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POLICY AND PREVENTION

Overestimation of Drinking Norms and its Association with Alcohol Consumption in Apprentices

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Abstract — Aims: To investigate associations of normative misperceptions and drinking behaviors in apprentices, complementing the previous literature on university students. **Methods:** A survey in a defined region of northern Germany was carried out among 1124 apprentices attending vocational schools. Using items from the short form of the Alcohol Use Disorders Identification Test (AUDIT-C), drinking behaviors and normative perceptions of drinking in the reference group of same-gender apprentices were assessed. Demographic, smoking- and drinking-related predictors for normative misperceptions were explored. **Results:** Personal drinking behavior was positively correlated with perceived norms, both for drinking frequency (males: Kendall's $\tau = 0.33$, $P < 0.01$; females: $\tau = 0.22$, $P < 0.01$) and drinking quantity (males: Kendall's $\tau = 0.39$, $P < 0.01$; females: $\tau = 0.25$, $P < 0.01$). Alcohol use disorders according to AUDIT-C cut-offs were more prevalent in subjects who overestimated drinking quantity in their reference group than in those who correctly estimated or underestimated drinking quantity (male: $P < 0.01$; relative risk (RR) 1.78; female: $P < 0.01$; RR 1.65). Concerning drinking frequency, this difference was only found in males ($P < 0.01$; RR 1.49). Male gender and higher alcohol use were positively associated with normative misperceptions of both drinking quantity and frequency. **Conclusion:** Interventions correcting alcohol use misperceptions might be effective in reducing problem drinking in adolescents with heterogeneous educational levels.

INTRODUCTION

According to the social norms approach (Perkins, 2002), peer influence is based more on what we think others believe and do (the 'perceived norm') than on what others actually believe and do (the 'actual norm'). Extensive research has shown that university and college students typically overestimate how much other students approve alcohol use (injunctive norm) and how much other students actually drink (descriptive norm; Borsari and Carey, 2003; Franca *et al*., 2010; McAlaney and McMahon, 2007; Perkins, 2007). Descriptive and injunctive social norms have shown to be among the best predictors of alcohol consumption (Kypri and Langley, 2003; Neighbors *et al*., 2007; Perkins *et al*., 2005). Students who reported higher perceived social norms for alcohol use among their peers also reported heavier drinking themselves. Misperceptions in drinking norms that were evident at all levels of specificity of the reference group (e.g. typical student, same-gender student, and close friends); however, decreased with social proximity (Larimer *et al*., 2009; McAlaney and McMahon, 2007).

The presentation of correct information about peer group norms is hypothesized to reduce perceived peer pressure for high levels of alcohol consumption in both problem drinkers and nondrinkers (Perkins, 2002). Although this hypothesis has stimulated research on the efficacy of social norms interventions, there still is a need for longitudinal studies analyzing the reciprocal causality of normative beliefs and problem drinking (McAlaney and McMahon, 2007).

Social norms interventions are typically provided in one of two forms: social marketing campaigns or personalized normative feedback. Social marketing campaigns rely on universal, mass communication methods for educating a target group on actual drinking behaviors. These campaigns have the advantage of reaching a large audience, but they can be costly and are not individually tailored (Walters *et al*., 2000). Personalized normative feedback interventions provide individualized information about the actual drinking norm in a reference group. Furthermore, the feedback provides comparisons between the actual drinking norm and perceptions of the norm as well as a personal drinking profile including personal alcohol consumption in relation to peers. Individualized social norms interventions delivered using the web or computer are effective in reducing alcohol misuse in university and college students according to a recent Cochrane review (Moreira *et al*., 2009). However, only a small number of high-quality studies were available for this review. To enlarge the evidence base of personalized social norms interventions provided via different communication channels (e.g. web, computer, face-to-face, mail), there has been a call for further methodologically sound efficacy studies (John and Alwyn, 2010).

Studies that focused on misperceptions of drinking norms, its association with alcohol use and the effectiveness of social norms interventions have been predominantly carried out in adult college or university students aged 18–30 (Franca *et al*., 2010; McAlaney and McMahon, 2007; Neighbors *et al*., 2007). However, particularly in European countries, problem drinking also constitutes a serious public health problem in younger age groups and less educated adults (Hibell *et al*., 2007) and social norms interventions are promising for its reduction. To date, no study has investigated normative misperceptions of self-reported alcohol drinking and its association with drinking behaviors in young adults who are not students.

