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An Experimental Study on Imitation of Alcohol Consumption in Same-Sex Dyads

Helle Larsen^{1,*}, Rutger C. M. E. Engels¹, Isabela Granic² and Geertjan Overbeek¹

¹Behavioural Science Institute, Radboud University Nijmegen, The Netherlands and ²The Hospital for Sick Children, Toronto, Canada

*Corresponding author: Behavioural Science Institute, Radboud University Nijmegen, PO Box 9104, 6500 HE Nijmegen, The Netherlands.
Tel: +31-24-361-29-55; Fax: +31-24-361-27-76; E-mail: H.Larsen@pwo.ru.nl

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Abstract — Aim: In order to study the role of imitation in relation to drinking, alcohol consumption among two peers was examined with experiments in a naturalistic drinking setting. **Method:** In a bar lab, 135 young adults (52% women) were exposed to either a non-drinking, a light-drinking or a heavy-drinking same-sex model (i.e. a confederate) in a 30-min time-out session. Instead of using a taste task (Quigley and Collins, 1999. The modeling of alcohol consumption: a meta-analytic review. *J Stud Alcohol* 60:90–8) in which participants were obliged to consume alcohol, in the current study, a design was used in which participants were allowed to drink alcohol but could also choose non-alcoholic beverages. **Results:** Craving for alcohol was included as a covariate in ANCOVAs. Results showed that the participants consumed substantially more alcohol when exposed to heavy-drinking models compared to light- and non-drinking models. Craving levels were positively related to alcohol consumption during the experiment. **Conclusion:** Both men and women imitated same-sex peers' drinking behavior in an *ad lib* naturalistic bar setting.

Consuming alcohol is a social phenomenon that frequently takes place with peers at parties, pubs and discos. According to Bandura (1977), most human behavior is learned through modeling or imitation. Individuals are likely to adopt a model's behavior if this behavior has a functional value and if the model is liked and similar to the observer. Thus, one way peer influence may manifest itself is through imitation. Imitation plays a major role in the development and maintenance of addictive behaviors (Bandura, 1977; Quigley and Collins, 1999; Harakeh *et al.*, 2007). Imitation is also known to facilitate interactions and to increase liking between interaction partners (Chartrand and Bargh, 1999; Van Baaren *et al.*, 2004).

When conducting research on imitation of alcohol consumption, it is crucial to do this in the appropriate context. For instance, in survey or research using questionnaires in which information is gathered during the day in a classroom (e.g. Urberg *et al.*, 1997; Jaccard *et al.*, 2005), participants are not in the natural drinking context in which influence processes may occur (e.g. in a bar, in the evening hours). Moreover, there are usually long time intervals between measurements and, as a result, real-time interactions in which influence processes occur are not studied (Engels *et al.*, 2007). Some studies, however, have focused on moment-to-moment interactions by conducting observations of dyadic interactions. Conducting observations, and particularly when embedded in an experimental design, may be a highly effective method to capture peer influence processes that underlie young adults' alcohol consumption.

In a review of experimental studies, Quigley and Collins (1999) conclude that imitation of drinking behavior predicts the amount of alcohol consumption in young adults. For instance, Caudill and Marlatt (1975) used a wine-taste paradigm in which a participant and a model (i.e. a confederate) were included. They found that participants exposed to a heavy-drinking model consumed more alcohol compared to participants exposed to light- and non-drinking models. Lied and Marlatt's study (1979) also revealed that participants consumed more alcoholic beverages when exposed to a heavy-drinking model compared to a light-drinking model. Overall, these ex-

perimental studies demonstrated the strong effects of models' drinking on individual drinking in a specific situation. However, one limitation of these wine-tasting paradigms is that participants know in advance that they will consume alcohol as part of a taste discrimination task. Although in this paradigm processes of imitation can be examined, the basic problem is that people do not have a choice not to drink at all. In our view, a taste-test paradigm is limited in terms of ecological validity because participants are obliged to drink, have no choices for specific beverages and because a taste-test does not provide a natural drinking setting. This lack of ecological validity may have resulted in biased estimates of participants' alcohol consumption levels in these earlier studies.

