The effects of alcohol expectancies on drinking behaviour in peer groups: observations in a naturalistic setting

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Abstract

Aims To study the functionality of alcohol expectancies in predicting drinking behaviour in existing peer groups of young adults in a ‘naturalistic’ setting.

Design and setting Young adults were invited to join an experiment with their peer group in a bar annex laboratory. During a ‘break’ of 50 minutes in this experiment, their activities, social behaviour and drinking behaviour were observed with digital video and audio equipment.

Participants Twenty-eight peer groups were involved in this study. A peer group consisted of seven to nine people, with relationships ranging from intimate relations and close friendships to being acquaintances. A total of 238 participants were involved.

Measurements Information of the drinking behaviour from observations and questionnaire data on alcohol expectancies provide the opportunity to look at how and which expectancies are related to actual drinking patterns. Multiple regression and multi-level analyses were applied.

Findings Expectancies on the positive and arousing effects of alcohol consumption were related to alcohol consumption in a naturalistic, social drinking situation, in addition to group effects of drinking. Expectancies on the negative and sedative effects of drinking, however, were not related to drinking.

Conclusions The findings indicate that among young adults observed in a peer group and naturalistic drinking setting, positive expectancies about the effects of alcohol and expectancies about the effects of alcohol on arousal are related positively to drinking level.

Keywords Alcohol expectancies, naturalistic setting, observations.

Introduction

Research on alcohol expectancies has become central in theoretical models explaining adolescent and adult involvement in drinking patterns, alcohol misuse and alcohol-related problems (Abrams & Niaura 1987; Leigh 1989). Since Brown et al. (1980) developed the Alcohol Expectancy Questionnaire (AEQ) assessing individual perceptions on a variety of positive alcohol related consequences, many studies have focused on the link between alcohol expectancies and drinking habits. In addition, researchers differentiated positive and negative expectancies and showed that in both social and problem drinkers, negative expectancies contributed in the prediction of less drinking (e.g. Fromme et al. 1993). An example concerning the increasing attention on alcohol expectancies, is a study by George et al. (1995), who tested thoroughly the psychometric properties of an instrument consisting of eight subscales on specific positively (e.g. enhancement, sexual, relaxation) and negatively (e.g. loss of power, loss of control) perceived outcomes of drinking. In line with these studies refining the measurement of alcohol expectancies, some others suggested distinguishing between expectancies with regard to the effects of various levels of...
alcohol consumption (low and high doses of alcohol, Wiers et al. 1997) or to differentiate between explicit and implicit alcohol expectancies (e.g. Stacy 1997; Wiers et al. 2002).

The empirical evidence for the effectiveness of alcohol expectancies to explain variation in drinking patterns appears to be substantial in a large number of cross-sectional studies. Studies among adolescents (e.g. Wiers et al. 1997) and adults (e.g. Cooper et al. 1988) found support for moderate to strong associations between alcohol expectancies and alcohol consumption. For instance, in a cross-sectional study among adult social drinkers, Lee, Greely & Oei (1999) reported that positive and negative expectancies are related differentially to weekly consumption, frequency of drinking and quantity consumed per drinking session. Individuals who expected alcohol use to increase assertiveness and cognitive impairment reported a larger quantity of drinking per session. However, these specific expectancies were not related to the frequency of drinking in general.

Strong evidence for the importance of alcohol expectancies can be found in prospective research, in which tests are conducted on the effects of expectancies on changes in drinking patterns. Contrasting findings are reported in longitudinal studies: some studies found moderate associations between expectancies and drinking over a 1-year period (Carey 1995; Goldman, Greenbaum & Darkes 1997), whereas others indicated that alcohol expectancies are related primarily to specific stages of drinking (e.g. onset of drinking among young people: Aas et al. 1998) or to drinking by young adults (e.g. Sher et al. 1996). Also, some prospective studies found no effect of alcohol expectancies on changes in drinking over time (see review by Jones, Corbin & Fromme 2001).

More recently, it has been suggested that assessment of expectancies might be improved by not examining different subtypes of positive or negative expectancies, but to perceive expectancies as nodes in a semantic network (Wiers et al. 2002). In this approach, using multidimensional scaling, expectancies were found to differ on two dimensions: positive-negative and arousal-sedation (see also Rather et al. 1992). In addition, there is evidence of underlying distinct neurobiological processes of these two dimensions and that the sensitized initial arousal responses to drug-related stimuli are crucial in the development of problem drinking and addiction (Robinson & Berridge 2001). However, only a few studies have used this approach in empirical research. In a 1-month prospective study, Wiers et al. (2002) demonstrated that scores on scales based on these two dimensions predicted the quantity of drinking in young adults over time.

