feelings of sadness). Little research has investigated drinking motivations from the perspective of SLT. This is an important gap in the literature given how drinking motives are strong predictors

of frequent and heavy alcohol use (Cooper et al., 2016). Limited prior work suggests drinking motives confer influence via a socialization process. Adolescent drinking motives (enhancement, conformity, coping, and social) are positively predicted by classmate drinking motives (Kuntsche & Stewart, 2009), demonstrating motives can be transmitted via peer social influence. Moreover, a peer group's drinking motives influence an adolescent's own drinking motives, which subsequently influence that adolescent's drinking levels (Stewart, Castellanos-Ryan, Vitaro, & Conrod, 2014). Hussong (2003) used a 28-day, prospective design in friendship dyads to show college students' alcohol use was influenced by their own drinking motives as well as the drinking motives of their friend. Finally, in an emerging adult sample, both an individual's own drinking motives as well as the enhancement, social, and coping-anxiety motives of their romantic partner influenced the individual's alcohol use over a four-week period (Kehayes, Mackinnon, Sherry, Leonard, & Stewart, 2019). Moreover, the partner's positive reinforcement motives influenced change in the individual's positive reinforcement motives, which subsequently influenced the individual's drinking behaviour. Thus, change in drinking motivations may be another social influence mechanism. In summary, emerging evidence suggests an individual's drinking behaviours may be influenced by their romantic partner's or peer's drinking motives through a social learning process.

Rationale and Gaps in the Literature

Given emerging adults drink heavily (Naimi et al., 2003) and experience significant alcohol-related problems (Hingson, Zha, & Weitzman, 2009), which are likely socially-driven (Lau-Barraco & Linden, 2014), it is important to understand how peer relationships influence emerging adults' alcohol use. Given the importance of both drinking buddies (Lau-Barraco & Linden, 2014) and drinking motives (Cooper et al., 2016) on emerging adults' drinking

behaviour, it is important to test if an individual's drinking behaviour is influenced by their drinking buddy's motivations for alcohol use. By understanding the way drinking buddies influence each other's behaviour, we may be better able to tailor early interventions to reduce risky alcohol use within this population.

Given drinking motive partner effects in romantic couples (Kehayes et al., 2019), it is important to extend this to drinking buddies, an influential relationship in emerging adulthood (Lau-Barraco & Linden, 2014), while also improving upon the limitations of past research. Hussong (2003) investigated social, coping, and enhancement motives and close friends within a social context. We extended Hussong's (2003) work by investigating five distinct drinking motives (Grant et al., 2007) in drinking buddies, a relationship that appears to be more influential on emerging adult drinking than other peer relationships (Lau-Barraco, Braitman, Leonard, & Padilla, 2012). Hussong (2003) utilized a 28-day framework that sampled frequency of drinking and problematic use daily; however, daily drinking data were collapsed across the 28 days and drinking motives were only measured at baseline. The present study utilized a four-wave, four-month longitudinal design with motives and drinking behaviour assessed at each wave. We also employed actor-partner interdependence models (APIM; Cook & Kenny, 2005) which measure both actor effects (i.e., the effect of the individual's motives on their own drinking behaviour) and partner effects (i.e., the effect of the drinking buddy's motives on the individual's drinking behaviour) and which account for interdependence within dyads. To expand on Hussong's (2003) focus on drinking frequency, we included two distinct measures of drinking behaviour: days spent drinking per month (frequency) and the total number of drinks consumed per month divided by the number of drinking occasions (quantity). Finally, we investigated whether the influence of drinking buddy motives on individual drinking behaviour occurs indirectly via

changes in the individual's own drinking motives, given similar mediational findings in adolescent classroom peers (Kuntsche & Stewart, 2009), adolescent nominated peers (Stewart et al., 2014), and emerging adult romantic couples (Kehayes et al., 2019). This would provide a mechanism for how drinking buddy motives effect change in individual drinking behaviour.

Aims and Hypotheses

Our aim was to investigate the influence of drinking motives (Cooper, 1994) on drinking behaviour within the influential social context of emerging adult drinking buddy relationships (Lau-Barraco & Linden, 2014). We tested four specific hypotheses:

H1: Given enhancement and social motives are the strongest predictors of drinking behaviour in adult samples (Cooper et al., 2016), and findings that actor coping-anxiety motives also influence actor drinking behaviour in emerging adults (Kehayes et al., 2019), we hypothesized the individual's enhancement, social, and coping-anxiety drinking motivations would positively predict the individual's own drinking frequency and quantity (i.e., actor effects).

H2: Based on similar findings in romantic couples (Kehayes et al., 2019), we hypothesized the drinking buddy's enhancement, social, and coping-anxiety drinking motivations would positively predict the individual's drinking frequency and quantity (i.e., partner effects).

H3: Based on similar mediation findings in romantic couples (Kehayes et al., 2019), we hypothesized that change in individual drinking buddy enhancement and social motives would mediate the hypothesized partner effects (i.e., drinking buddy enhancement and social motives would predict increased individual drinking for those reasons, which would then predict increased individual drinking behaviour).

H4: Finally, we hypothesized the predictions proposed in H1, H2 and H3 would hold at the within-subject (i.e., change within any given month) and between-subject levels (i.e., averaged

across all months).

Cooper et al.'s (2016) meta-analysis suggests the effect of coping and conformity motives on drinking frequency and quantity tends to be small relative to social and enhancement motives, and Kehayes et al. (2019) found coping-depression and conformity motives did not predict drinking within romantic partners. Therefore, our analyses for conformity and coping-depression motives were exploratory.

RQ1: Do coping-depression, and/or conformity motives have positive actor and/or partner effects when predicting drinking frequency and/or quantity?

Moreover, findings are mixed regarding whether male and female drinking buddies influence each other to varying degrees (Leonard & Homish, 2008; Reifman et al., 2006).

Therefore, questions of moderation by sex were also exploratory:

RQ2: Are there sex differences in the actor and/or partner effects described in H1 and H2?

