Alcohol consumption among university students in the night-time economy in the UK: A three-wave longitudinal study

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Compliance with ethical standards: The School of Psychology Research Ethics Committee at the authors' institution approved the study (REC number: 2016/987). All procedures performed were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Abstract

Background. Excessive alcohol consumption is commonly reported in university/college students, and contributes to emerging peer-group relations.

Purpose. This study aimed to provide up-to-date longitudinal data on students' alcohol consumption patterns, and predictors of this, across a single academic year.

Methods. A 3-wave study was conducted at a university in the UK. Participants reported their alcohol consumption patterns, along with perceptions of the social norms and behavioral expectations associated with attending licensed venues where alcohol is sold (the "night time economy"). Participants also reported their social identification with this environment.

Results. Around half of participants overall fell into the three higher alcohol-risk categories (moderate, high or hazardous drinking). A modest reduction in consumption was observed across the study. At each assessment point, males reported greater alcohol consumption in the preceding two months than females, while Year 4 students and those on graduate-entry programs reported the lowest consumption. Excessive alcohol consumption was regarded as largely normative within the night time economy, both descriptively ("what others do") and injunctively ("what others approve of"). Social identification and norm perceptions, along with gender, year group, and intoxication and socialising expectations, were significantly associated with higher alcohol consumption at baseline. However, baseline consumption was the only variable significantly associated with alcohol use at the end of the academic year.

Conclusions. Many students drink alcohol at potentially harmful levels, and norms and expectations supporting this consumption are prominent and stable. The findings support a targeted approach to intervention that accounts for heterogeneity in the student population.

KEY WORDS: Alcohol consumption; AUDIT; night-time economy; social identity; group norms

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Excessive alcohol consumption is responsible for around 2.5 million deaths globally each year (1). Licensed venues (e.g., bars, clubs: the "night time economy") are major outlets for the consumption of alcohol (2), and for many people attending these, alcohol serves as the "glue" that facilitates socialization (3, 4). For young people at university—the population of focus in the current investigation—this shared experience of alcohol consumption is particularly marked. In emerging social networks, such as when students join university, alcohol consumption facilitates group bonding and contributes to social identity (e.g., 5, 6, 7, 8).

The start of the academic year in the UK is characterized by organized events in the night time economy (or NTE), and attendance at these reinforces emerging social norms concerning alcohol consumption, through exposure to the drinking behavior of group members (descriptive norms) and beliefs about the group's approval or disapproval of one's own consumption (injunctive norms) (8, 9, 10). Student drinking patterns often mirror these norms: up to two thirds of students sampled at UK and Ireland universities reported drinking alcohol at levels deemed to be harmful, with a convergence in consumption patterns for males and females (11). For many students at university, frequent excessive consumption of alcohol with other students is "part and parcel" of the higher education experience (e.g., 12, 13, 14, 15). Accordingly, it is unsurprising that *socializing with friends* and the *expectation of becoming intoxicated* are two dominant cognitions underpinning students' participation in the NTE (4).

It is unclear how universities should address problematic drinking in students, with limited evidence for the effectiveness of commonly-used intervention techniques like motivational interviewing or social norms campaigns (16, 17). In part this is due to shortcomings in the evidence base underpinning interventions: with a few exceptions (18, 19, 20, 21), most studies document drinking patterns at single time points within an academic year (e.g., 8, 11), and often fail to account for the effects of past drinking on current behavior (22). University student numbers in the UK have also increased steadily in recent years (23), and there is evidence from the wider population for a

reduction in alcohol consumption across this period (24). Up-to-date longitudinal designs are therefore needed to determine current consumption patterns and to inform future interventions, including consideration of possible heterogeneity within the population targeted by these (e.g., 25), and addressing the question of whether excessive alcohol consumption constitutes behavioral "spikes" (e.g., at the start of the academic year) that become less marked later (18). If heavy alcohol consumption is largely restricted to the start of the academic year, interventions targeting "at risk" groups (e.g., new students not yet embedded within student alcohol culture) separately from those targeting the wider student population (in whom drinking habits may be already established) may be warranted. Providing an up-to-date account of alcohol consumption patterns among subgroups of student participants in the NTE was the first focus of this study.