The overwhelming majority of studies use self-report data on drinking levels in their investigation of the role of expectancies in the course of drinking (Jones, Corbin & Fromme 2001; some exceptions include Sharkansky & Finn 1998; Wall, Thrussell & Lalonde 2003). Individuals report their alcohol consumption in terms of quantity or frequency of drinking, heavy drinking or problem drinking. One of the problems with this approach is that information is gathered only on an aggregative level and it remains unknown whether outcome expectancies predict actual drinking patterns (see also Mohr et al. 2001). In other words, do expectancies really predict particular drinking patterns in real-life settings, specifically that of young people’s social drinking in their peer group in a pub? This might be a very relevant question, as the lion’s share of (late) adolescent drinking takes place in peer contexts, and especially in the adolescent age group young people are highly sensitive to peer influence. The individual expectancies concerning the use of alcohol may operate differently in affecting drinking in these social situations, and it is realistic to presume that the relation between alcohol expectancies and social drinking cannot be assessed appropriately when applying questionnaires.

We might expect that those individuals who attribute a positive valence to outcomes of alcohol are more likely to consume alcohol in social settings, such as public drinking places, in which they drink with their peers, whereas individuals who attribute a negative valence to outcomes of drinking (feelings of depression, low self-worth, loneliness) might be more likely to drink solitary and not in a social setting with friends. In essence, observational methods are probably among one of the most accurate ways to assess people’s drinking habits (Van de Goor 1990). In our opinion, the theoretical value of the alcohol expectancy approach will be particularly high if expectancies predict drinking behaviour in naturalistic drinking settings, in which alcohol consumption is reliably measured.

The majority of research into alcohol consumption of young people does not focus on drinking habits in naturalistic settings. Nonetheless, some experimental studies with a balanced placebo design have looked at the function of expectancies in the aetiology of alcohol consumption while conducting their studies in a bar laboratory setting (see review by McKay & Schare 1999). In addition, some of the classic studies on the effects of social modelling or imitation have also used a bar laboratory setting (see review by Quigley & Collins 1999). An important limitation of the modelling studies is that they are not conducted in groups of people who already knew each other in advance (but see Bruun 1959). It is very likely that particularly in existing social groups, strong modelling or imitation effects occur. If we aim to study the effects of outcome expectancies on actual drinking, it is crucial to scrutinize drinking behaviour in its normal
social habitat. Because 80% of the total consumption of 18–24-year-olds in the Netherlands is concentrated in public drinking places, such as pubs, discos and bars (Knibbe, Van de Goor & Oostveen 1991), this might be the ideal setting to study effects of expectancies on drinking habits.

In the present study, we conducted systematic observations of the individual’s social and drinking behaviours in existing social groups of young people in a bar laboratory at the University of Nijmegen. Outcome expectancies were assessed prior to the ad-lib drinking session. We predicted that in this context of drinking in a bar with a group of friends and acquaintances, differences in individual drinking levels would be affected primarily by positive expectancies on the effects of alcohol and by expectancies on the level of arousal that alcohol instigates. In contrast, we assumed that expectancies related to the negative effects of drinking on emotional adjustment (being depressed, unhappy) and expectancies related to the sedative effects of alcohol (becoming silent, sleepy) would not affect drinking levels in this social setting.

**METHOD**

**Participants**

Participants were 238 young adults who volunteered to participate. They entered our laboratory setting as a group, in the sense that one undergraduate student invited six to eight friends to become involved in this research project. A total of 30 peer groups enrolled. The majority of the groups (n = 27) consisted of eight people. A total of 128 men (54%) and 110 women (46%) participated, ranging in age from 18 to 28 years old. A total of 203 (85%) participants had at least finished pre-university education, which indicates that this study involved participants with a relatively high educational level. Of the respondents, 50 (21%) indicated to live with their parents or other caretakers, whereas the others indicated to either live alone, or with a partner or friend. The constellation of the groups differed from all men (7%) and all women (7%) to mixed gender (86%).

**Procedure**

Participants were invited to become involved in a study on the effects of alcohol on group discussions and judgments. This was a cover-up story in order to avoid that participants were aware of the actual aims of the study, i.e. examining group processes in alcohol consumption in an ad-lib drinking setting. This type of procedure is employed in many studies on modelling effects on alcohol consumption (see review by Quigley & Collins 1999). The groups were invited to our bar laboratory for two sessions in 1 year; in this paper we looked only at the results of the first measurement. The first session lasted 2 hours and took place in a bar laboratory at our campus. This bar laboratory was situated in a room furnished as an ordinary small pub, with a bar and stools, tables and chairs and indoor games such as table soccer and billiards and a TV/video. During the sessions popular music was broadcasted. Volume and type of music were kept stable over the groups. Participants were told that we had hired this bar from the faculty and it was used normally for the celebrations of staff members of the university.

