

# Drinking Motives Moderate the Effect of the Social Environment on Alcohol Use: An Event-Level Study Among Young Adults

KOEN SMIT, M.SC.,<sup>a,b,\*</sup> MARTINE GROEFSEMA, M.SC.,<sup>a</sup> MAARTJE LUIJTEN, PH.D.,<sup>a</sup> RUTGER ENGELS, PH.D.,<sup>a,b</sup> & EMMANUEL KUNTSCHKE, PH.D.<sup>a,c</sup>

<sup>a</sup>*Behavioural Science Institute, Radboud University, Nijmegen, the Netherlands*

<sup>b</sup>*Trimbos Instituut, Netherlands Institute of Mental Health and Addiction, Utrecht, the Netherlands*

<sup>c</sup>*Addiction Switzerland, Research Institute, Lausanne, Switzerland*

**ABSTRACT. Objective:** The purpose of this study was to test (a) whether drinking motives predict event-level drinking on weekend evenings; (b) whether the number of friends present in social situations was associated with drinking on weekend evenings; and (c) whether drinking motives moderate the association between friends present and drinking. **Method:** We linked individual-level drinking motives (measured at baseline) to event-level data assessed every Thursday, Friday, and Saturday evening over 5 weeks. The number of drinks and male and female friends present in the situation were assessed at 9 P.M., 10 P.M., 11 P.M., midnight, and 1 A.M. In total, 197 young adults (51.3% male) completed 11,516 event-level assessments. **Results:** Multilevel models by gender revealed that higher enhancement motives predicted a greater number of drinks consumed in a given moment, but only among women. The higher

the number of male and female friends present in a situation, the more drinks consumed by both genders. Last, drinking motives moderated the association between the number of friends present and the number of drinks. For women, higher enhancement motives predicted more drinks in situations with more male friends. For men, higher coping motives predicted more drinks in situations with no friends and in situations with more female friends. Lower coping motives predicted more drinks with more male friends. Higher conformity motives predicted fewer drinks with more female friends. **Conclusions:** Drinking motives appear to moderate event-level factors rather than directly predict drinking on weekend evenings. Depending on the motives for drinking, event-level factors (e.g., friends present in a situation) have a strong effect on an individual's drinking. (*J. Stud. Alcohol Drugs*, 76, 971–980, 2015)

**E**XCESSIVE ALCOHOL USE most frequently occurs among young adults, specifically college students (Kuntsche & Gmel, 2013; Poelen et al., 2005), and it is associated with health-related consequences, such as injury and alcohol use disorders later in life (Rehm et al., 2009). Individual factors (e.g., drinking motives) as well as factors within the social environment (e.g., friends in a specific situation) have been extensively linked to higher levels of drinking (Kuntsche et al., 2006; Larsen et al., 2010; van Schoor et al., 2008). The current study adds to this existing knowledge by using ecological momentary assessments (EMA), a method that provides assessments of drinking in the moment (Kuntsche & Labhart, 2013b). The aims were to test whether drinking motives predict drinking on weekend evenings, whether the number of friends present is associated with drinking on weekend evenings, and whether drinking motives moderate the association between the number of friends present and drinking on weekend evenings.

Numerous psychological factors have been found to influence drinking behavior (e.g., psychopathology and personality traits), and drinking motives are among the most important proximal factors (Kuntsche et al., 2006). According to the motivational model of Cox and Klinger (1988, 1990), drinking motives are based on the decisional framework suggesting that people decide to drink to attain a subjective reward. The valence of these subjective rewards is either positive (enhance positive outcomes) or negative (avoid negative outcomes). The source of rewards has been divided into internal rewards (i.e., personal affect) and external rewards (i.e., affect from the social environment). By combining the valence (positive/negative) and the source (internal/external) of the expected rewards, four drinking motive dimensions can be defined: enhancement (to obtain positive mood), coping (to avoid or reduce negative feelings), social (to obtain social rewards), and conformity (to avoid social rejection).

Enhancement motives have been consistently associated with heavy drinking, whereas coping motives have been associated with alcohol-related problems (Kuntsche & Kuehlig, 2012; Kuntsche et al., 2005; Neighbors et al., 2007). Social motives have been linked to moderate alcohol use, whereas strong conformity motives seem inversely associated with alcohol use (Lyvers et al., 2010). The few available longitudinal studies have demonstrated that enhancement motives, positive motives (social/enhancement; Armeli et

---

Received: December 4, 2014. Revision: July 6, 2015.

Study procedures are approved by the ethical committee of the Faculty of Social Science, Radboud University (No. ECG2013-1308-11). The authors do not have any conflicts of interest.

\*Correspondence may be sent to Koen Smit at the Trimbos Institute, Netherlands Institute of Mental Health and Addiction, Da Costakade 45, Room 02.14, 3521 VS, Utrecht, the Netherlands, or via email at: ksmi@trimbos.nl.

al., 2010; Cooper et al., 2008; Read et al., 2003), and coping motives (Cooper et al., 2008) predict alcohol use over time. Unfortunately, the majority of the evidence regarding the association between drinking motives and alcohol use stems from studies using retrospective assessments (e.g., estimates of alcohol use over the past 30 days), which may induce significant recall bias (Ekholm, 2004; Kuntsche & Labhart, 2012). This is particularly important because of the high fluctuation of the amount of alcohol consumed by young adults on weekends (Del Boca et al., 2004; Labhart & Kuntsche, 2014). These studies indicate that the observed frequency of drinking is less consistent compared with what is assumed from retrospective assessments. The current study extends existing literature by investigating whether drinking motives measured at baseline predict alcohol use in the moment over five subsequent weekends. A promising recently developed EMA technique (Kuntsche & Labhart, 2013c) offers the possibility to assess drinking behavior in real time by sending short questionnaires to participants' smartphones, thereby reducing recall biases.

Several EMA studies have investigated alcohol use among young adults. For example, one study that conducted daily assessments on palmtops (small, handheld computers) investigated the temporary sequence in which drinking occurs after a hangover. The results indicated that hangovers affect (i.e., prolong) the timing of next drinking episodes (Epler et al., 2014). Another study assessing alcohol use on participants' smartphones demonstrated that levels of predrinking (i.e., drinking before going out to a licensed premise) predicted more alcohol use and adverse consequences on a given evening (Labhart et al., 2013).