Method

Participants

Drinking buddy dyads were recruited through online advertisements, posters, and via the psychology research pool.¹ The sample consisted of 174 pairs of same-sex drinking buddies (115 female pairs [66.1%] and 59 male pairs [33.9%]). This represents the full recruited sample with no exclusions. Participants' mean age at baseline was 18.66 ($SD = 1.17$) years, and most were Caucasian (79.3%) and university students (84.8%) with a minority living as roommates at baseline (21.0%). They were friends for an average of 4.05 months ($SD = 2.21$) and had frequent face-to-face contact with their drinking buddy ($M = 19.75$, $SD = 7.60$, days/month). Due to our

¹One research paper has been published utilizing a subsample of this dataset. It examined the social matching of alcohol consumption in drinking buddy dyads, and the impact of extraversion on this drinking behaviour (masked for review).

recruitment methods (i.e., flyers, online ads), we had no way of tracking the true response rate, as we did not know how many participants were exposed to our ads.

Measures

Modified Drinking Motives Questionnaire-Revised (M-DMQ-R). Drinking motives were assessed using a 30-day version of the M-DMQ-R (Grant et al., 2007), a 28-item, self-report measure that assesses participants' scores on five motives subscales: coping-anxiety (e.g., *To forget my worries*), coping-depression (e.g., *To numb my pain*), enhancement (e.g., *To get a high*), conformity (e.g., *To fit in with a group I like*), and social (e.g., *To be sociable*).

Participants rated how much each item related to their reasons for drinking over the past 30 days on a relative frequency scale ranging from 1 (*almost never/never*) to 5 (*almost always/always*).

Grant et al. (2007) found that the M-DMQ-R had excellent factorial validity and internal consistency. The 30-day version correlated strongly with the original M-DMQ-R in the present sample at baseline ($r_s = .86-89$). See Table 2 for multilevel internal consistencies and ICCs.

Self-administered Timeline Follow-Back (STLFB). Drinking frequency and quantity were measured using the STLFB (Collins, Kashdan, Koutsky, Morsheimer, & Vetter, 2008), a calendar-based self-report measure used to track alcohol use over the past 30 days. A standard drink was defined as 5-ounces of wine, a drink containing one shot of liquor or spirits, or 12-ounces of beer or cooler. STLFB data was used to calculate frequency of drinking days (i.e., the number of drinking days/month) and quantity/occasion (i.e., the sum of drinks consumed/month divided by the number of drinking days). The STLFB has been effectively used to measure drinking behaviour in other dyadic studies (e.g., Kehayes et al., 2019).

Procedure

Drinking buddies were recruited if they (a) were of the same sex, drank together, and

were not romantically involved with one another; (b) were friends who had known each other for a year or less; (c) both had regular internet access at home; (d) included at least one first-year undergraduate; (e) were both between the ages of 18–25 years; and (f) had both consumed at least 12 alcoholic drinks in the past year. These criteria were used to ensure all friends were engaging in drinking behaviour together and were in a relatively newer friendship where social influence would be likely to happen. Dyads completed questionnaires online and only came into the lab to complete the baseline questionnaire. Follow-up questionnaires were completed online at home to increase retention. Participants were each sent a secure link to their questionnaire in an email that contained their individual identification code. Survey links remained open for 24-hours. If a questionnaire was missed, participants were sent a make-up survey via a link available for 24-hours. Make-up surveys were sent out every day for up to seven days after the original survey. After 7 days, participants were sent three weekly reminders until the end of the 30 days. At this point, the survey was considered missed if the participant did not respond. If a participant completed a make-up survey, the instructions were modified so that the measures referred to the time-period that each member of the dyad was supposed to complete the survey. To encourage retention, participants were provided with an extra \$5.00 each per survey if both dyad members completed their surveys on the originally scheduled day. At study completion, participants were debriefed via email and compensated via cash and/or psychology course credit.

Data Analytic Strategy

Missing data and protocol compliance were assessed by analyzing the proportion of make-up surveys completed and by examining missing data. Descriptive statistics (i.e., means, standard deviations, internal consistencies, and intraclass correlations [ICCs]) were calculated, as well as multilevel bivariate correlations. Multilevel Cronbach's alpha was utilized to calculate

within- and between-subject internal consistencies (Geldhof, Preacher, & Zyphur, 2014).

Hypotheses were tested using APIMs (Kenny & Ledermann, 2010) within a multilevel path-analysis framework. Ten APIMs were modeled to test the effects of five drinking motives on two alcohol outcomes (frequency, quantity). Given the longitudinal data, multilevel path-analyses with fixed slopes and random intercepts were used (Preacher et al., 2010), which partitions the variance into within- and between-subject components. The within-subjects level represents change in the same direction within any given month (e.g., did enhancement motives and alcohol frequency change in the same direction within any given month?). The between-subjects level represents the portion of the variance that did not change across the four months (e.g., when scores are averaged across four months, were enhancement motives and drinking frequency related?). A multilevel APIM model can be found in Figure 1. A root-mean-square error of approximation (RMSEA) $< .06$, a standardized root-mean-square residual (SRMR) $< .08$, and a CFI and TLI $> .95$ were taken to indicate excellent model fit (Kline, 2011). To account for any violation of the normality assumption, a robust estimator of fit indices and standard errors was used (MLR estimation). A full information maximum likelihood approach was used (Enders & Bandalos, 2001) that employs all available data to adjust parameters and standard errors to account for missing data. To minimize the influence of a few extreme cases, we removed any values larger than three SDs above the group mean (7 data points; 2.01% of data).²

The 95% confidence intervals for indirect effects were assessed using the delta method in Mplus (using the MODEL CONSTRAINT command; Muthén & Muthén, 2017). Sex differences were explored by examining nested APIM models comparing constrained-across-sex models to unconstrained models where paths and covariances were permitted to vary freely across sex. The

²Results remained consistent with or without the outliers included.

model with the lower Bayesian Information Criterion (BIC) value was considered to have the better fit, with ΔBIC 2-6 indicating positive evidence, ΔBIC 6-10 indicating strong evidence, and ΔBIC 10+ indicating very strong evidence (Raftery, 1995). If the unconstrained model fit the data better than the constrained model, this indicated significant sex differences.