Thus, a natural drinking setting is crucial to attain an ecologically valid research procedure. To our knowledge, until now only one experimental study was conducted in a naturalistic bar setting (Caudill and Kong, 2001). This study demonstrated that participants with high social approval needs, and those who tend to drink heavily in social contexts, were more likely to imitate another person's alcohol consumption. However, in this study, the taste-test paradigm was also used, thus possibly influencing the amount of alcohol consumed in the observational sessions. More recently, Bot and colleagues (Bot *et al.*, 2005, 2007b) also examined imitation of drinking in an *ad lib* drinking context, but they examined group processes in natural peer groups and did not use an experimental design. To overcome these limitations, we conducted an experiment among youths examining their *ad lib* drinking in a 'real life' setting (i.e. a bar lab).

Numerous previous studies have demonstrated sex differences in alcohol consumption, but not many experimental studies have examined sex differences in imitation of drinking. Moreover, a large number of experimental studies on drinking imitation have been conducted among men only (e.g. Caudill and Marlatt, 1975; Collins *et al.*, 1985). One study that explicitly examined sex differences in imitation did not find differences between men and women in the extent to which they imitated a confederate's behavior (Caudill and Kong, 2001), while other studies only examined sex differences in sip frequency

and volume (Quigley and Collins, 1999). In our experimental study, we hypothesized that sex differences in imitation of alcohol consumption would be present because previous studies on alcohol use have demonstrated that men drink more alcohol than women (e.g. Bot *et al.*, 2005) because alcohol might be more important for social bonding for men (Pape and Hammer, 1996) and because men generally experience more social pressure to drink (Suls and Green, 2003).

Apart from imitation processes, young adults' craving may also be a crucial factor underlying their alcohol consumption. People may react to alcohol-related cues from their surroundings (e.g. when in a bar) with feelings of craving. Craving is a subjective state in which an individual experiences the desire to engage in drug-related behaviors (Marlatt, 1978; Raabe *et al.*, 2005). Consuming alcohol can thus also be explained within a cue-reactivity paradigm, which is based on classical conditioning (Carter and Tiffany, 1999; Tiffany and Conklin, 2000; Franken *et al.*, 2003; Conklin, 2006; Field *et al.*, 2007). When confronted with alcohol-related stimuli in a bar, specific alcohol-related memories may be elicited in drinkers that subsequently exacerbate the experience of craving (Franken *et al.*, 2003). Craving is thus related to drinking and may result in 'habitual heavy drinking' among youth. For this reason, it is important to control for craving when examining young adults' alcohol-related imitation behaviors in drinking settings.

In the present study, we used an experimental design to test whether young adult men and women imitate a peer's drinking in an *ad lib* drinking context (i.e. a bar lab). We expected that the participants who would be exposed to a heavy-drinking model would consume more alcohol compared to participants who would be exposed to a light-drinking or a non-drinking model. Participants' urge to drink was controlled for by including craving as covariate in our statistical model. We expected that participants' levels of craving would be positively related to their levels of alcohol consumption in the observational session. Finally, we included sex as a predictor in our analyses. Specifically, men were expected to consume more alcohol than women, and we also expected that men would imitate more frequently than women.

METHOD

Participants

A total of 135 young adults were invited to take part in a 'study on the evaluation of a national alcohol prevention campaign'. This was a cover-up for the real aim of our study, which was to examine imitation processes in a naturalistic *ad lib* drinking setting. A total of 70 women (52%) and 65 men participated; all recruited at the university campus and had an average age of 21 years (range: 18–28; SD = 2.39). All participants were enrolled in university Bachelor programs (e.g. American Studies, Business Studies, Psychology, Medicine, English, Law and Economics). The participants' average age of drinking onset was 13.33 (SD = 2.37), and on average participants consumed 11 (SD = 11.97) alcoholic beverages a week. No abstainers were included in this study.

Procedure

All sessions took place in a bar laboratory situated at the Radboud University Nijmegen. Sessions were conducted on

all weekdays—except Mondays—between 4 p.m. and 9 p.m., and lasted ~2 h (for details on ecological validity of the bar lab paradigm, see Bot *et al.*, 2005, 2007a, 2007b). Ten undergraduate students aged 18 and older were employed as our confederates. Confederates were trained to act in a socially neutral way and were instructed to actively take part in the conversation with the participants. Confederates and participants were always of the same sex.