EMA studies have also provided some evidence for the link between drinking motives and alcohol use. A study using daily assessments on palmtops indicated that enhancement motives predicted a higher number of drinks consumed per drinking episode (Piasecki et al., 2014). Another study, using text messages, also indicated that enhancement motives predicted heavy drinking on weekend evenings (Kuntsche & Cooper, 2010), whereas a similar study using smartphone assessments found that enhancement motives among men and coping motives among women predicted heavy drinking (Kuntsche & Labhart, 2013a). In addition to investigating the association between drinking motives and alcohol use, EMA provides an opportunity to collect detailed information regarding the situation in which drinking occurs, such as having drinking company (Kuntsche & Labhart, 2013b).

The drinking environment (i.e., physical and social environment) has been widely investigated because it is strongly related to the level of alcohol use. For instance, peers in a given situation have been found to influence drinking behavior through indirect processes, such as modeling and social norms, or directly by offering a drink (Borsari & Carey, 2001). Experimental studies conducted in a semi-naturalistic

setting (i.e., a bar laboratory) have indicated that peer drinking strongly relates to young adults' alcohol use (Larsen et al., 2010; van Schoor et al., 2008). However, it remains unclear whether characteristics of the friends present in the drinking environment may affect alcohol use, specifically whether the number of friends present in a real-time situation is associated with alcohol use. Previous studies have demonstrated that people consume more alcohol in larger groups (Cullum et al., 2012; Mustonen & Mäkelä, 1999). Consequently, it may be interesting to investigate whether associations differ by gender of the friends present. Studies regarding gender composition of friend groups have indicated that men in small same-gender groups seem to drink more compared with men in small mixed-gender groups. Men in large mixed-gender groups used the most alcohol. In contrast, women's alcohol use was not related to gender groups (Senchak et al., 1998). Fairbairn et al.'s (2015) findings further supported this notion, indicating that men derive more reward from alcohol in same-gender groups than in mixed-gender groups. This effect was less pronounced in women. In sum, previous studies suggest an association between the number of friends and alcohol use. This association depends not only on the gender of the drinker, but also on the gender composition of the group of friends present.

Based on the EMA data, we focused on drinking on weekend evenings, as previous studies have indicated that young adults' alcohol consumption peaks on Thursday, Friday, and Saturday evenings, probably because they do not have any important responsibilities the following day (Del Boca et al., 2004; Gmel et al., 2008; Parker & Williams, 2003). Whereas previous studies indicate direct associations between drinking motives, social environmental factors (e.g., the gender composition of the group of friends present), and alcohol use (Fairbairn et al., 2015; Kuntsche & Labhart, 2013a; Kuntsche et al., 2005), to our knowledge, no studies have investigated whether drinking motives moderate the association between social environmental factors and alcohol use on weekend evenings. First, we examined whether drinking motives at baseline predict drinking on weekend evenings. In line with previous studies (Kuntsche & Labhart, 2013a; Lyvers et al., 2010), it was hypothesized that participants who score high on enhancement and coping motives consume a higher number of drinks in a given situation. Second, we examined whether the number of friends present was associated with drinking on weekend evenings. We hypothesized that the number of male and female friends present would be associated with a higher number of drinks. Third, as previous studies indicated that factors in the situation might influence the association between individuals' drinking motives and alcohol use (Engels et al., 2005; Kairouz et al., 2002; Kuntsche & Stewart, 2009), we aimed to investigate whether drinking motives moderate the association between the number of friends present and drinking on weekend evenings. Combining previous findings on drinking

motives and drinking with friends, we expected that those with high levels of enhancement and coping motives would consume a higher number of drinks on weekend evenings when more friends are present. Because of known gender differences in alcohol use (Holmila & Raitasalo, 2005), and the factors triggering alcohol use in a specific situation (Kuntsche et al., 2006; Senchak et al., 1998), we investigated whether the above-mentioned hypotheses held true for both men and women.

## Method

### Study procedures

The current study administered a baseline questionnaire and EMAs consisting of short questionnaires to participants' smartphones. Participants first attended a baseline meeting in the research laboratory at Radboud University. During this meeting, participants completed an online questionnaire. Subsequently, they were introduced to the EMA procedure that started on the following Thursday. For 5 consecutive weeks, participants received six emails on Thursday, Friday, and Saturday nights at predetermined times (i.e., 9 P.M., 10 P.M., 11 P.M., midnight, 1 A.M., and a follow-up questionnaire at 11 A.M.). Participants did not receive smartphone questionnaires on any other day of the week. Each email contained a hyperlink to a short online questionnaire. Each questionnaire was introduced with the targeted timeslot, e.g., "The following questions are about what you did from 8 P.M. to 9 P.M." Participants were asked to complete the questionnaire (which took less than 1 minute) as soon as possible, regardless of their location.

Participants who successfully completed the study (i.e., attended the baseline meeting and completed at least 75% of the smartphone questionnaires) received an incentive of €50 (about \$70 U.S.). The study was conducted between September 2013 and January 2014 and was approved by the institutional Ethical Review Board of the Faculty of Social Sciences of Radboud University. Written consent was obtained from all participants in the study.

### Sample

Young adults were recruited by (online) advertisements posted in the university and on social media. Selection criteria (stated in all advertisements) were (a) being between 18 and 25 years old, (b) consuming alcohol on (at least) a weekly basis, and (c) owning a smartphone with Internet access, which is the case for more than 90% of the Dutch young adult population (Korvorst & Sleijpen, 2014). Individuals who registered by email were invited to attend the baseline meeting (Kuntsche & Labhart, 2013a).

A total of 202 participants participated in the study. Of the 15,150 questionnaires sent, 2,267 (15%) were not

completed. To ensure reliable information, five participants (2.5%) who completed fewer than one third of all questionnaires were excluded (81 questionnaires, 0.5%). To minimize recall bias, questionnaires completed after 6 hours or more were excluded from the analyses (1,286 questionnaires, 8.5%). The final sample comprised 197 participants ( $M_{\text{age}} = 20.77$ ,  $SD = 1.73$ ; 51.3% men) providing 11,516 usable questionnaires (78% completed within 30 minutes).