This study reports the results of a survey investigating drinking social norms and drinking behaviors among apprentices in their first year of vocational training. The majority of this population group is between 15 and 20 years of age and represents a broad range of educational levels. The legal age limit to purchase alcohol in Germany is 16 years for beer and wine and 18 years for spirits. As gender differences in drinking behaviors are well documented and gender specificity is suspected to be an important element for

personalized feedback interventions (Lewis and Neighbors, 2007), we assessed gender-specific normative perceptions of alcohol use and conducted separate analyses for male and female apprentices. We investigated whether an overestimation of perceived alcohol use among same-gender apprentices resulted in higher personal alcohol use and more alcohol use-related disorders. On the basis of previous findings from university and college student samples, we expected that an overestimation of perceived alcohol use among peers would result in higher personal consumption and a higher percentage of alcohol use-related disorders. Furthermore, we explored demographic, smoking- and drinking-related variables that were associated with normative misperceptions of alcohol use.

METHODS

Participants

Data for this study were gathered from a survey including all apprentices in their first year of training at three different vocational schools in two districts of West Pomerania, northern Germany with a total population of ~160,000 inhabitants. In Germany, apprenticeship usually takes 3 years and has to be accompanied with vocational school education by law. The survey on alcohol consumption was approved by the Ministry of Social Affairs and Health of the Federal State of Mecklenburg-West Pomerania and conducted between December 2009 and April 2010. The questionnaires were completed during regular school lessons in the classrooms of the vocational schools and returned immediately afterward. There were 78 classes within the three vocational schools, which covered all main areas of vocational education (techniques, commerce, health care, gastronomy, crafts and vocational preparation). Depending on the profession, apprentices either received a dual education, consisting of on-the-job training in combination with vocational school education, or they solely received the latter. The majority of apprentices with on-the-job training received a monthly remuneration. Based on documents of the three vocational schools in the study area, a total of 1443 apprentices in the first year of training were registered. From these, 1126 (78%) were present at school and could be invited for participation in the survey. Two apprentices (0.2%) refused to complete the survey, resulting in a final sample of 1124 apprentices. Characteristics of the study sample are shown in Table 1. The age distribution did not differ between males and females ($\chi^2 = 0.94$; $P = 0.82$).

Table 1. Characteristics of the study sample

All subjects	1124
Gender	
Male	615 (54.7)
Female	509 (45.3)
Age	
15–17 years	360 (32.0)
18–20 years	536 (47.7)
21 years or older	227 (20.2)
No information	1 (0.1)
School education	
No grade	151 (13.4)
Secondary school (Hauptschule, 9 years)	347 (30.9)
Secondary school (Realschule, 10 years)	390 (34.7)
Technical or high school	224 (19.9)
No information	12 (1.1)
Nationality	
German	1099 (97.8)
Other nationality	17 (1.5)
No information	8 (0.7)
Cigarette smoking status	
Nonsmoking	433 (38.5)
Occasional smoking	53 (4.7)
Daily smoking	631 (56.1)
No information	7 (0.6)
Alcohol consumption, AUDIT-C, (scale 0–12), M (SD)	4.3 (2.7)
No information	4 (0.4)
Nondrinking	75 (6.7)
No information	3 (0.2)
Heavy episodic drinking: ≥4 (women) or ≥5 (men) alcoholic drinks at least twice during past month	
Yes	620 (55.2)
No	501 (44.6)
No information	3 (0.3)

Values are numbers (percentage) unless stated otherwise.

Measures

Alcohol consumption was assessed using the short form of the Alcohol Use Disorders Identification Test (AUDIT-C; Bush *et al*., 1998; Reinert and Allen, 2002). The AUDIT-C is a brief screening test for heavy drinking and/or active alcohol abuse or dependence and consists of three alcohol consumption questions which are summed up for a possible score of 0–12 with higher values representing higher alcohol consumption. The AUDIT-C proved to be a good screening instrument for detecting DSM-IV-defined alcohol use disorders among 18- to 20-year-old adolescents (Kelly *et al*., 2009). The suggested cut-off points for this age group are 6 for males and 5 for females. Heavy episodic (binge) drinking was assessed by the question: 'How often did you have 6 (male, female 5) or more drinks on one occasion in the past 30 days?'