Results

Compliance and Missing Data

Compliance rates were high; drinking buddies completed on average 3.49 ($SD = 0.93$) of four waves, with 70.7% completing all four waves. At wave 2, 62.6% completed their survey on the scheduled date, 27.3% completed a make-up survey, and 10.1% failed to complete their survey. At wave 3, 62.9% completed their survey on the scheduled date, 22.4% completed a make-up survey, and 14.7% failed to complete their survey. At wave 4, 44.0% completed their survey on the scheduled date, 29.6% completed a make-up survey, and 26.4% failed to complete their survey. An average of 30.44 days ($SD = 2.95$) elapsed between completed surveys.

Missing data varied by wave. Skip logic was used such that participants did not complete the DMQ-R if they did not consume alcohol that month. Therefore, analyses incorporated only data from months where alcohol was consumed by at least one buddy.³ At wave 1, 0.6% of participants did not drink alcohol the previous month and thus did not have drinking motives to report; and at waves 2, 3 and 4, 4.0%, 7.2%, and 11.2% of participants, respectively, did not drink alcohol the previous month.

Descriptive Statistics, Bivariate Correlations, and Intraclass Correlations

³Consistent with Kehayes et al. (2019), drinking outcomes for abstainers on any given month were coded as missing data as opposed to zeros. This meant that when only one buddy drank in a specific month, their data was used to calculate actor effects (but not partner effects). When both buddies drank in a specific month, their data was used to calculate actor and partner effects. When both buddies did not drink in a specific month, they were excluded from the model.

Means and standard deviations on all study measures are presented in Table 1. Drinking frequency ranged from 1-23 drinking occasions/month and drinking quantity ranged from 1-17 alcoholic beverages/occasion. Bivariate correlations at the within-subjects and between-subjects levels appear in Table 2. Most variables were correlated as expected. At the within- and between-subjects level, all five drinking motives were positively intercorrelated ($r_s = .22-.57$ within; $.30-.77$ between). Drinking quantity was positively correlated with coping-depression and coping-anxiety motives at the between-subjects level and with enhancement and social motives at both levels. Drinking frequency was positively correlated with coping-depression, coping-anxiety, enhancement, and social motives at both levels. Drinking quantity was positively correlated with drinking frequency at the between-subjects level only. Overall, correlations tended to be larger at the between-subjects level. Alphas ranged from $.85-.98$ (between-subjects) and from $.65-.92$ (within-subjects) suggesting good to excellent reliability, save for within-subjects coping-anxiety motives which was acceptable. ICCs suggested ~45% (drinking frequency) to ~71% (enhancement motives) of the variance was at the between-subjects level.

Multilevel Path-Analysis

Ten models were specified, with each of the five drinking motives predicting each alcohol outcome: frequency and quantity. These models are depicted in Figure 1 and were analyzed using indistinguishable dyads given drinking buddies were same-sex. All fit indices, except the chi-squared (χ^2) goodness of fit test, suggested models fit the data well (see Table 4 for fit statistics). Unstandardized path coefficients and covariances for all models appear in Table 3. Significant findings for actor and partner effects at $p < .05$ are noted below. Overall, nearly all of the actor effects were significant predictors of both frequency and quantity of drinking at the within- and between-subject levels, with the exception of conformity motives. In contrast,

partner effects were significant primarily with respect to drinking frequency at the within-subjects level. All covariances were positive and statistically significant, suggesting drinking buddies are similar in motives and alcohol use.

The analyses of actor effects were partially supportive of H1 and H4. There were significant actor effects for enhancement and social motives; these were observed for both frequency and quantity of drinking, and for analyses at the within- and between-subjects levels. Similarly, coping-anxiety motives evidenced the same significant associations, save the within-subjects analysis of drinking quantity. In terms of RQ1, actor coping-depression motives were associated with greater actor drinking frequency at the between- and within-subject levels; actor coping-depression motives were associated with greater actor drinking quantity at the within-subjects level only. Actor conformity motives were associated with greater actor drinking quantity at the within-subjects level only.

The analyses of partner effects were partially supportive of H2 and H4. Partner effects were significant for drinking frequency at the within-subjects level only for enhancement, social and coping-anxiety motives. These three motives did not evidence significant partner effects when predicting drinking quantity, save that partner enhancement motives predicted actor drinking quantity at the between-subjects level only.

Effect sizes. R^2 values at the between- and within-subject levels were calculated as estimates of standardized effect sizes for both alcohol outcomes (Table 4). Despite equality constraints placed on the indistinguishable dyads, variances can differ across partners causing R^2 values to vary (Kline, 2011). Therefore, R^2 values for both partner A and partner B are reported.

Indirect Effects and Moderation by Sex

Indirect effects testing for mediation are displayed in Supplemental Table 1. Partially

consistent with H3, partner social motives predicted actor drinking frequency through actor social motives at the within-subjects level. All other indirect paths were nonsignificant.

In relation to exploratory RQ2, nested APIM model comparisons by sex are presented in Supplemental Tables 2 and 3. BIC values were always lower in the model constrained to equality across sex, with Δ BIC values ranging from 22.82-37.97 (Supplemental Table 4), providing very strong evidence of no moderation by sex.

Discussion

The present study's aim was to investigate drinking motives' effects on drinking behaviour (Cooper, 1994) within the influential social context of emerging adult drinking buddy relationships (Lau-Barraco & Linden, 2014). Previous research had shown that drinking motives can be transferred between classroom peers (Kuntsche & Stewart, 2009), a close friend/romantic partner's drinking motives can influence an emerging adult's drinking behaviour (Kehayes et al., 2019; Hussong, 2003), and drinking motives in peers and romantic partners can influence an individual's drinking motives which subsequently influence their own drinking behaviours (Kehayes et al., 2019; Stewart et al., 2014). Overall, results from the present study add to the extant literature and suggest that an individual's drinking behaviour is influenced not only by their own drinking motives but also by the drinking motives of their drinking buddy.