The participants first filled in a questionnaire on a computer, answering background questions about, among other things, educational background and drug and alcohol use. Next, the participants met their co-participants (i.e. our confederates) and entered the bar lab. The bar lab is a room furnished as an ordinary small Dutch pub, with a bar and stools, tables and chairs and indoor games such as table soccer and billiards and a TV-video set. During sessions we played popular music (volume and type of music were kept constant across all sessions). Pilot studies had been previously conducted to verify the credibility of the setting (Bot *et al.*, 2005). Next, they were told to sit at the table in front of the TV where they had to watch and evaluate five general commercial advertisements on products such as food for 10 min (i.e. they were instructed to answer questions regarding their perception of advertisements in general, for us to acquire a baseline measure). This task was constructed to be undemanding and neutral for the participants in order not to influence subsequent alcohol consumption.

After completing this first task, the experimenter entered the bar lab and told the participants and confederates that there would be a break before the evaluation of the alcohol prevention campaign. The experimenter explained that the reason for this break was to evaluate whether a break in between was necessary to 'achieve the best results'. The participants and confederates were asked to sit at the bar where peanuts and drinks were available. The break lasted for 30 min. A wall clock was visible in order for the confederates to keep track of the time. Just before each session, confederates were told to either drink only two sodas (i.e. 1: 'control' condition), to drink one alcoholic drink and then two soda (i.e. 2: 'light' condition) or to drink three (women) or four (men) alcoholic drinks (i.e. 3: 'heavy' condition). The participants and confederates were offered a drink (beer, red or white wine, rosé or soda) and were told that they were allowed to drink whatever they wanted during the break. Importantly, the confederates were instructed to immediately place their order, so we could observe whether the participants would make the same choice.

During the break, no bartender was present because we wanted to avoid interfering with the interaction between the participants and confederates. The confederates were instructed to always initiate ordering the following drink by showing the participants the kind of drink they had chosen to consume, without asking directly if the participants wanted the same. Confederates were trained and finished their drinks on time. We tested effects of imitation on alcohol choices, and did not focus on pace of drinking or on imitation on a micro level (e.g. imitation of sipping). We decided not to completely control the drinking behavior of the confederates, so we did not instruct them to finish their drink in a specific time interval, or to sip within given intervals. This would be very hard to achieve when using confederates and probably would not represent a very realistic context. During each session, video and audio recordings were made with a flexible camera with a zoom lens. A research

assistant operated the camera in an observation room adjacent to the bar lab. Three undergraduate research assistants were trained to code the videotaped observations.

After the break, a Dutch alcohol prevention campaign was shown. Similar to the first task, the participants had to fill in a questionnaire to evaluate the campaign. At the end of the session, both the participants and confederates were asked to separately fill in an evaluation form. The evaluation form consisted of a series of items that dealt with manipulation checks and allowed for participants to comment on the perceived aims of the study. Eleven participants showed some suspicion about the cover-up story and eight were very suspicious and asked direct questions about the 'other participant'. These 19 participants were excluded from the analyses, as we wanted to make sure that participants' actual drinking behavior was not influenced by their suspicion. Also, one participant was excluded because she was 51 years old. Consequently, of the 135 participants who took part in the study, 115 were included in the final analyses. There were no differences in age and educational track of the selected and non-selected participants. However, more women (15) than men (4) indicated that they thought the confederates were part of the research team.

We used this paradigm with the two tasks (with the second being alcohol related) because we needed a plausible reason for people to come to the bar lab, and we needed to give them an opportunity to drink, but we also wanted to prevent them from focusing on the alcohol offered during the break. For both the goals of the study and for ethical reasons, we needed to include only individuals who normally drink some alcohol (and to exclude abstainers). Thus, to come up with a cover story that would distract participants from the alcohol during the break but still make it plausible that alcohol would be offered in a scientific study, we designed the two tasks with the last one related to alcohol drinking. We have used this type of paradigm successfully in other studies (e.g. Bot *et al.*, 2005; Harakeh *et al.*, 2007).