### Measures

#### Baseline questionnaire (individual level)

(A) *DEMOGRAPHICS*: Demographic variables included gender and age.

(B) *WEEKLY ALCOHOL USE*: Weekly amount of alcohol use was measured using a self-report questionnaire that asked whether the participants used alcohol on each of the past 7 days and how many drinks they consumed on these days (Hajema & Knibbe, 1998). Response categories ranged from 0 to 11+ (11+ coded as 11.5). By summing the number of drinks consumed over a 7-day period, weekly alcohol use was calculated.

(C) *ALCOHOL USE DISORDER IDENTIFICATION*: The Alcohol Use Disorders Identification Test (AUDIT) consists of 10 items, and it is a reliable screening instrument to identify hazardous drinking behavior and alcohol dependence (Saunders et al., 1993). The AUDIT showed satisfactory reliability in the current sample (Cronbach's  $\alpha = .75$ ).

(D) *DRINKING MOTIVES*: The 20-item self-report Drinking Motives Questionnaire-Revised (Cooper, 1994) was used to measure the relative frequency of drinking for enhancement, social, conformity, and coping motives in the last 12 months. Items were rated on a 5-point scale ranging from 1 = *almost never* to 5 = *almost always*. For each dimension, a mean score of five items was established. The scales showed satisfactory reliability (Cronbach's  $\alpha_{\text{enhancement}} = .74$ ,  $\alpha_{\text{social}} = .73$ ,  $\alpha_{\text{conformity}} = .68$ ,  $\alpha_{\text{coping}} = .76$ ).

#### Smartphone questionnaires (event level)

(A) *TIMEFRAME IN THE EVENING*: Participants were asked to complete five questionnaires in the evening, each covering a timeframe of 60 minutes (1 = 8–9 P.M., 2 = 9–10 P.M., 3 = 10–11 P.M., 4 = 11 P.M.–midnight, and 5 = midnight–1 A.M.).

(B) *NUMBER OF DRINKS*: Participants indicated the number of drinks consumed within the previous hour separately for the beer, wine, and spirit/mixed drinks categories. Response categories ranged from 0 to 5+ (coded as 5.5). To be consistent with previous research and to maintain a simple and clear display with buttons that foster more accurate responses (Kuntsche & Labhart, 2012; Labhart et al., 2013), we chose to truncate each separate drink at five or more (5+). A sum score was calculated for the three beverage categories.

(C) *NUMBER OF FRIENDS PRESENT*: Participants were asked to indicate the number of male friends and female friends pres-

TABLE 1. Descriptive statistics

Variable	Men	Women	<i>t</i>	<i>p</i>
Event level, <i>n</i>	6,003	5,513		
No. of drinking situations <sup>a</sup>	47.2% (of <i>n</i> )	32.1% (of <i>n</i> )	6.64	<.001
No. of drinks within situation <sup>a</sup>	2.49 (0.90)	1.79 (0.67)	6.18	<.001
No. of male friends present <sup>a</sup>	2.90 (1.28)	1.52 (1.16)	7.96	<.001
No. of female friends present <sup>a</sup>	1.38 (1.07)	2.45 (1.15)	6.75	<.001
Individual level, <i>n</i>	101	96		
Mean age, in years <sup>b</sup>	20.77 (1.82)	20.76 (1.64)	0.05	.962
Social motives <sup>b,c</sup>	3.48 (0.64)	3.31 (0.68)	1.77	.078
Enhancement motives <sup>b,c</sup>	3.05 (0.74)	2.86 (0.73)	1.82	.071
Coping motives <sup>b,c</sup>	1.70 (0.54)	1.81 (0.71)	-1.25	.213
Conformity motives <sup>b,c</sup>	1.55 (0.51)	1.44 (0.46)	1.64	.104
AUDIT <sup>b,d</sup>	14.73 (6.16)	10.75 (3.99)	6.20	<.001
Weekly alcohol <sup>b,e</sup>	21.91 (14.47)	11.41 (8.75)	5.41	<.001

Notes: Significant differences in **bold**. No. = number; AUDIT = Alcohol Use Disorders Identification Test. <sup>a</sup>Descriptive statistics are means (standard deviations in brackets) based on the full ecological momentary assessments data set, the *t* values are based on participants' mean scores in aggregated form. <sup>b</sup>Descriptive statistics are means (standard deviations in brackets) and *t* values based on the baseline questionnaire data. <sup>c</sup>Mean scores are based on the Drinking Motives Questionnaire; higher scores indicate stronger motives (range: 1–5). <sup>d</sup>Mean scores are based on the Alcohol Use Disorders Identification Test; higher scores indicate higher risk patterns of alcohol use (range: 0–40). <sup>e</sup>Mean scores are based on the total number of drinks consumed over a 7-day period (range: 0–80.5).

ent in each timeframe of 60 minutes. Response categories ranged from 0 to 5+ (5+ coded as 5.5).

### Statistical analysis

Descriptive analyses, *t* tests, and correlations were performed in SPSS Version 21 (IBM Corp., Armonk, NY). When testing gender differences in event-level variables, only the 0.1%  $\alpha$ -error level was considered as the level of significance to avoid reporting minor differences as significant due to nesting of observations within individuals (Kuntsche et al., 2013). To determine univariate associations between drinking motives and number of drinks, correlation analyses were conducted using participants' aggregated mean scores.

Multilevel linear regression analyses were performed in Mplus 6.12 (Muthén & Muthén, 2010). In the first model, to test whether individual-level drinking motives and the number of friends present predicted the number of drinks consumed within 1 hour on weekend evenings, alcohol use was regressed on the four drinking motives (individual-level main effects) and on the number of friends present (event-level main effects). In the second model, cross-level interactions were included to test whether drinking motives moderate the relationship between the number of male friends and female friends present and the number of drinks consumed. Because of known gender differences (Holmila & Raitasalo, 2005), both models were estimated separately for men and women. The multilevel models take into account the nesting of situations (first level of analysis) within individuals (second level of analysis). Although we did not specify hypotheses regarding day of the week and time of the day, variance may be clustered around day and time (for example, heavier drinking may occur when the

evening proceeds). Therefore, day of the week and time of the day were entered in the model as situational covariates. Intercorrelations among motive scales ranged from .27 to .59 (all *ps* < .01). As the prediction of the specific drinking motive dimensions is thought to be attributed to the unique variance of each dimension (Kuntsche et al., 2005, 2006; Piasecki et al., 2014; van der Zwaluw et al., 2011), all motive scales were entered in the models simultaneously. To illustrate the cross-level interaction effects, the model-based trendlines were calculated using the regression weights of a specific drinking motive and the number of friends present. All variables were grand mean centered to obtain the average effect of each variable at zero.