First, after they had entered the bar laboratory, the procedure of the study was explained to the participants. Then, they were asked to fill in a questionnaire containing various questions about drinking patterns, expectancies, friendships and types of relationship within the group. This took approximately 40 minutes. Next, they evaluated 10 people via pictures shown on the TV screen, i.e. they each wrote down whether they thought these people were attractive and intelligent, after which they had 30 seconds for each picture to discuss their opinions with the other group members. These tasks were constructed to be undemanding, and as participants’ judgements were asked it was impossible to give incorrect answers; therefore the amount of alcohol consumed would not be less as a result of some participants’ urge to do well on these tasks. During the completion of the questionnaire and the evaluation non-alcoholic drinks were offered. After completing these tasks, which needed about 10 minutes in total, they had a 50–55-minute time-out which was to be spent in the bar laboratory. They could play some of the games available, watch TV or have conversations. Participants were told that they could order a drink at the bar and that the bartender would not ask them whether they would like to have something to drink, because this would burden him unnecessarily, and it would be unethical for researchers to push the participants towards drinking. Soft alcoholic beverages (i.e. beer, wine) and non-alcoholic drinks were available and were free. It is essential to mention that soft alcoholic drinks in the Netherlands are relatively cheap [for example, in ordinary bars or restaurants, the price of a beer (0.25 centilitre) does not exceed 2.00 euros]. This implies that offering drinks for free does not encourage excess drinking for the majority of Dutch youths. Of course, if this study had been conducted in cultures with a different drinking culture, offering free drinks would probably lead to binge drinking in many of the participants. Nonetheless, many students still consumed a substantial number of drinks in this time-out session. Nuts and chips were offered free as well. After the 50–55-minute free time slot a second task, similar (but with
different pictures) to the first one, was executed. After 2 hours, the participants went home by taxi. They received 30 euros per group for their participation.

During the 2-hour session, video and audio recordings were conducted. Two cameras were used (one flexible with a zoom and one steady), hidden in two corners of the bar laboratory. A research assistant operated the camera in an observation room next to the bar laboratory. Participants were told in advance that they would be observed and all gave written permission for the use of these data for our study. When participants asked whether they were also observed during the break, this was affirmed and explained by telling them that this was in order to assess the total amount people drank, as it was important to assess the expected alcohol effect on the second task. In that case we also stressed that they were not obliged to drink alcohol, because non-drinkers or light drinkers were also required for our study. Pilot studies were conducted to verify the credibility of the setting and procedure. Participants strongly endorsed the credibility of the setting and none of the 32 participants in the pilot studies guessed the actual aim of the study. Participants were allowed to smoke during the session (if the other group members consented) because in the pilot studies we noticed that forcing smokers not to smoke while drinking strongly affects the feasibility of a normal drinking occasion for them.

The research proposal was approved and granted by the Dutch Foundation for Scientific Research. The medical ethical committee (CCMO Arnhem-Nijmegen) approved of the protocols for our study. Debriefing of participants was conducted after the second assessment.

Measures

Alcohol use (self-reports)

First, participants were asked to indicate whether they had ever consumed alcohol, and their age of onset (Engels, Knibbe & Drop 1997). Further, they were asked to fill in how many drinks they normally drink in 1 hour (Engels, Knibbe & Drop 1997). We assessed frequency of drinking by asking about how often participants had drunk in nine specific settings in the past 4 weeks (Engels et al. 1999). The following settings were included: parental home, own home, friend’s home, party, youth/student organization, sport canteen, disco, music festival or rave and café. Responses ranged from 1, ‘never’ to 6, ‘every day’. The overall mean score over these nine settings was calculated. Due to skewness of the frequency of drinking variables, scores of the total scale were log-transformed.

Alcohol-related problems

A short version of the severity of problem drinking scale of Cornel et al. (1994) was employed to assess the level of problems due to alcohol consumption. Factor analyses with LISREL 8 on a large data set of 6205 adults showed a clear one-factor solution for the total scale. A screening instrument of six items matched satisfactorily with scores on the total scale consisting of 15 items ($r^2 = 0.92$). Examples of items were: ‘Have you ever tried to quit drinking without being successful?’ and ‘Did your partner or close relatives ever worry about your alcohol consumption, or complain about it?’. Answers were on a dichotomous scale.