Each participant received two study credits or €12 for their participation. Debriefing of the participants was done after the data collection was completed. Whenever participants had consumed alcohol during the observational session they were offered a taxi home. The research proposal had earlier been approved and granted by the Netherlands Organization for Scientific Research. Furthermore, the protocols for the study were approved by the Ethical Committee of the Faculty of Social Sciences, Radboud University Nijmegen.

Measures

Observational data. All sessions were recorded and stored on DVDs. Three independent coders coded 15 of the 135 sessions in order to assess the reliability. The correlations ranged from 0.90 to 1.00, indicating that there was a very high level of agreement between the three independent observers.

Total alcohol consumption was assessed by counting the amount of alcoholic drinks consumed in the 30-min *ad lib* drinking session. We counted the amount of total milliliters consumed and subtracted what was left in the glass after the session ended. We coded confederates' and participants' choices of consumption (i.e. beer, wine, soda or nothing), number of glasses consumed and whether the confederates chose the drink before the participant in order to make sure we could capture imitation. One bottle of beer contained 170 ml and one glass of

Table 1. Sample means (*M*) and standard deviations (*SD*)

	Total		Men		Women		<i>T</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Q. Craving	1.56	0.69	1.81	0.77	1.28	0.46	4.58***
B. Drinks (standardized)	0.48	0.70	0.69	0.78	0.24	0.51	3.74***
B. Drinks (not standardized)	0.71	1.05	1.10	1.22	0.26	0.56	4.79***

Note. *N* = 114 (men = 61; women = 53). Q. = questionnaire self-reports; B. = bar lab; observed drinking in standardized drinks and unstandardized drinks. ****P* < 0.001.

wine contained 110 ml. The wine we offered contained 12.5% alcohol, meaning that a glass of wine contained 13.75 ml pure alcohol. The beer we offered contained 5% alcohol, so one beer contained 8.5 ml pure alcohol. Since participants had to consume more beer to reach the same amount of pure alcohol as the wine, we divided the total amount of beer consumed per participant with 1.62 (i.e. based on the difference in pure alcohol between wine and beer glasses: $13.75/8.5 = 1.62$). In addition to conducting our analyses with an unstandardized measure of 'number of drinks', we also used this standardized measure of alcohol consumption in the bar lab in further analyses (Pearson correlation between these measures was 0.98).

Questionnaire data (self-reports). Craving was assessed with a Dutch translation of the Alcohol Craving Questionnaire-Revised (ACQ-R) (Raabe *et al.*, 2005). Craving refers to the urge and intention to drink alcohol (21 items) and positive and negative reinforcement (9 items) at that specific moment. The responses ranged from 1 = 'strongly disagree' to 7 = 'strongly agree'. Cronbach's alpha was 0.95. The psychometric properties were tested, and the ACQ-R was found to be a reliable and valid instrument to assess state alcohol craving (Raabe *et al.*, 2005).

Strategy for analyses. We examined whether there was an effect of the experimental condition and sex on participants' drinking in addition to the effect of craving, with a three (control/light/heavy condition) by two (female/male) experimental design. With an ANCOVA, we examined whether there were differences in the total amount of alcohol consumed between the three conditions and between women and men. In addition, we tested effects of condition on choices of beverages per drink consumed by the confederates. Participants' level of craving at the moment of assessment was used as a covariate.

RESULTS

Means and standard deviations for all variables analyzed are provided in Table 1. The observed number of drinks during the sessions was higher for men compared to women. Also, men showed higher levels of craving for alcohol than women did. Finally, craving for alcohol was positively correlated with observed drinking (0.50, *P* < 0.001, respectively).