To compare the associations between the four drinking motive dimensions and alcohol use in the first multilevel model with the associations between cross-sectional measures in an exploratory way, we tested whether cross-sectional alcohol use (i.e., AUDIT scores and weekly drinking) correlated with the motive dimensions.

## Results

Descriptive analyses demonstrated that 96 women and 101 men completed, on average, 58.5 (77.9%) of the total 75 questionnaires within the permitted time span of 6 hours. In total, 78% of the questionnaires were completed within 30 minutes; the remaining 22% of the questionnaires were completed between 30 minutes and 6 hours ( $M = 26.10$ ,  $SD = 46.67$ ). Postponing questionnaires did not significantly affect the results, as the main findings held true when including the questionnaires completed after 6 hours (results available from the author on request). Overall, on 4,633 of the 11,516 assessments (40.2%), participants indicated that they consumed one or more drinks (Table 1). *T* tests dem-



TABLE 2. Correlations of weekly alcohol and AUDIT scores with the four drinking motives among men, women, and the total sample

Variable	Social		Enhancement		Coping		Conformity	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Weekly alcohol								
Men	.362	<.001	.367	<.001	.167	.095	.035	.730
Women	.065	.189	.089	.389	-.095	.359	.166	.332
Total	.310	<.001	.287	<.001	.010	.890	.098	.172
AUDIT								
Men	.422	<.001	.418	<.001	.208	<b>.037</b>	.166	.097
Women	.365	<.001	.400	<.001	.246	<b>.016</b>	.241	<b>.018</b>
Total	.404	<.001	.419	<.001	.165	<b>.021</b>	.218	<b>.002</b>

Notes: AUDIT = Alcohol Use Disorders Identification Test. Significant correlations in **bold**.

onstrated that the percentage of situations in which alcohol was consumed was significantly higher for men than for women. On average, men consumed a significantly higher number of drinks in a given moment compared with women. Furthermore, for both men and women, the number of same-sex friends present at a given time was significantly higher compared with opposite-sex friends. At an individual level, men scored significantly higher on the AUDIT and weekly drinking. No significant gender differences emerged for age or any of the drinking motives.

To determine whether drinking motives were associated with AUDIT scores and weekly drinking, correlation analyses were performed. The results showed that social and enhancement motives positively correlated with weekly drinking but only in men. Furthermore, all drinking motives were positively associated with AUDIT scores, except for conformity motives in men (Table 2).

Correlation analyses were conducted to determine univariate associations between drinking motives and number of drinks. Results show that social and enhancement motives were positively associated with number of drinks but only for men (Table 3).

The results of the first multilevel model investigating the main effects of drinking motives and friends present on the number of drinks showed no significant association between any of the four drinking motives and number of drinks for men. However, for women, a higher level of enhancement motives was related to a higher number of drinks consumed on a given moment on weekend evenings (Table 4).

At the event level, the number of friends present was associated with a higher number of drinks within a 60-minute timeframe. These effects were found in both genders for the numbers of both male and female friends present.

To determine whether any of the four drinking motives moderated the link between friends present and number of drinks consumed, cross-level interaction effects were included in the second model (Table 5). For women, the higher the level of enhancement motives, the stronger the link between the number of male friends present and the number of drinks. This moderation effect was not found for the number of female friends present. For men, higher levels of coping motives were related to a higher number of drinks when no friends were present (individual-level main effect). In addition, among men scoring high on coping motives, the effect of the number of female friends present on the number of drinks was particularly strong. For men scoring low on coping motives, the same was true when more male friends were present. In addition, it was found that men who scored high on conformity motives consumed fewer drinks when more female friends were present. The cross-level interactions remained basically the same when estimated for only one motive dimension at a time in separate models.

Figure 1 illustrates the effect of drinking motives on the link between the number of male friends present and the number of drinks. The increase in consumed drinks with increasing number of male friends present was steeper for women who scored high on enhancement motives (upper graph). Among men (lower graph), those who scored high

TABLE 3. Correlations among drinking motives, numbers of friends present, and alcohol use presented for men (above the diagonal) and women (below the diagonal)

Variable	1.	2.	3.	4.	5.	6.	7.
1. Social	—	.587***	.332**	.383***	.159	-.071	.230*
2. Enhancement	.528***	—	.294**	.300**	.043	-.104	.233*
3. Coping	.363***	.354***	—	.323**	-.103	-.062	.023
4. Conformity	.496***	.265**	.271**	—	.143	-.070	.193
5. Male friends present	-.057	-.059	.005	.000	—	.412***	.402**
6. Female friends present	.088	.028	-.049	.129	.259*	—	-.045
7. Number of drinks	-.004	.114	.175	-.023	.178	.211*	—

Note: Correlations are based on participants' mean scores in aggregated form.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

TABLE 4. Number of drinks regressed on friends present (event-level main effect) and drinking motives (individual-level main effect) by gender

Variable	Men			Women		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Intraclass correlation	.079			.077		
Situational factors						
Male friends present	.398	.025	<b>&lt;.001</b>	.171	.026	<b>&lt;.001</b>
Female friends present	.111	.033	<b>.001</b>	.166	.014	<b>&lt;.001</b>
Individual factors						
Social motives	.016	.103	.877	.010	.069	.887
Enhancement motives	.122	.120	.311	.097	.047	<b>.038</b>
Coping motives	.128	.109	.240	.028	.054	.606
Conformity motives	.040	.111	.718	-.131	.071	.064

Notes: Values shown are unstandardized regression coefficients; significant effects in **bold**; adjusted for day and time effects.

on coping motives consumed a slightly higher number of drinks when fewer friends were present compared with those who scored low on coping motives. However, when more male friends were present, the opposite was the case because of a steeper increase in drinking with increasing number of male friends present among those scoring low on coping motives.