Alcohol expectancies

We measured alcohol expectancies in two dimensions: valence (negative–positive) and arousal (arousal–sedation). According to Wiers et al. (2002), these two dimensions are found consistently in semantic memory studies of expectancies (Goldman et al. 1999) and in emotion research (Lang et al. 1999). Wiers and colleagues (2002) developed and employed a measure (personal communication 2004) differentiating four scales. Each scale consists of six items. The scale was introduced by the following text: ‘Can you indicate to what amount the following effects occur to you when you drink alcohol or would be drinking alcohol?’. The reply categories began with the statement: ‘Drinking makes me . . .’. The first scale indicates expected outcomes of drinking that have a positive valence and medium arousal (e.g. fun, happy, nice, friendly; alpha = 0.88), the second scale indicates negative valence and medium arousal (e.g. depressive, unhappy, sad, alpha = 0.77), the third scale high arousal and mid-valence (e.g. impulsive, intense, energetic, alpha = 0.85) and the fourth scale high sedation and mid-valence (e.g. calm, sleepy, alpha = 0.69). We executed a factor analysis with varimax rotation and a fixed amount of four factors on the data employed for this study. The fourth factor in the initial solution had an eigenvalue of well over 1 (1.324) and the division of the variables in the factor solution was identical to the four scales in the expectancy questionnaire. The total variance explained by the four factors was 55.78%.

Alcohol use (observational data)

We counted the number of drinks consumed in the 52-minute time-out during the ad-lib drinking session. To assess the amount of alcohol consumed by each partic-
pant, their recordings were observed one by one. In our study we used glasses that were smaller than standard glasses. In all sessions the same glasses were used and filled to the same level. The contents of beer glasses were on average 160 ml and the contents of wine glasses 110 ml. The (lager) beer we used in our study contained 5% alcohol, which means that a glass of beer contained on average 8 ml pure alcohol. The wines we offered contained from 11 to 12% alcohol, so a glass of wine contained from 12.1 to 13.2 ml pure alcohol. We divided the number of glasses consumed beer by 1.5. If participants did not finish their drinks at the end of the session, we subtracted the rest volume from the total consumption. In pilot sessions the numbers of drinks were counted by several observers, who scored a single measures intraclass correlation of 0.90 (average measures: 0.95). This relatively high level of agreement, together with an analysis of the recordings and a discussion about the differences between the observers’ counts, led us to decide to allow single counts as alcohol use measure.

Analyses

Data from the questionnaires were entered in SPSS version 12.0. The video and audio recordings were coded in The Observer 4.1 (Noldus Information Technology b.v., Wageningen, the Netherlands). We did not code the behaviours during both tasks but coded only the free time slot. We were able to assess not only how many (alcoholic) drinks each individual consumed, but also when, in what order, with whom and during what activity. Five trained research assistants conducted the coding. For the purpose of the current paper, we only focused on the number of alcoholic and non-alcoholic drinks consumed.

Concerning the analyses of the observational data, we had to omit two groups. One was omitted because of technical problems and another because the group members had to omit two groups. One was omitted because of technical problems and another because the group members had to omit two groups. In the latter group individual drinking behaviour could, of course, not be predicted by possible explanatory variables such as previous drinking levels or expectancies. It should be stressed that in none of the other 28 groups were drinking games played.

In survey studies that examine the relation between expectancies and alcohol consumption, regression analyses are usually applied. To compare the findings in our observation study with those in other studies, we first analysed the survey data of our sample by multiple regression analyses.

Participants’ observed drinking levels are strongly dependent on the specific peer group they are in, reflected in the intraclass correlation ($r = 0.46, P < 0.001$). Therefore the observational data are analysed using multi-level analysis (MLwiN version 1.1). While it was apparent that drinking within the groups was dependent on the proportion of males in the group, we entered not only respondent’s gender, but also the gender composition of the groups in the analyses. As a result, multi-level analyses were conducted with gender (i.e. gender and gender distribution in the groups) and expectancies as independent variables, and drinking levels as dependent variable. First we estimated the deviance (IGLS, see Goldstein 1995) of the intercept-only model; we then computed the models containing the variables we aimed to test. The least significant predictors in the model were omitted stepwise until the deletion of variables led to a significant increase in the deviance of our model. Finally, we tested whether this solution was significantly better than the intercept-only model. We tested both fixed and random effects. The fixed effects are the regression weights of the independent variables, and the random effects indicate the variance in the regression weights between groups. If a random effect is found, this means that a relation varying between groups exists between an independent variable and a dependent variable.