Next, we performed an ANCOVA in order to examine whether there were differences in alcohol consumption between the three conditions (control, light and heavy) and between women and men. The number of drinks consumed in the experimental setting was standardized so that one glass of beer was comparable to one glass of wine in amount of pure alcohol. Participants' levels of craving were entered in the ANCOVA as covariates in order to control for their associations with alcohol

Table 2. ANCOVA: differences in alcoholic standardized drinks consumed between condition and sex

	Alcohol condition							
	Control (<i>N</i> = 42)		Light (<i>N</i> = 40)		Heavy (<i>N</i> = 32)		Total (<i>N</i> = 114)	
	<i>M</i>	SE	<i>M</i>	SE	<i>M</i>	SE	<i>M</i>	SE
Women (<i>N</i> = 53)	0.22	0.11	0.30	0.11	0.67	0.12	0.40	0.08
Men (<i>N</i> = 61)	0.42	0.11	0.49	0.11	0.87	0.11	0.59	0.08
Total (<i>N</i> = 114)	0.32 ^a	0.09	0.39 ^a	0.09	0.77 ^b	0.10	–	–

Note. Alcoholic drinks consumed in experimental setting measured in *standardized* drinks. The estimated means are controlled for craving. Superscripts for significant differences between conditions should be read horizontal. The value with superscript 'b' is significantly different from the values with superscript 'a'.

Table 3. ANCOVA: differences in alcoholic drinks consumed between condition and sex

	Alcohol condition							
	Control (<i>N</i> = 42)		Light (<i>N</i> = 40)		Heavy (<i>N</i> = 32)		Total (<i>N</i> = 114)	
	<i>M</i>	SD	<i>M</i>	SD	<i>M</i>	SD	<i>M</i>	SD
Women (<i>N</i> = 53)	0.28	0.16	0.36	0.16	0.89	0.18	0.49 ^a	0.12
Men (<i>N</i> = 61)	0.70	0.15	0.83	0.16	1.36	0.17	0.96 ^b	0.11
Total (<i>N</i> = 114)	0.46 ^a	0.13	0.59 ^a	0.13	1.13 ^b	0.15	–	–

Note. Alcoholic drinks consumed in experimental setting measured in *not standardized* drinks. The estimated means are controlled for craving. Superscripts for significant differences between conditions should be read horizontal. Superscripts for significant sex difference should be read vertical. The values with superscript 'b' are significantly different from the values with superscript 'a'.

consumption in the sessions (Table 2). The findings showed that participants' craving [$F(1, 109) = 26.57, P < 0.001, PES = 0.20$] was positively related to alcohol consumption in the observational sessions. In addition, there was a mean difference between participants' assigned conditions in the number of drinks consumed in the observational session [$F(2, 109) = 6.17, P < 0.001, PES = 0.10$]. Specifically, planned contrasts revealed that there were significant differences in the amount of drinking between the control and heavy conditions ($P < 0.001$) and the light and heavy conditions ($P < 0.001$). No differences were found in terms of drinking between participants in the control and light conditions ($P = 0.56$). Finally, there were no sex differences in the number of drinks consumed [$F(1, 109) = 2.86, P = 0.09$] and none of the tested interactions reached significance.

The same analyses were performed with the non-standardized number of drinks consumed in the experimental setting. The results resembled those of the standardized drinks (Table 3); however, there was a difference between men and women in the number of drinks consumed [$F(1, 109) = 7.47, P < 0.01, PES = 0.06$]. In general, men consumed more alcohol than women. Most likely this difference is due to the fact that men usually drank beer and women wine, and with the non-standardized alcohol measure, the differences in pure alcohol and centiliters were not taken into account.

Additional analyses were conducted to test whether participants' choice of drink was influenced by the confederates' choice of drinks (i.e. condition). We tested this for each drink separately. Regarding the first drink, we combined the heavy and light conditions because in both conditions the first drink the confederate consumed was an alcoholic beverage. The results showed that 48% of the participants consumed an alcoholic beverage in the alcohol condition (i.e. heavy and light conditions) compared to 24% in the control condition [$\chi^2(1) = 3.71, P < 0.05$]. For the second drink, we tested the