Consistent with H1 and past research (Cooper et al., 2016), people who endorsed higher drinking for enhancement and social reasons tended to drink in higher quantities and more frequently when averaged across four months. Fluctuations in enhancement and social motives were also associated with fluctuations in both alcohol outcomes over the four months. These results add to research showing enhancement motives are related to heavy alcohol consumption (Cooper et al., 2016; Kuntsche et al., 2005), and result in escalations in drinking over time

(Mackinnon, Kehayes, Clark, Sherry, & Stewart, 2014). Moreover, drinking to increase social affiliation is associated with drinking quantity and frequency (Grant et al., 2007; Kuntsche et al., 2005). Our results add to this literature and suggest that emerging adults' social motives are related to drinking behaviours, at least when other motives are not controlled (Grant et al., 2007).

When split into separate constructs, coping-depression motives are associated with drinking levels, whereas coping-anxiety motives are more typically associated with alcohol-related problems (Grant et al., 2007). However, Kehayes et al. (2019) found emerging adults' coping-anxiety motives predicted their drinking frequency and quantity, whereas their coping-depression motives predicted only their drinking frequency. Our results suggested emerging adults who drink to cope with their depression or their anxiety are both drinking more frequently and in higher quantities. Conversely, conformity motives predicted drinking quantity in the actor at the within-subjects level only. Our general lack of conformity motive findings across alcohol outcomes is understandable given conformity motives are more commonly associated with alcohol-related problems than with alcohol use indices (Cooper et al., 2016).

Consistent with H2, drinking for enhancement reasons in the drinking buddy was associated with co-occurring changes in the actor's drinking frequency during any given month, and with increased drinking quantity in the actor when averaged across time. That is, drinking for enhancement reasons in one friend was associated with co-occurring changes in the other friend's drinking frequency during any given month, and with increased drinking quantity in the other friend when averaged across time. Consistent with H2, drinking buddies' coping-anxiety and social motives predicted actor drinking frequency during any given month as well. Partially consistent with H3, when averaged across time the social motive partner effect was mediated by the actor's own social motives. That is, if a drinking buddy was motivated to drink for social

reasons, the actor also tended to drink for social reasons which in turn was associated with increased drinking frequency in the actor. However, given this was the only indirect effect found among four significant partner effects, there are likely other important mechanisms through which a buddy's drinking motives effect change in an individual's drinking behaviour (e.g., injunctive and descriptive norms; Neighbors et al., 2008). For example, a person may believe drinking to cope with anxiety is normative if they see their drinking buddy drinking for that reason, which may in turn affect the person's drinking behaviour. Alternatively, our direct partner effects may suggest that if a drinking buddy feels the need to drink to increase their positive feelings, for example, and brings their friend along, that friend may be directly influenced to drink through that social contextual interaction. Finally, sex did not significantly moderate our results, consistent with prior drinking buddy research (Reifman et al., 2006). However, given this was an exploratory research question, and given the relatively small sample of male drinking buddies in the present study, additional work is needed to further investigate whether male and female drinking buddies influence each other's drinking motives to differing extents.

Our results replicate, and extend to drinking buddies, the results of Hussong (2003) who found the enhancement, generic coping, and social motives of a friend at baseline predicted increased drinking frequency in the actor when collapsed over a 28-day period. Our results also extend her findings by utilizing Grant et al.'s (2007) five-factor model of drinking motives. While partner conformity motives were unrelated to actor drinking in the present study, our results suggest partner effects of coping motives within drinking buddies are specific to coping-anxiety motives. Kehayes et al. (2019) also found significant partner effects for only enhancement, social, and coping-anxiety motives in romantic partners. Thus, our results add to

evidence suggesting internal motives (specifically enhancement and coping-anxiety) and social motives are likely perceivable by others and are more likely to effect change in close others (Kehayes et al., 2019; Stewart et al., 2014). While Hussong's (2003) design included a 28-day assessment of drinking relative to drinking motives measured only at baseline, we assessed motives and drinking behaviour across four waves which allowed us to examine co-occurring change over time, a methodology that more strongly suggests socialization versus purely selection.

Many studies support the importance of peers generally, and drinking buddies specifically, in emerging adult drinking behaviour (Lau-Barraco & Linden, 2014; Wechsler, Dowdall, Davenport, & Castillo, 1995). Our results suggest buddies influence each other to drink not only through modelling overt drinking behaviours (DeMartini, Prince, & Carey, 2013), but also through modelling the motivations that underlie their drinking behaviours. These results add to the drinking motives literature by investigating the social context that surrounds motives as opposed to their influence on the individual only. Other theoretical accounts of the social benefits of alcohol consumption may also contribute to drinking buddy influence (Roberts, Arrow, Lehmann, & Dunbar, 2014). For example, shared alcohol use might enhance psychological wellbeing and promote the reinforcement of social bonds with others via endorphin release (Dunbar et al., 2017; Gianoulakis, 2004).

In our study, drinking buddies' motives were more predictive of increased actor drinking frequency than quantity. Kehayes et al.'s (2019) study of romantic partners found the opposite, where partner drinking motives predicted increased actor drinking quantity more so than frequency. This may be due to study design differences (i.e., four months versus four weeks), sample characteristics (e.g., length of relationship), and/or differences across friendships vs.

romantic relationships. For example, romantic partners may be more likely to drink as a dyad only, thus influencing the quantity each other drink via SLT mechanisms. In contrast, drinking buddies may be more likely to encourage the individual to go out drinking with a group thereby influencing drinking frequency. While heavy drinking is associated with many negative health and social outcomes (Health Canada, 2016; Patrick et al., 2019), drinking frequency also seems to predict negative outcomes. Risk of death from alcohol-related illness linearly increases with frequency of use (Rehm, Room, & Taylor, 2008). High frequency drinking in late adolescence predicts harmful alcohol use several years later (Heron et al., 2013). Thus, it appears frequency of alcohol use is an important outcome to target in prevention/early intervention.