RESULTS

Descriptives

Concerning self-reported alcohol consumption, almost all participants (99%) reported life-time consumption of alcohol. In Table 1 we show their scores on the important variables. Robust differences between men and women were apparent. Male participants reported a stronger engagement in 6 + drinking [$M = 5.65$ vs. $M = 4.54$, $t (238) = 6.61, P < 0.001$], a higher weekly consumption [$M = 21.76$ vs. $M = 10.39$, $t (238) = 6.11, P < 0.001$], to consume more drinks per hour [$M = 4.25$ vs. $M = 2.53$, $t (238) = 5.91, P < 0.001$] and scored higher on the problem drinking scale [$M = 7.51$ vs. $M = 6.77$, $t (238) = 4.77, P < 0.001$] than women. Men and women in our sample did not differ on alcohol expectancies, except for the scale sedation and mid-valence on which men ($M = 2.65$, SD = 0.68) scored higher than women ($M = 2.35$, SD = 0.70; $t (238) = 3.45, P < 0.001$). Often, gender differences in expectancies are confounded with alcohol consumption, and when controlling for these differences no (e.g. Rauch & Bryant 2000), or hard to define (Read et al. 2004), effects from alcohol expectancies are found. We chose to control for the main effects from gender, and not to examine possible differential effects from gender, to prevent a substantial extension to this paper.

Age differences were scarce on the drinking measures. The problem drinking scores were somewhat higher only in older participants [$r (220) = 0.15, P < 0.05$]. For this reason, age was not included in the analyses.
Alcohol expectancies and peer group drinking behaviour

Not surprisingly, differences in drinking were also found on the peer group level according to self-reported data. Mean levels of drinking per group ranged from, on average, 7.50 (SD = 5.75) drinks per week to 50.13 (SD = 32.41) drinks per week (F 29,238 = 4.15, P < 0.01). These patterns were also apparent in the number of drinks consumed per hour [ranging from 1.88 (SD = 1.03) to 6.81 (SD = 3.48) (F 29,237 = 2.64, P < 0.01)]. However, no differences between the groups were found in mean level of scores on the four outcome expectancy scales.

To examine whether a specific subgroup of participants with different alcohol expectancies had joined our study, we compared the scores in the current sample with another suitable sample (students in social sciences and their friends; n = 165). Only on the scale of positive valence/medium arousal did differences occur. The sample in the current study scored somewhat higher on this scale than the other sample [M = 4.19 vs. M = 3.98, t (401) = 2.01, P < 0.05]. This implies that the sample in our study was somewhat more positive in expectancies from consuming alcohol, but was rather similar on the whole.

**Associations of alcohol expectancies and drinking by participants’ self-reports**

First, the interrelations between alcohol expectancies and self-reported alcohol consumption and problem drinking were examined. Pearson correlations showed clearly that expectancies are related differentially to alcohol use (see Table 2). Positive expectancies and expectancies on high arousal are related to frequency of consumption, and to 6+ drinking, whereas negative expectancies and expectancies on sedative effects of drinking are related to problem drinking. It should be stressed that concerning problem drinking, positive expectancies and expectancies on high arousal were related.

We analysed the survey data of our sample by multiple regression analyses. Gender was included in the first step, and the four alcohol expectancy scales in the second step. As depicted in Table 2, it appeared that participants who had positive expectancies were more likely to drink frequently in the last 4 weeks. The set of expectancies explained an additional 6% of the variance in drinking after controlling for age and gender (11% explained

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**Table 1** Characteristics of the sample.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20.48</td>
<td>2.10</td>
<td>18</td>
<td>28</td>
</tr>
<tr>
<td>Age of drinking onset</td>
<td>13.03</td>
<td>2.27</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Frequency of drinking</td>
<td>2.03</td>
<td>0.45</td>
<td>1.11</td>
<td>4.22</td>
</tr>
<tr>
<td>6 + drinking</td>
<td>5.14</td>
<td>1.40</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Alcoholic drinks/hour</td>
<td>3.46</td>
<td>2.38</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Non-alcoholic drinks/hour</td>
<td>1.03</td>
<td>1.08</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Problem drinking</td>
<td>2.05</td>
<td>2.74</td>
<td>0.05</td>
<td>14.08</td>
</tr>
<tr>
<td>Observed alcohol consumption</td>
<td>2.75</td>
<td>1.43</td>
<td>0</td>
<td>7.50</td>
</tr>
<tr>
<td>Positive expectancies</td>
<td>4.19</td>
<td>0.96</td>
<td>1</td>
<td>6.50</td>
</tr>
<tr>
<td>Negative expectancies</td>
<td>1.60</td>
<td>0.59</td>
<td>1</td>
<td>4.33</td>
</tr>
<tr>
<td>Arousal expectancies</td>
<td>3.65</td>
<td>0.93</td>
<td>1</td>
<td>6.33</td>
</tr>
<tr>
<td>Sedation expectancies</td>
<td>2.51</td>
<td>0.69</td>
<td>1</td>
<td>4.67</td>
</tr>
</tbody>
</table>

n = 238.