Our second focus was on potentially modifiable factors associated with alcohol consumption. As noted above, alcohol consumption largely takes place in group settings, and so it might be expected that students' self-definition at the group level will be associated with their alcohol consumption patterns. That is, those who more strongly identify as members of the group (i.e., who experience a sense of *social connectedness* with other students on a night out) should report heavier alcohol consumption compared to those who identify less strongly. Further, alcohol consumption patterns should also reflect the norms of that reference group: if the group's norms advocate heavy alcohol consumption, students' own behavior should reflect this. Qualitative research and cross-sectional studies support these two predictions (e.g., 8, 10, 26). For example, Reed et al. showed associations between students' identification with different reference groups (friends, peers, members of college fraternities), group norms, and alcohol consumption patterns.

However, it is not known whether social identification is associated prospectively with alcohol consumption. If consumption decreases across the academic year or across year groups, a corresponding change in group norm perceptions may be seen with excessive alcohol consumption becoming less normative. Under such circumstances, a corresponding change in students' motivations for participation in the NTE might also occur: whereas a principal motivation for students attending night clubs in their early years of university might centre on intoxication expectations (4), other factors

(e.g., to seek romance) might become more prominent in later years. The design of the current study purposely allowed for an assessment of whether patterns of social identification and associated group processes (NTE norms, expectations) vary across time and in relation to alcohol consumption patterns. The specific focus on *NTE*-based norms and expectations, and social identity, allowed us to consider the potential of the NTE as an intervention point for shaping consumption behavior.

The current research

Students at a UK university completed a survey at three time points across a single academic year, November 2015 (baseline), February 2016 (3-month follow up), and May 2016 (6-month follow up). The university sampled here is located within easy walking distance of a city centre, and venues in the city regularly host events exclusively for students. There are numerous clubs and bars (e.g., sports bars) across the city. Many of these also offer drinks promotions targeting students and are often full to capacity. In common with many other universities in the UK, where the legal drinking age is 18 years, the university itself runs on-campus venues where alcohol can be purchased and consumed.

The survey was targeted at all students (bachelor's/undergraduate and those on graduate-entry programs) who self-reported that they attended licensed venues in the local NTE. Diversity data from this university indicate that in 2015-16 when the study was conducted, most students (70%) were white, and females comprised 56% of the student population.

The following research questions were addressed (RQs):

RQ1: What are the patterns of student alcohol consumption at the start of the academic year?

RQ2: To what extent are alcohol consumption patterns stable over time and across different student year groups?

RQ3: To what extent are social identification and associated group norms and expectations associated with alcohol consumption patterns?

RQ4: To what extent are these variables associated with alcohol consumption over time?

Methods

Participants

Eligible participants were students who self-reported that they attended one of three club venues in the local city. These venues were frequently crowded on dedicated "student nights" (venue capacity varied between 450 and 1,300). Included participants reported attending one of the clubs up to four times, on average, over the two months preceding the study. Access to the study at baseline was via an online survey link circulated to the student body through multiple channels, including direct email to all registered students at the university, local advertising, and social media. Participants who indicated willingness to participate in the follow up assessments were emailed the survey link at the three and six-month time points. Up to two reminder emails were sent at each follow up. The survey was hosted on Limesurvey software at the authors' institution. Participation was incentivized through prize draw entry (shopping vouchers). The study sample was defined as all participants who provided alcohol consumption data (the primary outcome) at baseline (N = 1,372; 499 males, 848 females, 25 undisclosed). Subsequent participation / non-participation was defined according to the provision of consumption data at three and six months post-baseline: n = 421 (30.69%) provided data at baseline and 3-months (154 males, 266 females, 1 undisclosed), n = 377 (27.48%) at baseline and 6-months (128 males, 248 females, 1 undisclosed), n = 259 (18.88%) at all assessment points (94 males, 164 females, 1 undisclosed)[1].

Measures and Procedure

The study received ethics approval from the authors' institution (REC number: 2016/987). After providing online informed consent, participants provided demographic and personal information including: age, gender, ethnicity, year of university study, relationship status, sexuality, and information about high school attended (independent/fee-paying or state funded; single sex or co-educational). They then completed the measures below. Upon completion, participants received a study debrief that signposted health and wellbeing services, including drug and alcohol services. All responses were made on 5-point scales (1 = "*strongly disagree*"; 5 = "*strongly agree*")[2].

Social identification as a "clubber" (a UK term to describe someone who participates in the night time economy) was assessed with five items derived from Doosje, Ellemers, and Spears (27; e.g., "*I feel strong ties with other clubbers*").