From an intervention perspective, it may be helpful to explore motivations for drinking in friends of those who engage in problematic alcohol use, given the influence their friends' motivations may have on the individuals' drinking frequency. In network therapy for substance abuse, the client's social network is included in the treatment process (Galanter, 2015). The client selects either a close friend or family member who then participates in therapy and supports the client as they progress through treatment. Given ours and others' results (Lau-Barraco & Linden, 2014), it may be particularly important to specifically discuss the drinking buddy's reasons for drinking in a therapy context. The buddy may not be aware of their own influence on the client's drinking, and such psychoeducation could be useful in preventing potential negative influence from occurring. Moreover, drinking motives have been successfully targeted in treatment in individual intervention, where underlying risky motivations are reduced, leading to a reduction in drinking behaviours (Conrod, Castellanos-Ryan, & Mackie, 2011). This intervention might be adapted and utilized within a network therapy approach to specifically target risky drinking motives within the client's friendship network.

Limitations and Future Directions

With our design and chosen analytic strategy, we were unable to fully separate socialization and selection effects on drinking behaviour. Although we did recruit friendships that were at maximum six months long and although we found co-occurring change in drinking behaviour via drinking motivations over time, buddies may have selected each other based on similarity in drinking and/or drinking motives before the study began. Future research could recruit drinking buddies who have just started their friendship, perhaps when first entering university, to see if they are similar in these constructs initially, and to see if influence occurs as their friendship progresses. We may lack statistical power to detect small effects due to our limited sample size, especially given conformity and coping motives are weakly associated with alcohol use as compared to enhancement and social motives (Cooper et al., 2016). This may have affected our ability to find mediational effects as well. Time lags that are shorter or longer may produce different results. Moreover, even though aspects of our design were virtually identical to Kehayes et al.'s (2019), our differing time lags makes it difficult to make direct comparisons across studies. Finally, our sample mainly consisted of young, student friends, and all drinking buddy dyads were same-sex dyads. Thus, future research may wish to focus on other dyads (e.g., older friendships, mixed-sex dyads) to determine generalizability.

Conclusions

We provided a novel contribution to the literature by investigating drinking motives theory (Cooper, 1994) from the perspective of social influence (Bandura, 1977). Past research showed friends could influence each other to drink via their drinking motivations (Hussong, 2003). We extended this research to drinking buddies (Lau-Barraco & Linden, 2014) using longitudinal methods. Overall, drinking motives within drinking buddy relationships were key

predictors of emerging adult drinking behaviour. Results showed that the social, enhancement, and coping-anxiety motives of a drinking buddy were predictive of drinking frequency in the actor over time. Thus, it appears that a person's drinking behaviour is influenced not only by their own motives but also by the motives of their drinking buddy. These novel results have important practical applications in terms of intervention, suggesting that individual and drinking buddy drinking motives may both be crucial targets in network therapy to prevent an individual's risky drinking behaviours from escalating over time (Galanter, 2015).

Declaration of Interest

The authors report no conflict of interest.

References

- Akers, R. L. (1985). *Deviant behavior: A social learning approach* (2nd ed.). Belmont, CA: Wadsworth.
- Bandura, A. (1971). Vicarious and self-reinforcement processes. In R. Glaser (Ed.), *The nature of reinforcement* (pp. 228-278). New York: Academic Press.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Borsari, B., & Carey, K. B. (2001). Peer influences on college drinking: A review of the research. *Journal of Substance Abuse, 13*, 391–424. doi: 10.1016/S0899-3289(01)00098
- Christiansen, M., Vik, P. W., & Jarchow, A. (2002). College student heavy drinking in social contexts versus alone. *Addictive Behaviors, 27*, 393–404. doi:10.1016/S0306-4603(01)00180-0
- Conrod, P. J., Castellanos-Ryan, N., & Mackie, C. (2011). Long-term effects of a personality-targeted intervention to reduce alcohol use in adolescents. *Journal of Consulting and Clinical Psychology, 79*, 296-306. doi:10.1037/a0022997
- Collins, R., Kashdan, T. B., Koutsky, J. R., Morsheimer, E. T., & Vetter, C. J. (2008). A self-administered timeline followback to measure variations in underage drinkers' alcohol intake and binge drinking. *Addictive Behaviors, 33*, 196-200. doi:10.1016/j.addbeh.2007.07.001
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*, 117-128.
- Cooper, M. L., Kuntsche, E., Levitt, A., Barber, L., & Wolf, S. (2016). Motivational models of substance use: A review of theory and research on motives for using alcohol, marijuana, and tobacco. In K. Sher (Ed.), *Oxford Handbook of Substance Use Disorders* (pp. 375-

- 421). Oxford, UK: Oxford Handbooks Online.
- Cox, W., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*, 168-180. doi:10.1037/0021-843X.97.2.168
- DeMartini, K. S., Prince, M. A., & Carey, K. B. (2013). Identification of trajectories of social network composition change and the relationship to alcohol consumption and norms. *Drug and Alcohol Dependence, 132*, 309–315. doi: 10.1016/j.drugalcdep.2013.02.020
- Dunbar, R. I. M., Launay, J., Wlodarski, R., Robertson, C., Pearce, E., Carney, J., & MacCarron, P. (2017). Functional benefits of (modest) alcohol consumption. *Adaptive Human Behavior and Physiology, 3*, 118-133. doi: 10.1007/s40750-016-0058-4
- Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling, 8*, 430–457. doi: http://dx.doi.org/10.1207/S15328007SEM0803_5
- Galanter, M. (2015). Network therapy. In M. Galanter, H. D. Kleber, & K. T. Brady (Eds.), *The American Psychiatric Publishing textbook of substance abuse treatment* (5th ed.) (pp. 441-461). Arlington, VA: American Psychiatric Publishing, Inc.
- Geldhof, G. J., Preacher, K. J., & Zyphur, M. J. (2014). Reliability estimation in a multilevel confirmatory factor analysis framework. *Psychological Methods, 19*, 72-91. doi:10.1037/a0032138
- Gianoulakis, C. (2004). Endogenous opioids and addiction to alcohol and other drugs of abuse. *Current Topics in Medical Chemistry, 4*, 39–50.
- Grant, V. V., Stewart, S. H., & Mohr, C. D. (2009). Coping-anxiety and coping-depression motives predict different daily mood-drinking relationships. *Psychology of Addictive*

Behaviors, 23, 226-237. doi:10.1037/a0015006

Grant, V. V., Stewart, S. H., O'Connor, R. M., Blackwell, E., & Conrod, P. J. (2007).