**Discussion**

The objectives of this study were to examine the value of drinking motives in predicting drinking on weekend evenings, to determine whether the number of friends present in a situation is associated with drinking on weekend evenings, and to examine whether drinking motives moderate the association between the number of friends present and drinking on weekend evenings.

First, as hypothesized, enhancement motives were associated with increased drinking on weekend evenings. However, this was the case for women only. It seems that particular women who “drink to have fun” and “like the effects of alcohol” (enhancement motives) seize weekend evenings as an opportunity to consume a higher number of drinks. No associations were found between coping motives and drinking on weekend evenings. Our findings are partly in line with previous EMA studies based on other data sets, demonstrating that high levels of enhancement and coping motives predicted alcohol use (Kuntsche & Cooper, 2010; Kuntsche & Labhart, 2013a; Piasecki et al., 2014). This is also partly in line with studies that used different methodologies to measure alcohol use (e.g., cross-sectional measures). For example, enhancement motives consistently predicted alcohol use over time (Cooper et al., 2008; Read et al., 2003). In contrast with the present findings, coping motives were

TABLE 5. Drinking motives as main effects and as moderator (cross-level interaction) on the relationship between friends present and number of drinks

Variable	Men			Women		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Main effects						
Event level						
Male friends	.392	.023	<b>&lt;.001</b>	.161	.024	<b>&lt;.001</b>
Female friends	.116	.024	<b>&lt;.001</b>	.174	.015	<b>&lt;.001</b>
Individual level						
Social	-.031	.110	.778	-.021	.063	.736
Enhancement	.134	.121	.266	.110	.047	<b>.020</b>
Coping	.136	.102	.184	.040	.052	.439
Conformity	.034	.122	.785	-.140	.065	<b>.031</b>
Cross-level interactions						
Male friends						
Social motives	.035	.053	.508	.009	.040	.824
Enhancement motives	-.001	.040	.971	.113	.036	<b>.002</b>
Coping motives	-.111	.046	<b>.015</b>	.005	.045	.914
Conformity motives	.111	.064	.084	-.108	.061	.078
Female friends						
Social motives	-.083	.057	.145	-.008	.030	.797
Enhancement motives	.056	.038	.146	-.023	.024	.349
Coping motives	.135	.046	<b>.003</b>	.003	.021	.887
Conformity motives	-.120	.052	<b>.022</b>	-.012	.031	.700

Notes: Values shown are unstandardized regression coefficients; significant effects in **bold**; adjusted for day and time effects.

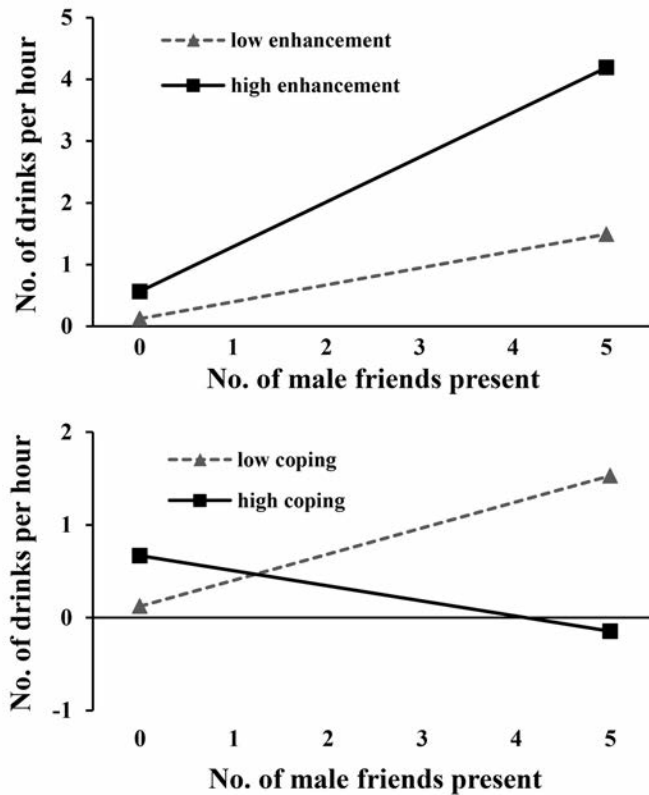


FIGURE 1. Illustration of cross-level interaction effects of drinking motives on the link between male friends present and the number of drinks consumed (female enhancement motives in the upper graph, male coping motives in the lower graph). No. = number.

found to predict subsequent alcohol use and to be associated with alcohol-related problems (Bradizza et al., 1999; Cooper et al., 2008). Social motives predicted alcohol use in several studies (Armeli et al., 2010; Bradizza et al., 1999; Engels et al., 2005). In current correlation analyses, it appeared that next to enhancement motives, positive correlations were found among other motives and cross-sectional measures (i.e., weekly drinking and the AUDIT). Remarkably, all drinking motives were associated with AUDIT scores (Table 2). Therefore, it seems that different drinking motives predict event-level alcohol use compared with cross-sectional (self-reported, retrospective) measures of alcohol use. In other words, different associative patterns regarding drinking motives and alcohol consumption may be found across methodologies. This may imply that drinking motives, rather than the number of drinks consumed in a specific timeframe on weekend evenings, are better able to predict general patterns of alcohol use.

Concerning the second aim, in line with expectations, the numbers of male friends and female friends present in the situation were associated with the number of drinks consumed by both genders. The previous findings suggested that a substantial number of young adults use alcohol when with

larger groups of friends (Cullum et al., 2012). The current findings further indicate that the number of friends present in a situation affects drinking on weekend evenings.

Third, we expected that enhancement and coping motives would moderate the relationship between the number of friends present and drinking on weekend evenings. In line with our expectations, enhancement motives moderated the relation in that for women scoring high on enhancement motives, the association between the number of male friends present and number of drinks consumed was stronger. This was not the case in the presence of a higher number of female friends. This is in line with previous research, suggesting that women tend to use alcohol for specific purposes in the company of men (e.g., to facilitate social contact, to gain positive attention, and to establish intimate relationships; LaBrie et al., 2007; Young et al., 2005). The current study adds that this is only the case for those who usually drink to have fun and to feel the effects of alcohol (enhancement motives), but not for those scoring low on enhancement motives. It appears that drinking by the latter group of women is particularly affected when male friends are present, perhaps because they feel the pressure to comply with the higher drinking norm of men (Table 1).