Quantity and frequency of alcohol consumption were assessed separately using the corresponding items of the AUDIT-C. Drinking frequency was assessed by the first item of the AUDIT-C: 'How often do you have a drink containing alcohol?' Pictures and measures of quantity for different drinks were used to illustrate the quantity of 'a drink'. Response options were never (0 points), monthly or less (1 point), 2–4 times a month (2 points), 2–3 times a week (3 points) and 4 or more times a week (4 points).

Drinking quantity was assessed by the second item of the AUDIT-C: 'How many drinks do you have on a typical day when you are drinking?' Pictures were used to illustrate the quantity of a standard drink, which corresponded to 14 g of pure alcohol. Response options were 1–2 drinks (0 points), 3–4 drinks (1 point), 5–6 drinks (2 points), 7–9 drinks (3 points) or 10 or more drinks (4 points).

Perceived descriptive norms were assessed using modified versions of the first and second AUDIT-C items. Male apprentices were asked to estimate the alcohol consumption among male apprentices and female apprentices were asked to estimate the alcohol consumption among female apprentices by utilizing the following items: (a) 'How often does a typical (male/female) apprentice have a drink containing alcohol?' and (b) 'How many drinks does a typical (male/female) apprentice have on a typical day when drinking alcohol?' The response options corresponded with those

from the AUDIT-C items to assess drinking frequency and quantity.

Data analyses

We initially described each proportion of apprentices, which overestimated, correctly estimated and underestimated quantity and frequency of alcohol use in their reference group of same-gender apprentices. The gender-specific median was defined as the actual norm concerning drinking quantity and frequency. We chose the median out of the various statistical measures of central tendency in describing the actual norm. The median is recommended as the preferred measure of central tendency for use with ordinal data. We interpreted values of the perceived norm above those values of the actual norm as overestimation, values of the perceived norm below values of the actual norm as underestimation and values of the perceived norm corresponding to those of the actual norm as correct estimation.

To test whether higher descriptive drinking norms may result in higher personal alcohol consumption, we correlated the personal behavior concerning drinking quantity and frequency with the perceived norms in the gender-specific reference groups. As drinking quantity and frequency were assessed using ordinal scales, we used rank correlations (Kendall's τ) to test these associations. Furthermore, we tested whether alcohol abuse or dependence, according to the gender-specific AUDIT-C cut-offs, was more prevalent in apprentices who overestimated drinking quantity or frequency in their reference group than in apprentices who correctly estimated or underestimated drinking quantity or frequency in their reference group. These comparisons were conducted using Pearson's χ^2 statistics. Given the clustered nature of the data (apprentices within school classes), these χ^2 statistics were corrected for the survey design and then converted into an F statistic. Finally, we carried out logistic regression analyses to explore predictors for normative overestimations concerning drinking quantity and frequency. The following predictors were tested in multiple logistic regression models: gender, age, school education, nationality, smoking status and alcohol consumption (AUDIT-C). Due to the survey design, we computed robust variance estimators for the logistic regression models. All analyses were performed using Stata, version 10.1, and an alpha level of 0.05 (two-tailed) was chosen for the statistical tests.

RESULTS

Personal alcohol consumption and normative beliefs

Figs 1 and 2 illustrate the perceived norm and the personal behavior according to drinking quantity and frequency. Frequency of alcohol drinking was overestimated by 44.9% of the male apprentices (females: 15.7%), 41.8% estimated it correctly (females: 59.2%) and 13.3% underestimated it (females: 25.0%). The quantity of alcohol drinking was overestimated by 40.2% of male apprentices (females: 25.8%), was estimated correctly by 30.1% (females: 33.9%) and (females: 40.3%) was underestimated by 29.7%. Perceived norms of both drinking frequency (males: Kendall's $\tau = 0.33$, $P < 0.01$; females: $\tau = 0.22$, $P < 0.01$) and drinking quantity (males: Kendall's $\tau = 0.39$, $P < 0.01$; females: $\tau = 0.25$, $P < 0.01$) were positively correlated with the personal behavior.