Psychometric evaluation of the five-factor Modified Drinking Motives Questionnaire-Revised in undergraduates. *Addictive Behaviors*, 32, 2611-2632. doi:10.1016/j.addbeh.2007.07.004

Health Canada. (2016). *Canadian Tobacco, Alcohol and Drugs Survey: Summary of results for 2015*. Ottawa, ON.: Author.

Heron, J., Maughan, B., Dick, D. M., Kendler, K. S., Lewis, G., Macleod, J., ... Hickman, M.

(2013). Conduct problem trajectories and alcohol use and misuse in mid to late adolescence. *Drug and Alcohol Dependence*, 133, 100–107. doi: 10.1016/j.drugalcdep.2013.05.025

Hingson, R. W., Zha, W., & Weitzman, E. R. (2009). Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005. *Journal of Studies on Alcohol and Drugs*, 16, 12–20. doi: 10.15288/jsads.2009.s16.12

Hussong, A. M. (2003). Social influences in motivated drinking among college students.

Psychology of Addictive Behaviors, 17, 142-150. doi:10.1037/0893-164X.17.2.142

Kehayes, I. L., Mackinnon, S. P., Sherry, S. B., Leonard, K. E., & Stewart, S. H. (2017).

Similarity in romantic couples' drinking motivations and drinking behaviors. *Substance Abuse*, 38, 488-492.

Kehayes, I. L., Mackinnon, S. P., Sherry, S. B., Leonard, K. E., & Stewart, S. H. (2019).

Drinking motives and drinking behaviors in romantic couples: A longitudinal actor-partner interdependence model. *Psychology of Addictive Behaviors*, 33, 208–220. doi: 10.1037/adb0000459

- Kenny, D. A., & Ledermann, T. (2010). Detecting, measuring, and testing dyadic patterns in the actor-partner interdependence model. *Journal of Family Psychology, 24*, 359–366. <http://dx.doi.org/10.1037/a0019651>
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2005). Why do young people drink? A review of drinking motives. *Clinical Psychology Review, 25*, 841-861.
- Kuntsche, E., & Stewart, S. H. (2009). Why my classmates drink: Drinking motives of classroom peers as predictors of individual drinking motives and alcohol use in adolescence: A mediational model. *Journal of Health Psychology, 14*, 536-546.
[doi:10.1177/1359105309103573](https://doi.org/10.1177/1359105309103573)
- Kuntsche, E., von Fischer, M., & Gmel, G. (2008). Personality factors and alcohol use: A mediator analysis of drinking motives. *Personality and Individual Differences, 45*, 796-800. [doi: 10.1016/j.paid.2008.08.009](https://doi.org/10.1016/j.paid.2008.08.009)
- Leonard, K. E., & Homish, G. G. (2008). Predictors of heavy drinking and drinking problems over the first 4 years of marriage. *Psychology of Addictive Behaviors, 22*, 25–35. [doi: 10.1037/0893-164X.22.1.25](https://doi.org/10.1037/0893-164X.22.1.25)
- Leonard, K. E., Kearns, J., & Mudar, P. (2000). Peer networks among heavy, regular, and infrequent drinkers prior to marriage. *Journal of Studies on Alcohol, 61*, 669–673. [doi: 10.15288/jsa.2000.61.669](https://doi.org/10.15288/jsa.2000.61.669)
- Lau-Barraco, C., Braitman, A. L., Leonard, K. E., & Padilla, M. (2012). Drinking buddies and their prospective influence on alcohol outcomes: Alcohol expectancies as a mediator. *Psychology of Addictive Behaviors, 26*, 747–758. [doi: 10.1037/a0028909](https://doi.org/10.1037/a0028909)

- Lau-Barraco, C., & Linden, A. N. (2014). Drinking buddies: Who are they and when do they matter? *Addiction Research & Theory*, *22*, 57–67. doi: 10.3109/16066359.2013.772585
- Mackinnon, S. P., Kehayes, I. L., Clark, R., Sherry, S. B., & Stewart, S. H. (2014). Testing the four-factor model of personality vulnerability to alcohol misuse: A three-wave, one-year longitudinal study. *Psychology of Addictive Behaviors*, *28*, 1000-1012.
doi:10.1037/a0037244
- Neighbors, C., O'Connor, R. M., Lewis, M. A., Chawla, N., Lee, C. M., & Fossos, N. (2008). The relative impact of injunctive norms on college student drinking: The role of reference group. *Psychology of Addictive Behaviors*, *22*, 576–581. doi: 10.1037/a0013043
- Naimi, T. S., Brewer, R. D., Mokdad, A., Denny, C., Serdula, M. K., & Marks, J. S. (2003). Binge drinking among US adults. *Journal of the American Medical Association*, *289*, 70–75. doi: 10.1001/jama.289.1.70
- Nogueira-Arjona, R., Shannon, T., Kehayes, I.-L., Sherry, S. B., Keough, M. T., & Stewart, S. H. (2019). Drinking to keep pace: A study of the moderating influence of extraversion on alcohol consumption similarity in drinking buddy dyads. *Addictive Behaviors*, *92*, 69–75.
doi: 10.1016/j.addbeh.2018.12.023
- Muthén, L.K., & Muthén, B.O. (2017). *Mplus user's guide* (8th ed.). Los Angeles, CA: Muthén & Muthén.
- Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods*, *15*, 209-233. doi:10.1037/a0020141
- Patrick, M. E., Terry-McElrath, Y. M., Lanza, S. T., Jager, J., Schulenberg, J. E., & O'Malley, P. M. (2019). Shifting age of peak binge drinking prevalence: Historical changes in