difference in choice of consumption between the three conditions. Because some participants chose nothing, we included three consumption categories (i.e. alcohol, soda or nothing). The results demonstrated a trend regarding the second drink [$\chi^2(1) = 7.99, P = 0.09$]. In the heavy condition, 34% chose alcohol, 28% soda and 37% no drink. In the light condition, 18% chose alcohol, 38% soda and 45% no drink, and in the control condition, 17% chose alcohol, 55% soda and 29% no drink. Although we should be cautious with the interpretation, this indicates that more participants chose alcohol as a second drink when the confederates also chose alcohol. More participants chose alcohol in the heavy conditions regarding the third drink [$\chi^2(4) = 32.40, P < 0.001$]. In the heavy conditions, 28% chose alcohol, 34% soda and 38% no drink. In the light conditions, no participants chose alcohol, 10% soda and 90% nothing. In the control condition, 2% chose alcohol, 17% soda and 81% no drink. Finally, confederates' choice of drinks also was associated with participants' choice of the fourth drinks [$\chi^2(4) = 12.83, P < 0.01$]. In the heavy conditions, 13% of the participants chose alcohol, 6% soda and 81% no drink. In the light condition, all participants choose no drink and in the control condition 2% chose alcohol and 98% no drink. In general, the analyses demonstrated that participants' choice of drink was related to the confederates' choice of drinks. When confederates chose alcohol (i.e. heavy conditions), more participants also chose alcoholic beverages.

Further, we tested whether there was an effect of the confederates by comparing the confederates with each other regarding the amount of alcohol consumed by the participants while controlling for condition. No effect was found [$F(6, 73) = 0.96, P = 0.49$], indicating that the imitation effects cannot be attributed to specific confederates. We also tested whether the effects of condition and sex differed for participants with different craving levels; no significant relations were found.

DISCUSSION

The findings of this experimental study showed that young adults who were exposed to heavy-drinking models consumed more alcohol compared to their peers who were exposed to light- and non-drinking models. As expected, after controlling for craving, the mean differences between the three conditions in the amount of alcohol consumed were substantial. Interestingly, the findings are in line with previous experimental studies conducted with taste-test paradigms (e.g. Caudill and Marlatt, 1975; Lied and Marlatt, 1979; Caudill and Kong, 2001; see review by Quigley and Collins, 1999). Our study is important because it extends previous findings by demonstrating that imitation of alcohol consumption also occurs in an *ad lib* naturalistic drinking context.

After controlling for participants' craving, there were no differences between men and women in alcohol consumption (standardized). Also, we did not find any sex differences in the levels of imitation. These results are in line with previous studies that likewise did not find differences between men and women in levels of alcohol imitation (Lied and Marlatt, 1979; Caudill and Kong, 2001). However, we exclusively focused on imitation in same-sex dyads. Some previous studies focusing on groups of mixed-sex compositions have found evidence for higher levels of imitation in males than females (Overbeek *et al.*, in press). To examine sex differences in imitation more thoroughly, future studies might include opposite-sex dyads and observe whether there are differences in imitation of the opposite sex's alcohol consumption. In terms of dyads, we expect that cross-sex imitation is strongly affected by whether people are interested in their drinking partner, as imitation enhances liking of the other one, and vice versa (Van Straaten *et al.*, 2008). On the one hand, women might want to stay in control of the situation when interacting with a male stranger, or may not want to convey the 'wrong' impression by drinking too much; thus, they may be less likely to imitate drinking behaviors of a heavy-drinking confederate (Bot, 2007). In contrast, men may imitate drinking levels when they are with an opposite-sex confederate, especially when they are interested romantically in the confederate. These sex-specific expectations remain speculative as no other experimental studies have been conducted on cross and same-sex interactions and imitation of alcohol use.

We did not find differences in alcohol consumption between participants in the light- and non-drinking conditions. Most previous experimental studies have relied exclusively on two drinking model conditions (Quigley and Collins, 1999). Some studies used low consumption models as a control condition, and some other studies have used no-model control conditions (i.e. with no confederate present) and compared these to heavy-drinking model conditions. However, although these study designs differed from ours (i.e. we had a model consuming soda in the control condition), our findings were quite similar to those of Caudill and Marlatt (1975). In the current study, a lack of difference in alcohol consumption levels between the light and control conditions may be attributed to the relatively high levels of alcohol that were consumed by the participants in the control conditions. The control participants' drinking levels may be explained by their exposure to cues in the bar lab (i.e. being in a drinking context) and also that the sessions took place after 4 p.m., a time that might be enough to elicit the urge

to drink alcohol, especially in normally heavy drinkers (Aarts *et al.*, 2001).