Furthermore, in line with expectations, coping motives were associated with a higher number of drinks among men, particularly when more female friends were present. Coping motives are thought to be associated with drinking to deal with negative emotional states, such as stress, anxiety, or depression (Baer, 2002; Ham & Hope, 2003; Ham et al., 2009). Therefore, being among female friends may increase self-awareness and stress among men (e.g., when trying to find a romantic partner, which in turn may result in drinking to cope with social anxiety or stress; Kuntsche et al., 2006; Nolen-Hoeksema & Harrell, 2002). The opposite was found for male friends: Low coping motives were associated with a higher number of drinks when more male friends were present, suggesting that those who drink a lot with a lot of friends may be the noncoping drinkers (i.e., the extroverts and sensation seekers; Kuntsche et al., 2006).

The results revealed an unexpected interaction for men: those scoring high on conformity motives consumed a smaller number of drinks when more female friends were present. Conformity motives have been found to be weakly or inversely related to alcohol use (Kuntsche & Labhart, 2013a; Lyvers et al., 2010; Merrill & Read, 2010). It has been suggested that the effects of conformity motives depend on the peer group to which people belong, as drinkers strongly adapt to the drinking norm of the group in a given situation (Kuendig & Kuntsche, 2013). The same might occur among men who drink for conformity as they adapt (i.e., lower) their pace of drinking to conform to the usually lower consumption of women (Table 1). Taken together, the findings indicate that particularly the interplay between drinking motives and the social environment in a given situ-

ation predicts drinking on weekend evenings among young adult men and women. This suggests that the influence of drinking motives on drinking behavior differs across social situations (Engels et al., 2005; Kairouz et al., 2002; Lyvers et al., 2010). However, more research is needed to shed light on the complex interplay among drinking motives, social company, and alcohol use at a given moment on weekend evenings.

By means of event-level assessments, the current study aimed to approximate ecological validity and to minimize retrospective bias. The study resulted in a data set with 11,516 assessments, of which the vast majority (78%) were completed within 30 minutes. However, when interpreting the results, several limitations must be acknowledged. First, the study design does not allow us to make firm conclusions regarding the direction of the effect of friends present. The effect of the number of friends present on drinking on weekend evenings may be subject to selection effects (Bullers et al., 2001; Robins et al., 2001). In this respect, those who consume more alcohol may be more often in the company of friends on weekend evenings. In addition, specific drinking motives may influence individuals' selection of certain social situations (Kahler et al., 2003; Kairouz et al., 2002). Future event-level studies on drinking motives and situational influences would benefit highly from information on drinking norms gained by including assessments of the drinking context (e.g., at home or in a bar; Cullum et al., 2012) and prevalence estimates of alcohol use among the present company, such as the friend group (Larsen et al., 2010). In line of this thought, future studies should further identify settings in which young adults with strong specific drinking motives are at more risk of excessive alcohol use.

The sample comprised mainly university and college students who consumed alcohol on a regular basis (at least once a week) and volunteered to participate in the study. Therefore, the second limitation is that the current study used a sample of nonrandomly drawn young adults. For this reason, selection bias may have occurred, complicating the generalizability of the results to the general Dutch population. Accordingly, replication of the current findings in a more representative sample is advised. A third limitation pertains to the smartphone assessments. At baseline, we did not provide sufficient information regarding standard drinks (i.e., the number of drinks converted to standard drinks containing 14 g of alcohol per drink), which may have resulted in less accurate drinking assessments. To promote comparable drinking assessments across situations and across individuals, future studies would benefit from providing precise information regarding standard drinks. It should also be noted that relying on EMA data as a drinking outcome confounds drinking data with EMA compliance. Therefore, the results of the current study should be interpreted with care.

Altogether, the current study adds to the existing knowledge by identifying specific drinking motives (e.g., enhance-

ment motives) and specific environmental factors (when more friends are present) that are associated with a higher number of drinks during weekend evenings. Rather than being direct predictors of drinking on weekend evenings, drinking motives may function as moderators. Situational factors are more likely to determine the number of drinks consumed. Depending on the motives for drinking, situational factors have a more or less strong effect on individuals' weekend drinking. Prevention programs should therefore consider both the individual and situational level. In other words, prevention should combine policy measures (e.g., prohibiting staff from serving alcohol to intoxicated persons and making low-level alcohol beverages available; Room & Livingston, 2009) with individual-focused approaches (e.g., the web-based self-help approach addressing heavy drinking among students; Riper et al., 2008), aiming to curb young adults' excessive drinking that most likely occurs on weekend evenings (Kuntsche & Gmel, 2013; Kuntsche & Labhart, 2012).

### Acknowledgment

The authors thank the anonymous reviewers for their helpful comments in revising an earlier version of the article.

### References

- Armeli, S., Conner, T. S., Cullum, J., & Tennen, H. (2010). A longitudinal analysis of drinking motives moderating the negative affect-drinking association among college students. *Psychology of Addictive Behaviors, 24*, 38–47. doi:10.1037/a0017530.
- Baer, J. S. (2002). Student factors: Understanding individual variation in college drinking. *Journal of Studies on Alcohol, Supplement 14*, 40–53. doi:10.15288/jsas.2002.s14.40.
- 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)00098-0.
- Bradizza, C. M., Reifman, A., & Barnes, G. M. (1999). Social and coping reasons for drinking: Predicting alcohol misuse in adolescents. *Journal of Studies on Alcohol, 60*, 491–499. doi:10.15288/jsa.1999.60.491.
- Bullers, S., Cooper, M. L., & Russell, M. (2001). Social network drinking and adult alcohol involvement: A longitudinal exploration of the direction of influence. *Addictive Behaviors, 26*, 181–199. doi:10.1016/S0306-4603(00)00099-X.
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*, 117–128. doi:10.1037/1040-3590.6.2.117.
- Cooper, M. L., Krull, J. L., Agocha, V. B., Flanagan, M. E., Orcutt, H. K., Grabe, S., . . . Jackson, M. (2008). Motivational pathways to alcohol use and abuse among Black and White adolescents. *Journal of Abnormal Psychology, 117*, 485–501. doi:10.1037/a0012592.
- Cox, W. M., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*, 168–180. doi:10.1037/0021-843X.97.2.168.
- Cox, W. M., & Klinger, E. (1990). Incentive motivation, affective change, and alcohol use: A model. In W. M. Cox (Ed.), *Why people drink: Parameters of alcohol as a reinforcer* (pp. 291–314). New York, NY: Gardner Press.