- normative trajectories among young adults aged 18 to 30. *Alcoholism: Clinical and Experimental Research*, 43, 287-298. doi: doi.org/10.1111/acer.13933
- Raftery, A. E. (1995). Bayesian model selection in social research. *Sociological Methodology*, 25, 111-164.
- Rehm, J., Room, R., & Taylor, B. (2008). Method for moderation: Measuring lifetime risk of alcohol-attributable mortality as a basis for drinking guidelines. *International Journal of Methods in Psychiatric Research*, 17, 141-151. doi: 10.1002/mpr.259
- Reifman, A., Watson, W. K., & McCourt, A. (2006). Social networks and college drinking: Probing processes of social influence and selection. *Personality and Social Psychology Bulletin*, 32, 820–832. doi: 10.1177/0146167206286219
- Roberts, S. B. G., Arrow, H., Lehmann, J., & Dunbar, R. I. M. (2014). Close social relationships: An evolutionary perspective. In R. I. M. Dunbar, C. Gamble, & J. Gowlett (Eds.), *Lucy to language: The benchmark papers* (pp. 151–180). Oxford: Oxford University Press.
- Stewart, S. H., Castellanos-Ryan, N., Vitaro, F., & Conrod, P. J. (2014). Why my friends drink is why I drink [Summary]. *Alcoholism, Clinical and Experimental Research*, 38 (Suppl. s1), 187a.
- Wechsler, H., Dowdall, G. W., Davenport, A., & Castillo, S. (1995). Correlates of college student binge drinking. *American Journal of Public Health*, 85, 921–926. doi: 10.2105/AJPH.85.7.921

Table 1

Descriptive statistics

	Wave 1		Wave 2		Wave 3		Wave 4	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Coping-depression motives	1.42	0.69	1.37	0.59	1.33	0.60	1.38	0.77
Coping-anxiety motives	1.85	0.83	1.79	0.70	1.73	0.72	1.75	0.84
Enhancement motives	2.77	1.109	2.60	1.06	2.55	1.02	2.56	1.06
Conformity motives	1.27	0.64	1.31	0.54	1.31	0.59	1.34	0.69
Social motives	2.98	0.95	0.76	0.88	2.65	0.91	2.67	0.99
Drinking quantity	5.12	2.79	5.12	2.80	5.30	2.74	4.88	2.77
Drinking frequency	7.78	4.03	6.04	3.82	5.58	3.67	5.46	3.73

Note. *M* = mean; *SD* = standard deviation; Drinking frequency = drinking occasions per month; Drinking quantity = drinks per

drinking day.

Table 2

Bivariate correlations, intraclass correlations, and reliability at between- and within-subject levels

Variable	1	2	3	4	5	6	7
1. Coping-depression motives	--	.59***	.33***	.57***	.22***	.04	.11*
2. Coping-anxiety motives	.77***	--	.48***	.44***	.40***	.04	.14***
3. Enhancement motives	.47***	.71***	--	.27***	.51***	.11***	.17***
4. Conformity motives	.52***	.51***	.30***	--	.27***	.04	.05
5. Social motives	.37***	.64***	.71***	.50***	--	.11**	.19***
6. Drinking quantity	.14*	.19**	.36***	.03	.29***	--	-.08
7. Drinking frequency	.24**	.30***	.33***	.01	.23**	.34***	--
ICC	.60	.60	.71	.53	.59	.66	.45
Alpha reliability (within-subjects)	.92	.65	.82	.84	.76	--	--
Alpha reliability (between-subjects)	.98	.85	.94	.92	.86	--	--

Note. Within-subject correlations are above the diagonal, and between-subject correlations are below the diagonal. ICC = intraclass correlation.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3

Multilevel actor-partner interdependence model coefficients

Outcome: Frequency								
	Actor Effects		Partner Effects		Covariance: Predictor		Covariance: Outcome	
	<i>B (SE)</i>	<i>p</i>	<i>B (SE)</i>	<i>p</i>	<i>B (SE)</i>	<i>p</i>	<i>B (SE)</i>	<i>p</i>
<u>Within Subjects</u>								
Coping-Anxiety	0.82 (0.25)	.001	0.53 (0.22)	.017	0.02 (0.01)	.177	2.81 (0.48)	< .001
Coping-Depression	0.95 (0.38)	.012	0.56 (0.30)	.056	0.01 (0.01)	.520	2.89 (0.49)	< .001
Enhancement	0.69 (0.18)	< .001	0.56 (0.18)	.002	0.03 (0.02)	.140	2.78 (0.51)	< .001
Social	0.82 (0.18)	< .001	0.64 (0.17)	< .001	0.05 (0.02)	.012	2.65 (0.51)	< .001
Conformity	0.32 (0.41)	.428	0.30 (0.33)	.358	0.01 (0.01)	.440	3.04 (0.52)	< .001
<u>Between Subjects</u>								
Coping-Anxiety	1.39 (0.40)	< .001	0.49 (0.30)	.103	0.05 (0.03)	.118	2.99 (0.75)	< .001
Coping-Depression	1.18 (0.44)	.007	0.59 (0.36)	.101	0.06 (0.03)	.044	3.01 (0.77)	< .001
Enhancement	0.92 (0.21)	< .001	0.12 (0.20)	.529	0.10 (0.07)	.139	3.16 (0.74)	< .001
Social	0.85 (0.26)	.001	0.28 (0.25)	.262	0.01 (0.05)	.925	3.19 (0.75)	< .001
Conformity	0.32 (0.50)	.530	-0.12 (0.35)	.743	0.02 (0.02)	.356	3.45 (0.81)	< .001
Outcome: Quantity								
	Actor Effects		Partner Effects		Covariance: Predictor		Covariance: Outcome	
	<i>B (SE)</i>	<i>p</i>	<i>B (SE)</i>	<i>p</i>	<i>B (SE)</i>	<i>p</i>	<i>B (SE)</i>	<i>p</i>
<u>Within Subjects</u>								
Coping-Anxiety	0.20 (0.14)	.132	0.06 (0.13)	.666	0.02 (0.01)	.166	0.57 (0.19)	.003
Coping-Depression	0.40 (0.18)	.028	-0.06 (0.13)	.677	0.01 (0.01)	.521	0.58 (0.19)	.002
Enhancement	0.33 (0.09)	< .001	0.01 (0.12)	.954	0.03 (0.02)	.139	0.58 (0.19)	.002
Social	0.30 (0.10)	.003	-0.12 (0.10)	.245	0.05 (0.02)	.011	0.60 (0.19)	.002
Conformity	0.31 (0.15)	.047	0.05 (0.14)	.707	0.01 (0.01)	.434	0.57 (0.19)	.003
<u>Between Subjects</u>								
Coping-Anxiety	0.68 (0.24)	.005	-0.01 (0.23)	.967	0.05 (0.03)	.119	3.11 (0.63)	< .001
Coping-Depression	0.51 (0.26)	.054	0.16 (0.25)	.529	0.06 (0.03)	.045	3.09 (0.65)	< .001
Enhancement	0.87 (0.16)	< .001	0.32 (0.14)	.019	0.10 (0.07)	.147	2.60 (0.55)	< .001
Social	0.84 (0.21)	< .001	0.27 (0.21)	.208	0.01 (0.05)	.907	2.88 (0.60)	< .001
Conformity	-0.05 (0.29)	.854	-0.10 (0.26)	.690	0.02 (0.02)	.357	3.15 (0.64)	< .001