Social norms were assessed using six items derived from Borsari and Carey (9): *injunctive alcohol norms* (four items; e.g., "*Other students in my preferred club disapprove of me being drunk there*"); *descriptive alcohol norms* (two items; e.g., "*Other students are frequently drunk when they go to my preferred club*").

Reingle et al.'s (4) 21-item "*Bar and Nightclub Expectations*" questionnaire assessed four sets of motivations for participating in the NTE: intoxication (seven items; e.g., "*I will get very drunk*"); socialization with friends (four items; e.g., "*I will spend time with friends*"); romance/sex-seeking (six items; e.g., "*I hope to meet people I am sexually attracted to*"); and problem relief (four items; e.g., "*I will forget about my problems*").

Alcohol consumption was assessed using the 10-item "Alcohol Use Disorders Identification Test" (AUDIT: 28), adapted to solicit consumption patterns and related behaviors over the preceding two months, in order to capture possible change in behavior between assessment points (e.g., *"How often during the last two months have you failed to do what was normally expected of you because of drinking"*). Scores were totaled for analysis. Scores below 8 indicate low risk for alcohol problems, scores of 8-15 can indicate a medium level of alcohol problems, and scores of 16 and above can indicate a high level of alcohol problems (scores over 20 warrant further investigation for alcohol dependence: 28).

Data analysis

Demographic and personal characteristics were summarized and scale reliabilities assessed[3]. AUDIT scores were compared across genders and year groups at baseline and follow up. A reliable change index (RCI) score (29) was calculated to determine individual-level change in alcohol consumption across the study (i.e., the number of participants whose AUDIT score reliably increased or decreased[4]). Means and standard deviations for latent variables (social identification, norms, and bar and club expectations) were also reported, as well as baseline bivariate correlations between these variables. Univariable linear regression models were fitted to AUDIT scores at baseline and 6-months, including demographic and personal variables, and baseline responses to the social identification, norms and expectations as covariates (and alcohol consumption in the 6-month analysis). Variables

found to be significant at the 5% level from univariable analyses were included as covariates in multivariable models. Our principal focus was on documenting and predicting alcohol consumption over the longer time frame: regression models for alcohol consumption at 3-months are presented in Electronic Supplementary Materials 1.

Results

Sample characteristics

Participants' mean age was 20.46 years (SD = 3.56). Compared to the wider university population (see above), the sample was slightly over-represented by females (62%) and white participants (84%). A higher percentage of participants were in Year 1 of their studies (35%), and 10% were on graduate-entry programs (masters or PhD-level). Most participants had attended a state high school (64%), and 73% attended co-educational (mixed-sex) high schools. Most (85%) reported their sexuality as straight; 58% reported that they were not in a relationship.

Alcohol consumption patterns

Around half of the participants were in one of the three higher risk categories (moderate, high or hazardous: Table 1a). A repeated measures ANOVA with a Greenhouse-Geisser correction identified significant differences in consumption between time points ($p < 0.001$). Post hoc tests (with Bonferroni correction) showed significant ($p < 0.001$) differences in AUDIT between baseline (mean (SD) score: 8.76 (5.96)) and 6-months (7.41 (5.28)), and between 3-months (8.42 (5.99)) and 6 months, but no difference between scores at baseline and 3-months ($p = 0.39$). The number of participants in each of the three highest AUDIT risk categories also reduced: more participants were in the low risk category at 6-months (53.99%) than at baseline (42.39%); 50.24% were in this category at 3-months follow up. The RCI analysis indicated that 13% of participants reliably decreased their alcohol consumption between baseline and 6-months follow up (RCI<-1.96), while 2.65% increased their consumption (RCI>1.96).

Gender and year group differences

Males reported consuming more alcohol than females at each assessment point (Table 1a). More males than females are represented in the two highest risk categories, and more females than

males are in the lowest risk category. These associations are consistent across follow-up points ($ps \leq 0.01$). Similar numbers of males and females appear in the 8-15 AUDIT score range.

For each of the bachelor/undergraduate degree year groups (Table 1b), a reduction in alcohol consumption was apparent across the study, although for Year 1 students this reduction was evidenced only at the 6-months: the mean AUDIT score at baseline and 3-months for Year 1 students was comparable (9.37 vs. 9.84). Alcohol consumption at baseline was highest in Year 2 students (mean AUDIT = 10.77). Year 4 students reported notably lower levels of consumption at 6-months compared to baseline (mean AUDIT = 5.42 vs. 8.68). The univariable regression analyses below confirm these year group effects: at baseline, Year 2 students consumed significantly more alcohol (compared to Year 1: Table 4) and at 6-months, Year 4 students consumed significantly less alcohol (compared to Year 1: Table 5). Overall consumption was lowest among students on graduate-entry programs and was largely stable over the academic year.