- Cullum, J., O'Grady, M., Armeli, S., & Tennen, H. (2012). The role of context-specific norms and group size in alcohol consumption and compliance drinking during natural drinking events. *Basic and Applied Social Psychology, 34*, 304–312. doi:10.1080/01973533.2012.693341.
- Del Boca, F. K., Darkes, J., Greenbaum, P. E., & Goldman, M. S. (2004). Up close and personal: Temporal variability in the drinking of individual college students during their first year. *Journal of Consulting and Clinical Psychology, 72*, 155–164. doi:10.1037/0022-006X.72.2.155.
- Eklholm, O. (2004). Influence of the recall period on self-reported alcohol intake. *European Journal of Clinical Nutrition, 58*, 60–63. doi:10.1038/sj.ejcn.1601746.
- Engels, R. C., Wiers, R., Lemmers, L., & Overbeek, G. J. (2005). Drinking motives, alcohol expectancies, self-efficacy, and drinking patterns. *Journal of Drug Education, 35*, 147–166. doi:10.2190/6Q6B-3LMA-VMVA-L312.
- Epler, A. J., Tomko, R. L., Piasecki, T. M., Wood, P. K., Sher, K. J., Shiffman, S., & Heath, A. C. (2014). Does hangover influence the time to next drink? An investigation using ecological momentary assessment. *Alcoholism: Clinical and Experimental Research, 38*, 1461–1469. doi:10.1111/acer.12386.
- Fairbairn, C. E., Sayette, M. A., Aalen, O. O., & Frigessi, A. (2015). Alcohol and emotional contagion: An examination of the spreading of smiles in male and female drinking groups. *Clinical Psychological Science, 3*, 686–701. doi:10.1177/2167702614548892.
- Gmel, G., Gaume, J., Fauzi, M., Kulling, J. P., & Daepfen, J. B. (2008). Who drinks most of the total alcohol in young men—risky single occasion drinking as normative behaviour. *Alcohol and Alcoholism, 43*, 692–697. doi:10.1093/alcalc/agn070.
- Hajema, K. J., & Knibbe, R. A. (1998). Changes in social roles as predictors of changes in drinking behaviour. *Addiction, 93*, 1717–1727. doi:10.1046/j.1360-0443.1998.931117179.x.
- Ham, L. S., & Hope, D. A. (2003). College students and problematic drinking: A review of the literature. *Clinical Psychology Review, 23*, 719–759. doi:10.1016/S0272-7358(03)00071-0.
- Ham, L. S., Zamboanga, B. L., Bacon, A. K., & Garcia, T. A. (2009). Drinking motives as mediators of social anxiety and hazardous drinking among college students. *Cognitive Behaviour Therapy, 38*, 133–145. doi:10.1080/16506070802610889.
- Holmila, M., & Raitasalo, K. (2005). Gender differences in drinking: Why do they still exist? *Addiction, 100*, 1763–1769. doi:10.1111/j.1360-0443.2005.01249.x.
- Kahler, C. W., Read, J. P., Wood, M. D., & Palfai, T. P. (2003). Social environmental selection as a mediator of gender, ethnic, and personality effects on college student drinking. *Psychology of Addictive Behaviors, 17*, 226–234. doi:10.1037/0893-164X.17.3.226.
- Kairouz, S., Glikzman, L., Demers, A., & Adlaf, E. M. (2002). For all these reasons, I do . . . drink: A multilevel analysis of contextual reasons for drinking among Canadian undergraduates. *Journal of Studies on Alcohol, 63*, 600–608. doi:10.15288/jsa.2002.63.600.
- Kuendig, H., & Kuntsche, E. (2013). Beyond personality—Experimental investigations of the effects of personality traits on *in situ* alcohol consumption in social and solitary drinking contexts. *Addictive Behaviors, 38*, 1635–1638. doi:10.1016/j.addbeh.2012.08.006.
- Korvorst, M., & Sleijpen, G. (2014, May 27). *Jongeren vooral online met smartphone*. Retrieved from <http://www.cbs.nl/nl-NL/menu/informatie/onderwijs/actueel/maatschappijleer/2014-4079-wm.htm>
- Kuntsche, E., & Cooper, M. L. (2010). Drinking to have fun and to get drunk: Motives as predictors of weekend drinking over and above usual drinking habits. *Drug and Alcohol Dependence, 110*, 259–262. doi:10.1016/j.drugalcdep.2010.02.021.
- Kuntsche, E., & Gmel, G. (2013). Alcohol consumption in late adolescence and early adulthood—where is the problem? *Swiss Medical Weekly, 143*, w13826. doi:10.4414/smw.2013.13826.
- 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. doi:10.1016/j.cpr.2005.06.002.
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2006). Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behaviors, 31*, 1844–1857. doi:10.1016/j.addbeh.2005.12.028.
- Kuntsche, E., & Kuendig, H. (2012). Beyond self-reports: Drinking motives predict grams of consumed alcohol in wine-tasting sessions. *Experimental and Clinical Psychopharmacology, 20*, 318–324. doi:10.1037/a0027480.
- Kuntsche, E., & Labhart, F. (2012). Investigating the drinking patterns of young people over the course of the evening at weekends. *Drug and Alcohol Dependence, 124*, 319–324. doi:10.1016/j.drugalcdep.2012.02.001.
- Kuntsche, E., & Labhart, F. (2013a). Drinking motives moderate the impact of pre-drinking on heavy drinking on a given evening and related adverse consequences—an event-level study. *Addiction, 108*, 1747–1755. doi:10.1111/add.12253.
- Kuntsche, E., & Labhart, F. (2013b). ICAT: Development of an Internet-based data collection method for ecological momentary assessment using personal cell phones. *European Journal of Psychological Assessment, 29*, 140–148. doi:10.1027/1015-5759/a000137.
- Kuntsche, E., & Labhart, F. (2013c). Using personal cell phones for ecological momentary assessment: An overview of current developments. *European Psychologist, 18*, 3–11. doi:10.1027/1016-9040/a000127.
- Kuntsche, E., Rossow, I., Simons-Morton, B., Bogt, T. T., Kokkevi, A., & Godeau, E. (2013). Not early drinking but early drunkenness is a risk factor for problem behaviors among adolescents from 38 European and North American countries. *Alcoholism: Clinical and Experimental Research, 37*, 308–314. doi:10.1111/j.1530-0277.2012.01895.x.
- 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.
- Labhart, F., Graham, K., Wells, S., & Kuntsche, E. (2013). Drinking before going to licensed premises: An event-level analysis of predrinking, alcohol consumption, and adverse outcomes. *Alcoholism: Clinical and Experimental Research, 37*, 284–291. doi:10.1111/j.1530-0277.2012.01872.x.
- Labhart, F., & Kuntsche, E. (2014). When yesterday's consumption strikes back: Deviation from usual consumption inversely predicts amounts consumed the next weekend evening. *Drug and Alcohol Review, 33*, 385–392. doi:10.1111/dar.12148.
- LaBrie, J. W., Hummer, J. F., & Pedersen, E. R. (2007). Reasons for drinking in the college student context: The differential role and risk of the social motivator. *Journal of Studies on Alcohol and Drugs, 68*, 393–398. doi:10.15288/jsad.2007.68.393.
- Larsen, H., Engels, R. C., Souren, P. M., Granic, I., & Overbeek, G. (2010). Peer influence in a micro-perspective: Imitation of alcoholic and non-alcoholic beverages. *Addictive Behaviors, 35*, 49–52. doi:10.1016/j.addbeh.2009.08.002.
- Lyvers, M., Hasking, P., Hani, R., Rhodes, M., & Trew, E. (2010). Drinking motives, drinking restraint and drinking behaviour among young adults. *Addictive Behaviors, 35*, 116–122. doi:10.1016/j.addbeh.2009.09.011.
- Merrill, J. E., & Read, J. P. (2010). Motivational pathways to unique types of alcohol consequences. *Psychology of Addictive Behaviors, 24*, 705–711. doi:10.1037/a0020135.
- Mustonen, H., & Mäkelä, K. (1999). Relationships between characteristics of drinking occasions and negative and positive experiences related to drinking. *Drug and Alcohol Dependence, 56*, 79–84. doi:10.1016/S0376-8716(99)00014-9.
- Muthén, L. K., & Muthén, B. O. (2010). *Mplus: Statistical analysis with latent variables: User's guide*. Los Angeles, CA: Authors.