**Table 2** Pearson correlations with, and multiple regression analyses on alcohol measures (self-reports) by outcome expectancies and gender.

<table>
<thead>
<tr>
<th>Frequency drinking</th>
<th>6 + Drinking</th>
<th>Number of drinks per hour</th>
<th>Problem drinking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>β</td>
<td>r</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.29**</td>
<td>-0.31**</td>
<td>-0.40**</td>
</tr>
<tr>
<td>Positive</td>
<td>0.18**</td>
<td>0.18**</td>
<td>0.19**</td>
</tr>
<tr>
<td>Negative</td>
<td>0.11</td>
<td>0.09</td>
<td>0.04</td>
</tr>
<tr>
<td>Arousal</td>
<td>0.14*</td>
<td>0.02</td>
<td>0.16*</td>
</tr>
<tr>
<td>Sedation</td>
<td>0.07</td>
<td>-0.06</td>
<td>0.01</td>
</tr>
</tbody>
</table>

n = 238. r Indicates the univariate correlation between the variables; β indicates the multivariate regression coefficient on the alcohol measures. Explained variances in alcohol consumption by alcohol expectancies ranged between 5 and 8%. Asterisks indicate a significant beta in the total model.

* P < 0.05; ** P < 0.01.
variance in drinking). Concerning the frequency of 6+ drinking ($r^2$ change = 0.05) and the number of alcoholic drinks per hour when going out on an evening ($r^2$ change = 0.07), participants who endorsed positive expectancies were more likely to consume a large number of drinks per hour. In the analysis of problem drinking, both positive and negative expectancy scales were multi-variately related to individual differences in problems attributed to alcohol consumption ($r^2$ change = 0.08).

**Alcohol use in observational setting: descriptives and links with self-report data**

The observed alcohol consumption is shown in Table 1; only 4.3% did not consume any alcoholic beverages in the bar laboratory setting. Strong gender differences were found: men consumed more alcohol in terms of number of glasses ($M = 3.31$) than did women ($M = 2.02$; $t(221) = 7.41$, $P < 0.001$).

Further, we examined whether levels of alcohol consumption in the observation study were related to self-reported data on alcohol consumption. This appeared to be the case. Drinking levels in the observation study were related to weekly consumption [$r (221) = 0.34$, $P < 0.001$], frequency of 6 + drinking [$r (213) = 0.31$, $P < 0.001$] and problem drinking [$r (220) = 0.42$, $P < 0.001$]. It was also related to self-reported consumption per hour when being in a pub or bar [$r (220) = 0.42$, $P < 0.001$]. This illustrates that those participants who drink heavily and frequently, according to their self-reports, also tend to drink substantially in the observation study. A paired t-test demonstrated that participants reported a higher drinking rate in 1 hour ($M = 3.34$, $SD = 2.03$) compared to the levels of drinking in the observation data [$M = 2.76$, $SD = 1.42$; $t(220) = 4.46$, $P < 0.001$].

**Associations between alcohol expectancies and drinking: observation data**

The zero-order correlations showed that two scales assessing outcome expectancies were related to drinking levels according to the observational data [positive expectancies/mid-arousal: $r (221) = 0.28$, $P < 0.001$; high arousal/mid-valence: $r (221) = 0.26$, $P < 0.001$]. Partial correlations showed that these associations remain significant [$r = 0.30$ (positive), and $r = 0.29$ (arousal)] after controlling for effects of gender on drinking levels. As the scales for negative expectancies/mid-arousal and high sedation/mid-valence were unrelated to observed drinking levels ($P > 0.10$), we decided to conduct advance analyses using only positive expectancies and expectancies on arousal as predictors. Opposite to alcohol consumption, for expectancies no significant intraclass correlations ($P > 0.05$) were found. Separate multi-level analyses were conducted to examine the relation between positive/arousal expectancies and drinking levels.

Our analyses demonstrated clearly that both positive expectancies and expectancies on the effects of alcohol on arousal are significantly related to individual drinking levels, above group and gender associations. No random outcomes were found for alcohol expectancies on drinking behaviour. For gender and gender distribution in the group we did find random outcomes (see Table 3).