Social identification, group norms, and bar and club expectations

Alcohol intoxication was regarded by participants as normative, both in terms of the descriptive norm (scores around 4 on the scale—indicating the perception that other students were often intoxicated in the NTE) and the injunctive norm (scores around 2—indicating the perception that others did *not* disapprove of the one's own intoxication). Participants reported moderate levels of identification with the "clubber" social category, and strong expectations around participating in the NTE for socialization purposes, with scores around 4 on the scale (Table 2). Comparatively weaker behavioral expectations were reported for attending clubs for purposes of intoxication, romance/sex seeking, and problem relief. A repeated measures ANOVA (with Greenhouse-Geisser correction) revealed that only scores on the social identification scale differed across time points ($p = 0.004$). Post hoc tests (with Bonferroni correction) showed that social identification was lower at 3-months (mean (SD) score: 2.49 (0.90)) than at baseline (2.62 (0.95); $p = 0.007$), but no significant differences between scores at baseline and 6-months (2.53 (0.91)), or between 3-months and 6-months.

Bivariate correlations between latent study variables (baseline)

Bar and night club expectations were inter-correlated (Table 3), and the injunctive and descriptive norm scales were negatively correlated, as might be expected. Descriptive norm perceptions were positively correlated with each of the bar and night club expectations subscales, and injunctive norm perceptions were correlated with intoxication expectations: perceptions that others disapproved of participants' own excessive drinking was associated with weaker expectations of being intoxicated in clubs. Social identification and AUDIT were positively and significantly associated with all scales/subscales except for injunctive norms.

Regression analyses

Table 4 presents the estimated effects from separate regression models, and multivariable model results, fitted to baseline alcohol consumption. In the univariable models, all variables except participant sexuality, high school type (i.e., state or independent) and composition (i.e., mixed or single sex) were significantly associated with alcohol consumption. In the multivariable model, being male, higher social identification, stronger perceptions of descriptive and injunctive norms advocating intoxication, and expectations of attending bars / clubs for reasons of intoxication and (negatively) socialization were all significantly associated with higher alcohol consumption at baseline. In the longitudinal analysis (6-month consumption), participant gender, year of study, social identification, descriptive norms, expectations around intoxication, romance/sex seeking, and problem relief, and baseline alcohol consumption were all associated with consumption (univariable analyses: Table 5). In the multivariable model, the only significant predictor of alcohol consumption at 6-months was baseline consumption. This effect was largely identical at 3-months (Electronic Supplementary Materials 1).

Discussion

These findings broadly reflect those from previous research, in the UK and elsewhere, that has highlighted excessive alcohol consumption among university students (e.g., 8, 11, 18). A previous study of UK university students indicated that excessive alcohol consumption tended to be concentrated in Year 1 students. Bewick et al. reported significantly higher levels of consumption in Year 1 students than in Year 2/3 students, indicating a potential "maturing out" of excessive

consumption (18). Direct comparisons between Bewick et al.'s study and ours are not possible because of the different measures of alcohol consumption employed, and Bewick et al. did not include students on graduate-entry programs. However, the current findings evidence a more nuanced pattern of consumption across the bachelor's/undergraduate year groups than Bewick et al., although an overall reduction was apparent. Just 50% of students in Years 1-3 of the current study (which constituted the majority of the bachelor's / undergraduate sample) had an AUDIT score of less than 8 at 6-months follow up. Moreover, there was some evidence that Year 2 students reported *higher* levels of consumption (than Year 1 students) at baseline and they had the highest AUDIT score overall at 6-months. And while Year 3 students reported comparatively lower levels of drinking at 3-months, compared to Years 1 and 2, this difference was not apparent at baseline or at 6-months. Finally, higher numbers of Year 4 students and those on graduate-entry programs reported drinking at safer levels (and for Year 4 students particularly at 6-months, coinciding with their final university examinations). Note, however, that there were considerably fewer participants from these two subgroups overall and so effects should be interpreted cautiously.