Alcohol use disorders and normative misperceptions of alcohol use

Alcohol abuse or dependence, according to the gender-specific AUDIT-C cut-offs, and its association with misperceptions of drinking quantity and frequency are shown in Tables 2 and 3. Alcohol use disorders were more prevalent in male apprentices who overestimated drinking frequency in their reference group than in apprentices who correctly estimated or underestimated drinking frequency in their reference group [$F = 14.61$, $P < 0.01$; relative risk (RR) = 1.49]. There was no difference in the proportion of alcohol use disorders between female apprentices who overestimated drinking frequency in their reference group and female apprentices who correctly estimated or underestimated drinking frequency in their reference group ($F = 0.68$, $P = 0.41$; RR = 1.14). In both male and female apprentices, alcohol use disorders were more prevalent in subjects who overestimated drinking quantity in their reference group than in those who correctly estimated or underestimated drinking quantity (male: $F = 38.12$, $P < 0.01$; RR = 1.78; female: $F = 10.53$, $P < 0.01$; RR = 1.65).

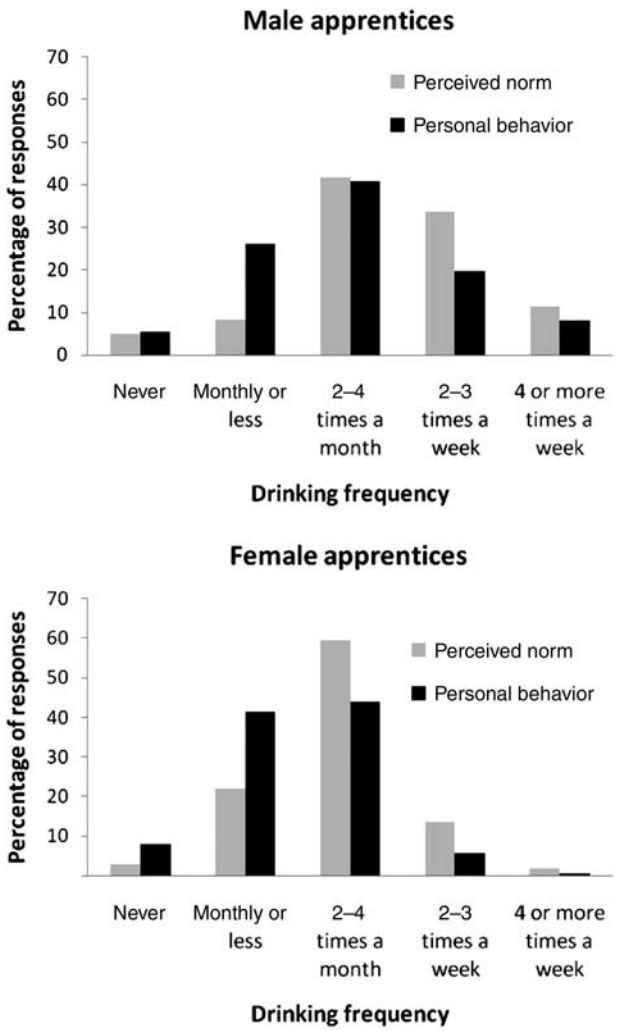

Fig. 1. Gender-specific perceived norm and actual drinking frequency.

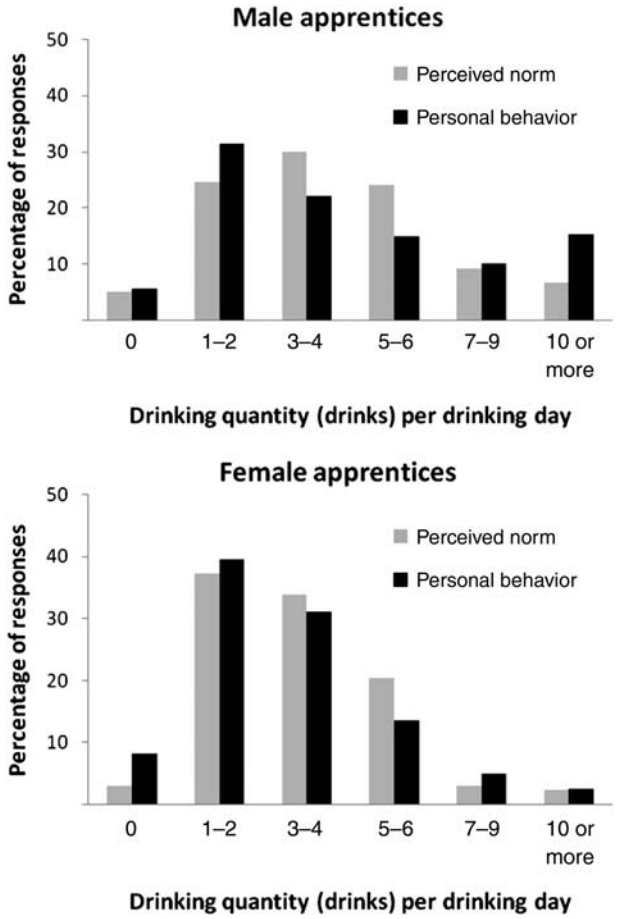

Fig. 2. Gender-specific perceived norm and actual drinking quantity.