Note. Models were specified as in Figure 1 in two separate runs, where the dependent variable was specified as either drinking occasions per month (frequency) or total number of drinks consumed per month divided by the number of drinking days (quantity). Unstandardized path coefficients are reported as they are more comparable across samples than standardized estimates. Bolded coefficients are significant at $p < .05$.

Table 4

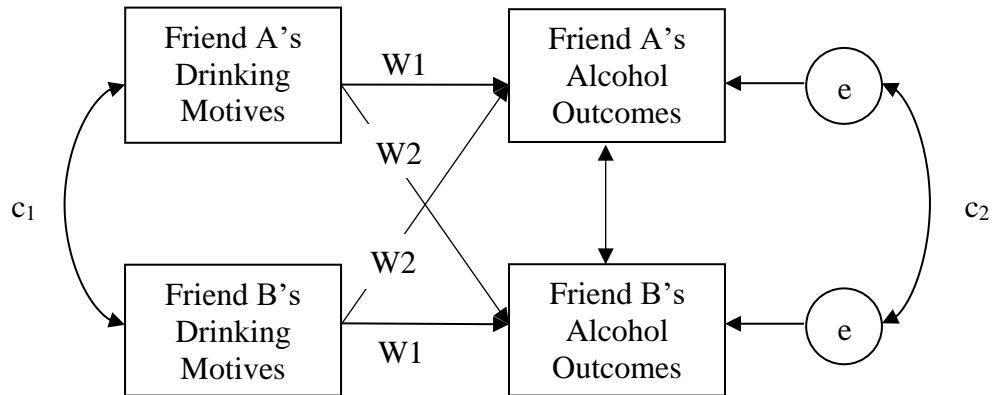
Multilevel actor-partner interdependence model fit statistics and R² values

Outcome: Frequency								
	χ^2	CFI	TLI	SRMR _{within}	SRMR _{between}	RMSEA	R ² _{within (PA/PB)}	R ² _{between (PA/PB)}
Coping-Anxiety	126.54	.99	.96	.02	.06	.03	0.03/0.03	0.10/0.11
Coping-Depression	101.56	.98	.95	.03	.05	.03	0.02/0.03	0.06/0.08
Enhancement	132.62	.99	.98	.04	.02	.02	0.04/0.04	0.08/0.10
Social	129.75	.99	.97	.04	.05	.02	0.06/0.06	0.05/0.06
Conformity	78.87	1.00	1.00	.02	.03	.00	0.00/0.00	0.00/0.00
Outcome: Quantity								
	χ^2	CFI	TLI	SRMR _{within}	SRMR _{between}	RMSEA	R ² _{within (PA/PB)}	R ² _{between (PA/PB)}
Coping-Anxiety	97.68	1.00	1.00	.01	.05	.00	0.03/0.01	0.04/0.03
Coping-Depression	86.34	1.00	1.00	.02	.03	.00	0.01/0.01	0.02/0.02
Enhancement	123.27	1.00	1.00	.01	.02	.00	0.02/0.01	0.16/0.13
Social	113.77	.97	.91	.03	.05	.04	0.01/0.01	0.10/0.06
Conformity	81.20	1.00	1.00	.03	.03	.00	0.00/0.01	0.00/0.00

Note. Chi-squared (χ^2) goodness-of-fit $df = 12$ across models. Bolded χ^2 goodness-of-fit tests are significant at $p < .001$. PA =

partner A; PB = partner b.

Within Subjects



Between Subjects

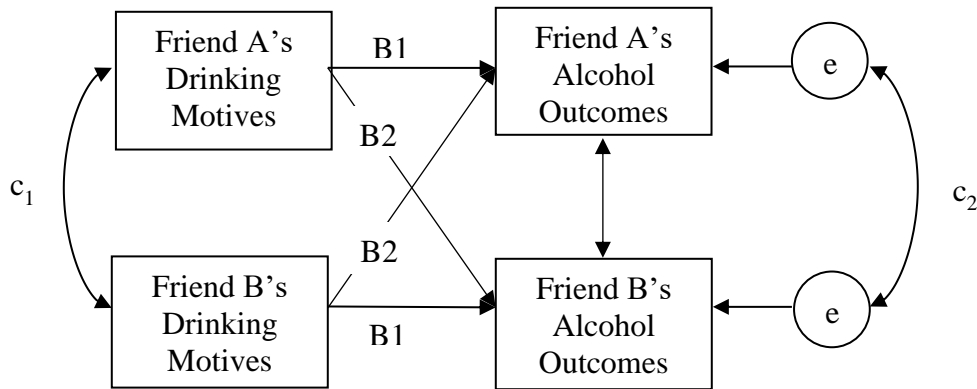


Figure 1. Multilevel APIM path diagram. Squares indicate observed variables; ovals indicate residual errors. Double-headed arrows indicate covariances; single-headed arrows indicate paths. In multilevel path-analysis, the variance is partitioned into within- and between-subject components. Indistinguishable dyads were specified so paths were constrained to equality across friends; paths that share the same label (e.g., W2) were constrained to be equal. Actor effects are paths W1 and B1 whereas partner effects are paths W2 and B2. Ten models were tested in our study by using five separate drinking motive predictors (i.e., enhancement, social, coping-depression, coping-anxiety, and conformity) and two separate alcohol outcomes (i.e., drinking occasions per month [frequency] and drinks per drinking day [quantity]).