Therefore, answering RQs 1-2, despite some evidence for a reduction in consumption over time and across year groups, the pattern of alcohol consumption for many bachelor's/undergraduate student participants in the NTE is one that is sustained and potentially harmful. The RCI analysis confirmed this general pattern of stability: only around 16% of participants overall evidenced a reliable change in consumption patterns (13% reduced their consumption)—leaving some 84% of participants showing no real change in their drinking behavior across the academic year. For a substantial number of students, consumption patterns therefore appear of considerable cause for concern, with AUDIT scores >19 indicating possible alcohol dependence (28). Well-rehearsed concerns about excessive alcohol consumption among university students, and thus the need for effective interventions, appear still relevant (13, 14).

Participants' responses to the group norms measures highlighted the normative expectations surrounding these consumption patterns, and participants identified with the NTE environment in which these norms are reinforced. Social identification, group norms and bar/cub expectations were all

associated with participants' alcohol consumption in the cross-sectional analysis (RQ3), as was gender. In the longitudinal analysis (RQ4), baseline alcohol consumption emerged as the only significant predictor of consumption at 6-months.

Implications

A 2015 Cochrane meta-analysis of 63 randomized / cluster-randomized controlled trials of social normative interventions found no discernible effects on alcohol consumption patterns, but high levels of attrition and heterogeneity across studies in intervention design, delivery and group targeted (e.g., sub-group versus entire student population), and poor methodological quality (17). Scott-Sheldon, Carey, Kaiser et al.'s meta-analysis revealed a lack of effectiveness of alcohol interventions aimed at students in high risk consumption categories, with some evidence for an *increase* in consumption after intervention exposure (30). Our finding that past alcohol consumption was the sole predictor of current consumption (i.e., independently of attitudes and cognitions) accords with earlier research (31) and suggests that there may be limited value in targeting norms and associated cognitions *during* the academic year, once alcohol routines are in place. Rather, alcohol interventions focused on changing normative perceptions may benefit from targeting principally new, incoming students, when consumption patterns are not yet routine (and for whom social identity and associated cognitions that can shape consumption behavior are forming and are therefore potentially malleable), or in student groups that are not characterised by excessive drinking. Joining university and transitioning into later years/graduate entry programs may represent "windows of opportunity" for initiating new behaviors through targeted interventions (32), potentially within the NTE. Along these lines, interventions that target students *prior* to joining university may similarly be warranted in order to shape these students' beliefs and expectations about university alcohol culture. For students already immersed in the university culture (for whom heavy alcohol consumption is more routine), interventions may be better suited to targeting the risks presented by excessive consumption, for example focusing on shaping the most harmful drinking patterns such as binge drinking. Such interventions will likely rely on coordinated action of different change agents (e.g., university, local government), and could include

restricting access to alcohol, alcohol pricing or labelling strategies (e.g., 33, 34), or targeting specific days or events when alcohol is likely to be consumed (e.g., 30).

Limitations

The current sample was drawn from a single university in the UK, although the patterns observed in several ways reflect those reported in previous research. Nonetheless, subtle variability in alcohol culture across different universities means that new interventions will require flexibility in both design and implementation in order to meet the needs of the targeted population(s) (see e.g., 35, 36). Accordingly, our conclusions should be seen as advocating general principles for intervention focus rather than specific recommendations for its content.

The NTE is a common feature of normal student life, with many bars and clubs in university host cities hosting events exclusively targeting this population group. However, it might be suggested that we sampled participants whose alcohol consumption patterns are unrepresentative of the wider student population. We think such sampling bias is unlikely given the substantial number of participants here who did not drink, or who drank very little (44% of Year 1 students at baseline, rising to 53% at 6-months follow up). Moreover, the consumption patterns observed in this study reflect those observed in other studies that have not explicitly targeted NTE participants. We therefore believe our sampling approach did not result in a skewed portrayal of student alcohol consumption. That said, our focus on NTE-based predictors of alcohol consumption (e.g., clubber identification), and social norms associated with participants' preferred club within the NTE, means that we cannot conclude anything here about wider influences, such as beliefs about university drinking culture that might be shaped in other contexts (e.g., 37) or other social identities (e.g., norms associated with other clubs in the NTE, or student sub-groups: 26). Future research may usefully account for such potential influences, although we suggest that their impact may be most marked in contexts where student participation in the NTE is less pronounced than here (for example, in countries where most university students cannot legally attend bars/clubs for the purpose of consuming alcohol). Finally, while the operationalization of the AUDIT measure in the current study facilitated comparison with previous studies that have similarly assessed general alcohol consumption patterns, it is not possible to conclude

whether consumption that occurs within the NTE specifically would follow the same pattern. Future research may therefore benefit from distinguishing the different contexts in which alcohol is consumed.