Table 2. Normative perceptions of drinking quantity and frequency in relation to alcohol-related disorders according to AUDIT-C score for male apprentices ($n = 615$)

	AUDIT-C score <6, *n* (%)	AUDIT-C score ≥6, *n* (%)
Drinking frequency		
Overestimated	119 (19.6)	153 (25.2)
Correctly estimated or underestimated	208 (34.3)	126 (20.8)
Drinking quantity		
Overestimated	92 (15.3)	149 (24.8)
Correctly estimated or underestimated	235 (39.1)	125 (20.8)

Percentages refer to the total number of male apprentices with complete data concerning both AUDIT-C and normative perceptions of drinking frequency ($n = 606$), or AUDIT-C and normative perceptions of drinking quantity ($n = 601$), respectively.

Predictors of normative misperceptions

Multiple logistic prediction models of normative overestimations according to drinking frequency and quantity are shown in Tables 4 and 5. Higher age group [21 years or older; odds ratio (OR) = 1.88, 95% confidence interval (CI): 1.18–2.99] and higher alcohol consumption (OR = 1.17, 95% CI: 1.10–1.24) were positively associated, whereas female gender (OR = 0.27, 95% CI: 0.18–0.38) and daily smoking (OR = 0.66, 95% CI: 0.46–0.95) were negatively associated with normative overestimations concerning drinking

Table 3. Normative perceptions of drinking quantity and frequency in relation to alcohol-related disorders according to AUDIT-C score for female apprentices ($n = 509$)

	AUDIT-C score <5, *n* (%)	AUDIT-C score ≥5 *n* (%)
Drinking frequency		
Overestimated	54 (10.7)	25 (5.0)
Correctly estimated or underestimated	306 (60.8)	118 (23.5)
Drinking quantity		
Overestimated	77 (15.5)	51 (10.3)
Correctly estimated or underestimated	279 (56.3)	89 (17.9)

Percentages refer to the total number of female apprentices with complete data concerning AUDIT-C and normative perceptions of drinking frequency ($n = 503$), or AUDIT-C and normative perceptions of drinking quantity ($n = 496$), respectively.

Table 4. Multiple logistic prediction model of normative overestimation versus correct estimation or underestimation of drinking frequency

Variable	OR (95% CI)	*SE*	*t*	*P*-value
Female gender	0.27 (0.18–0.38)	0.05	−7.22	0
Age				
15–17 years	Reference			
18–20 years	1.16 (0.80–1.70)	0.22	0.81	0.42
21 years or older	1.88 (1.18–2.99)	0.44	2.69	0.01
School education				
No grade	Reference			
Secondary school (Hauptschule, 9 years)	0.89 (0.56–1.42)	0.21	−0.51	0.61
Secondary school (Realschule, 10 years)	1.00 (0.61–1.63)	0.24	0	1
Technical or high school	0.99 (0.53–1.85)	0.31	−0.03	0.98
Other nationality than German	0.96 (0.31–2.97)	0.54	−0.07	0.95
Cigarette smoking status				
Nonsmoking	Reference			
Occasional smoking	0.57 (0.32–1.02)	0.17	−1.93	0.06
Daily smoking	0.66 (0.46–0.95)	0.12	−2.28	0.03
Alcohol consumption, AUDIT-C, (scale 0–12)	1.17 (1.10–1.24)	0.04	5.2	0

OR, odds ratio; CI, confidence interval.