In summary, our findings indicate clearly that in this sample of social drinkers, positive expectancies and expectancies on the effects of alcohol on arousal are

<table>
<thead>
<tr>
<th>Expectancies</th>
<th>Empty (SE) values</th>
<th>Positive (SE) values</th>
<th>Arousal (SE) values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>2.75 (0.10)**</td>
<td>0.49 (0.35)</td>
<td>0.61 (0.31)*</td>
</tr>
<tr>
<td>Gender</td>
<td>0.75 (0.19)**</td>
<td>0.75 (0.20)**</td>
<td>0.75 (0.20)**</td>
</tr>
<tr>
<td>Gender distribution</td>
<td>1.21 (0.42)*</td>
<td>1.17 (0.42)*</td>
<td>1.17 (0.42)*</td>
</tr>
<tr>
<td>Expectancy</td>
<td>0.27 (0.07)**</td>
<td>0.28 (0.07)**</td>
<td>0.28 (0.07)**</td>
</tr>
<tr>
<td><strong>Random effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.36 (0.22)*</td>
<td>0.37 (0.22)*</td>
<td>0.37 (0.22)*</td>
</tr>
<tr>
<td>Gender distribution</td>
<td>0.91 (0.43)*</td>
<td>0.92 (0.43)*</td>
<td>0.92 (0.43)*</td>
</tr>
<tr>
<td>Level 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>2.04 (0.19)**</td>
<td>0.82 (0.09)**</td>
<td>0.81 (0.09)**</td>
</tr>
<tr>
<td>Deviance</td>
<td>784.22</td>
<td>615.31</td>
<td>633.71</td>
</tr>
<tr>
<td>$\chi^2$ (5) (compared to empty model)</td>
<td>148.91***</td>
<td>150.51***</td>
<td></td>
</tr>
</tbody>
</table>

$n = 221$. $^*P < 0.05$; $^**P < 0.01$; $^***P < 0.001$. Nonsignificant values are omitted from the analyses in consecutive steps.
related to drinking levels in an ad-lib drinking setting. As expected, negative expectancies and expectancies on the sedating effects of alcohol were not related to drinking levels in social drinking settings. Those participants with positive expectancies on the effects of drinking and those who expected that alcohol would arouse them were more likely to drink with their peers.

**DISCUSSION**

The present study aimed to test the effects of alcohol expectancies on alcohol consumption in groups of young adults in a naturalistic drinking setting. In general, our findings showed that positive expectancies (e.g. drinking makes me happy, enjoyable) and expectancies on the effects of alcohol on arousal (e.g. drinking makes me impulsive, energetic) were related to drinking levels in an ad-lib drinking context. In contrast, negative expectancies and expectations on the sedative effects of alcohol were not related to drinking.

The most important aspect of this study is that it tests the relation between expectancies on alcohol consumption in a naturalistic drinking setting, whereas until now mainly survey studies and experimental studies have been conducted. In most cross-sectional or longitudinal research, only on the aggregate level associations between certain expectancies and drinking in general can be examined (see reviews by Leigh 1989; Jones et al. 2001). However, in these empirical studies the question remains whether and which expectancies predict drinking behaviour in specific settings, such as drinking with peers in public places. According to Lee et al. (1999) the links between expectancies and drinking levels in a drinking session deserve attention, because they provide insight into the mechanisms by which drinkers either limit their consumption at a certain moment or decide to continue drinking. Our findings underline the relevance of explicit expectations in drinking behaviour in specific settings. The fact that negative expectancies are not related to drinking levels is understandable, bearing in mind that drinking in this social setting, namely being with friends or acquaintances in a pub, is probably not driven by expected negative emotional outcomes. In our sample of college and university students it has been shown that, on a mean level, few negative effects of drinking alcohol are expected and that they are not related to alcohol consumption. This non-significant association might be caused by a selection effect. In particular, people who think that alcohol use leads to strong negative emotions, such as stress and loneliness, might not have been part of the sample. People who drink to alleviate feelings of stress might not want to be involved in a study on alcohol use or, worse, might not be part of a relatively large peer group of seven to nine people (Engels et al. 1999). The contextual characteristics of a bar may also account for the non-significant links between expectancies on the sedative features of alcohol. This is not a situation in which specific expectancies on sedative effects of alcohol steer high levels of drinking. It is possible that expectancies on sedation may be better predictors of alcohol consumption in extended drinking sessions, as the effects of alcohol on sedation may be more apparent after more time and higher alcohol intake.