To our knowledge, this is the first study that examined imitation effects in dyads in an *ad lib* naturalistic bar setting. To ensure ecological validity of research on imitation effects in alcohol consumption, this study aimed to test imitation effects in a drinking setting where participants were not obliged to consume alcohol as a part of a taste-task, but were completely free to choose alcoholic versus non-alcoholic beverages. A key issue in discussing the present findings is how to explain the process of imitation. What makes one drink alcohol when interacting with another drinking person? First, from a functional perspective, one explanation may be found in the prevailing social norms among youths. Specifically, youths imitate the drinking behavior of others because they may associate drinking with specific social benefits in a peer context (e.g. maintaining or increasing one's social status and popularity among peers; see Prinstein and Cillessen, 2003; Prinstein *et al.*, 2003). Thus, in order to acquire social approval and adapt one's behavior to the norms, youths might imitate peers' alcohol use (Bandura, 1977). Similarly, youths may believe that drinking alcohol best matches the prototype of popular, high-status peers (Gibbons and Gerrard, 1995). Second, imitation may be an automatic process that takes place non-consciously. When observing peers drink, one may automatically choose alcohol because of a non-conscious tendency to match or synchronize one's behavior to that of the interaction partner (Chartrand and Bargh, 1999). Future research is warranted to test these hypotheses.

One important strength of our study is that the findings on imitation were controlled for by participants' craving. Craving was positively related to the amounts of alcohol consumed in the observational sessions. Furthermore, alcohol cues may function as temptations, which are related to self-control (Muraven and Shmueli, 2006). Thus, when craving is elicited, individuals' self-control may decrease, which in turn might lead to increased susceptibility to peer influence. Given this line of reasoning, it would be fruitful to scrutinize the role of alcohol cues and self-control in relation to imitation of alcohol consumption. It might be possible that lower levels of self-control are related to imitation of alcohol consumption, since inhibiting a behavior reduces the available amount of self-control (Muraven and Shmueli, 2006).

The vast majority of studies on peer influence and alcohol use have used survey designs (e.g. Bauman and Ennett, 1996; Urberg *et al.*, 1997; Jaccard *et al.*, 2005; Poelen *et al.*, 2007). This line of research has not yet provided convincing evidence of strong associations between peer and individual drinking as the results generally showed small or non-significant effects of peer drinking. This might result in an underestimation of the actual roles peers play in alcohol consumption among youth (Engels *et al.*, 2007). Experimental studies, including our own, have examined imitation processes related to alcohol consumption in samples of adults or young adults. Consequently, we do not know whether similar processes operate among adolescents. It is important to study these younger age groups, because peer influence might be more profound when youths' social identity and self-esteem depend on approval by friends and peer group membership (Engels *et al.*, 1997). Therefore, future studies might consider testing processes of imitation among younger adolescents in a similar *ad lib* setting as in our present study. At least in the Netherlands, where children are allowed to

purchase and consume light alcoholic beverages at the age of 16, this would be ethically feasible.

Some limitations of our study should be addressed. First, most drinking situations normally involve more than two people. Even though there is no contact with the other people present (e.g. like in a disco) this might nevertheless influence the drinking patterns. We investigated imitation of drinking in dyads, which cannot directly be generalized to imitation processes within peer groups (e.g. Bot *et al.*, 2007b). Secondly, our observational sessions only lasted 30 min, whereas generally one would spend more time in a bar or at a party. Consequently, we do not know how imitation develops over time, how it continues or stops. This is particularly important keeping in mind that the consumption of alcohol also has neuropsychological and psychomotoric effects, leading to less inhibition or self-control. Also, we would expect stronger sex differences when observing couples over an extended period of time (see Bot *et al.*, 2007) given that men imitate more. Further, it is possible that when participants perceive the other one as being a heavy drinker, this would affect whether they keep drinking. This would not affect whether they imitate the first drink, and probably also not the second drink, given that in most Western countries, it is considered normal to have a beer or glass of wine in the late afternoon or evening in a bar. But this perception might have affected the continuation of drinking.

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