Table 5. Multiple logistic prediction model of normative overestimation versus correct estimation or underestimation of drinking quantity

Variable	OR (95% CI)	*SE*	*t*	*P*-value
Female gender	0.64 (0.47–0.88)	0.1	−2.84	0.01
Age				
15–17 years	Reference			
18–20 years	1.24 (0.86–1.79)	0.23	1.19	0.24
21 years or older	1.27 (0.79–2.04)	0.3	1.01	0.32
School education				
No grade	Reference			
Secondary school (Hauptschule, 9 years)	1.29 (0.86–1.94)	0.27	1.23	0.22
Secondary school (Realschule, 10 years)	1.48 (0.93–2.36)	0.35	1.69	0.1
Technical or high school	1.98 (1.11–3.55)	0.58	2.34	0.02
Other nationality than German	2.62 (0.85–8.07)	1.48	1.71	0.09
Cigarette smoking status				
Nonsmoking	Reference			
Occasional smoking	0.59 (0.31–1.13)	0.19	−1.62	0.11
Daily smoking	1.04 (0.74–1.46)	0.18	0.23	0.82
Alcohol consumption, AUDIT-C, (scale 0–12)	1.23 (1.16–1.30)	0.04	7.06	0

OR, odds ratio; CI, confidence interval.

frequency. Normative overestimations concerning drinking quantity were positively associated with a high educational degree (technical or high school; OR = 1.98, 95% CI: 1.11–3.55) and higher alcohol consumption (OR = 1.23, 95% CI: 1.16–1.30), whereas they were negatively associated with female gender (OR = 0.64, 95% CI: 0.47–0.88).

DISCUSSION

This is the first study investigating drinking social norms and their associations with drinking behavior in a sample of adolescent and young adult apprentices. The study results confirm the associations observed in college and university student samples between estimates of peer drinking and personal alcohol use.

First, there was a positive association between perceived norms of both drinking quantity and frequency and the personal drinking behavior. Second, alcohol use disorders were more prevalent in subjects who overestimated drinking quantity in their reference group than in those who correctly estimated or underestimated drinking quantity. Alcohol use disorders were also more prevalent in male apprentices who overestimated drinking quantity in their reference group than in those who correctly estimated or underestimated drinking quantity in their reference group; however, this difference was not found in female apprentices. Overestimations of alcohol consumption in same-gender apprentices were more prevalent in males, and male gender was positively associated with overestimations of drinking quantity and frequency in our regression models. This result indicates that gender differences exist in apprentices' normative misperceptions of alcohol use. The direction of the gender differences observed in this study is reversed in comparison with previous research, which has found women to have a higher (Borsari and Carey, 2003) or a similar degree of misperceptions (McAlaney and McMahon, 2007) compared with men. One possible explanation for this difference might be the fact that we formulated gender-specific items to assess normative perceptions in our study, whereas most previous studies did not specify items by gender. Considering the higher degree of alcohol use in male students, this might have resulted in higher discrepancies between personal behavior and perceived norms for female students. However, in our study only a small proportion of women overestimated drinking quantity and frequency in their reference group of same-gender apprentices. The higher percentage of female apprentices underestimating alcohol use rather than overestimating alcohol use in their reference group challenges the suggestion of a previous study (Lewis and Neighbors, 2007) to favor gender-specific referents for females. The results of this study suggest that social norm interventions might be promising to reduce problem drinking in apprentices. Particularly, subgroups of apprentices with the strongest normative misperceptions might benefit from this intervention approach. According to this study, these are male apprentices with high alcohol consumption. The results also indicate increasing normative misperceptions in the group of apprentices aged 21 years and older and increasing misperceptions concerning drinking quantity with increasing school education.

The data for this study were collected within a survey that reached the majority of apprentices in their first year of training in all schools from a given area. To obtain a high participation rate, the number of questionnaire items used for this survey was minimized as much as possible. However, these restrictions in the length of the questionnaire also resulted in some study limitations. First, the study focused on descriptive drinking norms, and injunctive drinking norms were neglected. Second, we only assessed social drinking norms at the level of a typical apprentice of same gender as the reference group. Third, we used ordinal, not metric, scales to assess personal drinking behavior and normative perceptions of drinking. This might have resulted in a less precise assessment of these variables in contrast to metric scales, which were mostly applied in previous studies (Lewis and Neighbors, 2007; McAlaney and McMahon, 2007).

Randomized controlled trials are required to test the effectiveness of social norms interventions to reduce problem drinking in nonstudent samples of adolescents. Our findings suggest that social norms interventions might provide an effective measure to reduce problem drinking in nonstudent samples and that vocational schools might be a promising setting to reach a large number of problem drinkers by these interventions.

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