Furthermore, these findings seem to support the reliability and credibility of examining alcohol use in groups in a bar laboratory setting. Although we aimed to create an atmosphere in which people would react as naturally as possible, which means as naturally as they were when in a real pub, the question remains whether we actually succeeded. There are some indications that we did. First, the cover-up story worked well according to the pilot studies. In addition, although this is based primarily on personal impressions, the behavioural patterns exhibited in the 1-hour time-out session are exemplary for normal behaviour in a pub or bar; for instance, people laugh, play games, sometimes have conversations about rather intimate matters, make passes at each other or watch TV. Secondly, there is also statistical evidence for the credibility of the setting. It might be possible not to find systematic overlap between what people normally drink and what people drink in this specific setting. If those who would normally drink substantially when being out, hardly drink in the bar laboratory setting, or vice versa, this would conflict seriously with the credibility of the setting. However, this was not the case. Young people who reported drinking excessively and frequently in everyday life were more likely to consume a high number of drinks in this 1-hour time-out session in the bar laboratory. It could even be that the drinking in the 1-hour time-out session was a better indication of alcohol consumption in everyday life. Distortions of survey reports of drinking might be caused by, e.g. individual difficulties to recall the number of drinks one had, but the amount of alcohol an individual drinks might also be affected by aspects such as glass sizes, shapes, fill levels and ethanol strength (Kerr & Greenfield 2003). In such cases the number of drinks reported might not be very informative, while in our study such variations are controlled for. Even so, the self-report data on the associations between expectancies and drinking levels coincided strongly with the associations found when assessing drinking levels with observational data.

Studying drinking in social groups implies that drinking levels are not only affected by individual differences in outcome expectancies, but presumably primarily by social interactions. The variations in mean level of drinking between the peer groups and non-significant differ-
ences in alcohol expectancies between groups illustrate that social interactions play a substantial role in the development of drinking levels. A strong point in our study is that no group effects from expectancies on drinking levels were found. This implies that, no matter what the drinking level in the group, drinking may be predicted by the individual expectancies of the group members. On the other hand, it could also be that the association between drinking expectancies and alcohol consumption is not independent from social influences on drinking. In that case, social aspects may moderate the relation between expectancies and alcohol consumption and can be considered relevant for the relation between expectancies and drinking, instead of merely an interfering factor (see, e.g. Barnow et al. 2004). It may be interesting to look at observational data in this manner in the future; moreover, further research employing observations of individual drinking may provide insight into this topic also. In this study, however, we considered alcohol expectancies as an individual measure, rather than a social orientation. The correspondence in drinking patterns between peer group members might nevertheless be affected by peer influence and selection processes (e.g. Bauman & Ennett 1996; Bot et al. 2005). In additional analyses, we found strong similarities in drinking behaviour within peer groups. Of course, selection effects could explain this: people who drink are more likely to affiliate with drinking peers. However, intragroup processes might also affect the variation in individual drinking levels in a specific drinking context. For example, those who instigate drinking by ordering drinks, or pressuring others to drink, might be affecting individual drinking levels more strongly than those who are more passive in their peer group interactions. Nevertheless, it appeared that certain types of expectancies affect variance in drinking levels.

Our study suffers from a some limitations. First, even though alcohol expectancies and drinking behaviour were assessed using different measures, which may prevent shared-rater bias, in our study no longitudinal data were employed. The causal direction of the relation between alcohol expectancies and drinking behaviour cannot be determined fully and may be the other way round. Secondly, although drinking levels in this observational setting correspond to what people normally drink, our setting is not representative of a normal evening out with friends: generally, more time is spent together when being out, and therefore alcohol consumption might be more spread during the evening. The alcohol expectancies on, e.g. arousal might be more predictive in these extended drinking sessions. Thirdly, asking about specific expectancies concerning drinking in social contexts might have led to different associations between expectancies and alcohol consumption than the expectancy questionnaire we applied, which asks for general expectations from alcohol consumption. On the other hand, applying a general expectancy measure allows comparison with other studies in which general measures are also used. We also disregarded social interactions with other people in a bar. We decided not to invite other groups in this study because this would make the situation too complex to study. Nonetheless, it would be interesting to know to what extent alcohol expectancies predict drinking in social settings with people who are mainly not acquainted. Fourthly, we concentrated only on first- and second-year university students, which hampers the generalizability of our findings. Finally, we might have attracted those students with initially high consumption patterns. Although the average frequency and quantity of drinking is high compared to the normal population or to other non-student peers, it does not deviate from the typical college and university student in the Netherlands, who consumes 16 alcohol drinks in 1 week (see Maalsté 2000), compared to 16.7 alcoholic drinks in 1 week in our research group.

All in all, our study shows that positive expectancies and expectancies on the high arousal propensities of alcohol use are related to enhanced levels of drinking in peer groups in a bar context. Also, it adds to findings of self-report studies showing the relevance of specific expectancies on alcohol consumption.

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