- Neighbors, C., Lee, C. M., Lewis, M. A., Fossos, N., & Larimer, M. E. (2007). Are social norms the best predictor of outcomes among heavy-drinking college students? *Journal of Studies on Alcohol and Drugs, 68*, 556–565. doi:10.15288/jsad.2007.68.556.
- Nolen-Hoeksema, S., & Harrell, Z. A. (2002). Rumination, depression, and alcohol use: Tests of gender differences. *Journal of Cognitive Psychotherapy, 16*, 391–403. doi:10.1891/jcop.16.4.391.52526.
- Parker, H., & Williams, L. (2003). Intoxicated weekends: Young adults' work hard–play hard lifestyles, public health, and public disorder. *Drugs: Education, Prevention & Policy, 10*, 345–367. doi:10.1080/0968763031000140200.
- Piasecki, T. M., Cooper, M. L., Wood, P. K., Sher, K. J., Shiffman, S., & Heath, A. C. (2014). Dispositional drinking motives: Associations with appraised alcohol effects and alcohol consumption in an ecological momentary assessment investigation. *Psychological Assessment, 26*, 363–369. doi:10.1037/a0035153.
- Poelen, E. A., Scholte, R. H., Engels, R. C., Boomsma, D. I., & Willemssen, G. (2005). Prevalence and trends of alcohol use and misuse among adolescents and young adults in the Netherlands from 1993 to 2000. *Drug and Alcohol Dependence, 79*, 413–421. doi:10.1016/j.drugalcdep.2005.03.020.
- Read, J. P., Wood, M. D., Kahler, C. W., Maddock, J. E., & Palfai, T. P. (2003). Examining the role of drinking motives in college student alcohol use and problems. *Psychology of Addictive Behaviors, 17*, 13–23. doi:10.1037/0893-164X.17.1.13.
- Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., & Patra, J. (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *The Lancet, 373*, 2223–2233. doi:10.1016/S0140-6736(09)60746-7.
- Riper, H., Kramer, J., Smit, F., Conijn, B., Schippers, G., & Cuijpers, P. (2008). Web-based self-help for problem drinkers: A pragmatic randomized trial. *Addiction, 103*, 218–227. doi:10.1111/j.1360-0443.2007.02063.x.
- Robins, G., Pattison, P., & Elliott, P. (2001). Network models for social influence processes. *Psychometrika, 66*, 161–189. doi:10.1007/BF02294834.
- Room, R., & Livingston, M. (2009). [Commentary] Does it matter where the drinking is, when the object is getting drunk? *Addiction, 104*, 10–11. doi:10.1111/j.1360-0443.2008.02423.x.
- Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction, 88*, 791–804. doi:10.1111/j.1360-0443.1993.tb02093.x.
- Senchak, M., Leonard, K. E., & Greene, B. W. (1998). Alcohol use among college students as a function of their typical social drinking context. *Psychology of Addictive Behaviors, 12*, 62–70. doi:10.1037/0893-164X.12.1.62.
- van der Zwaluw, C. S., Kuntsche, E., & Engels, R. C. (2011). Risky alcohol use in adolescence: The role of genetics (*DRD2, SLC6A4*) and coping motives. *Alcoholism: Clinical and Experimental Research, 35*, 756–764. doi:10.1111/j.1530-0277.2010.01393.x.
- van Schoor, G., Bot, S. M., & Engels, R. C. (2008). Alcohol drinking in young adults: The predictive value of personality when peers come around. *European Addiction Research, 14*, 125–133. doi:10.1159/000130416.
- Young, A. M., Morales, M., McCabe, S. E., Boyd, C. J., & Darcy, H. (2005). Drinking like a guy: Frequent binge drinking among undergraduate women. *Substance Use & Misuse, 40*, 241–267. doi:10.1081/JA-200048464.