Conclusions

This study provides an up-to-date assessment of drinking patterns among UK university students across the course of a single academic year, and documents the group-normative environment of the NTE that shapes and reflects these patterns. Using data from multiple time points across the year, and accounting for previous alcohol consumption, the study indicates that despite some evidence that consumption patterns became safer over time, particularly in advanced year groups, many students continue to drink at potentially harmful levels. Social group norms and expectations advocating excessive consumption were sustained across the year. The findings point to the potential importance of early intervention, especially with incoming students, in order to shape the group processes that can regulate alcohol consumption and participation in the NTE.

Notes

1. Characteristics (gender, age, sexuality, ethnicity, relationship status, year of study, high school type, high school composition) of participants with complete AUDIT data at all 3 time points (N = 259) were compared against those with complete AUDIT data at baseline only, or at baseline and one of the two subsequent time points (N = 1113). There was no evidence of any statistically significant differences/associations.
2. Note that the data reported here were collected as part of a larger project that also examined participants' experiences of sexual objectification in the NTE. Since the focus of the current contribution was on predicting alcohol consumption patterns, data on sexual objectification experiences are not reported here. Variables not reported are: sexual objectification perpetration and victimization frequency (38); sexual objectification norms perceptions, adapted from Borsari and Carey (9); sexual objectification prevalence, perceptions of club aggression, and personal confidence in stopping sexual objectification (bespoke items).

3. Only the reliability alphas for the subscales of the expectations of a night out scale were lower than conventional, although approached (and for the problem relief subscale at 6-month follow up, met) conventional levels (Table 2). Removing items did not improve reliability of these subscales and so they were retained for analysis.
4. The RCI was calculated for the difference in AUDIT scores between baseline and 6-month follow up (RCI = (x3 - x1)/SE, where SE = SD1 × sqrt(1 - ICC) = 2.94 and SD1 is the standard deviation of scores at wave 1 (6.26) (intraclass correlation coefficient, ICC = 0.78)).

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Table 1a

Alcohol consumption patterns at each assessment point

	Baseline				3-month follow up				6-month follow up			
AUDIT	Male (N=499)	Female (N=848)	Total (N=1347)	p value	Male (N=154)	Female (N=266)	Total (N=420)	p value	Male (N=128)	Female (N=248)	Total (N=376)	p value
Mean score (SD)	10.35 (6.75)	9.05 (5.87)	9.53 (6.24)	<0.001*	9.89 (6.91)	8.13 (5.43)	8.77 (6.06)	0.007*	8.98 (6.34)	7.35 (5.14)	7.90 (5.62)	0.01*
Risk categories, n (%)												
Low (<8)	195 (39.08)	376 (44.34)	571 (42.39)		69 (44.81)	142 (53.38)	211 (50.24)		62 (48.44)	141 (56.85)	203 (53.99)	
Moderate (8-15)	191 (38.28)	354 (41.75)	545 (40.46)	<0.001**	52 (33.77)	99 (37.22)	151 (35.95)	<0.001**	47 (36.72)	90 (36.29)	137 (36.44)	0.01**
High (16-19)	62 (12.42)	71 (8.37)	133 (9.87)		14 (9.09)	16 (6.02)	30 (7.14)		9 (7.03)	9 (3.63)	18 (4.79)	
Hazardous (>19)	51 (10.22)	47 (5.54)	98 (7.28)		19 (12.34)	9 (3.38)	28 (6.67)		10 (7.81)	8 (3.23)	18 (4.79)	

* t test for gender differences within assessment point; ** chi-squared test for trend within assessment point

Table 1b

Alcohol consumption patterns across different year groups

	Baseline					3-month follow up					6-month follow up				
AUDIT	Year 1 (N=481)	Year 2 (N=358)	Year 3 (N=295)	Year 4+ (N=79)	GE (N=138)	Year 1 (N=153)	Year 2 (N=110)	Year 3 (N=82)	Year 4+ (N=26)	GE (N=50)	Year 1 (N=121)	Year 2 (N=108)	Year 3 (N=85)	Year 4+ (N=24)	GE (N=39)
Mean score (SD)	9.37 (6.27)	10.77 (6.28)	9.75 (6.28)	8.68 (5.65)	6.95 (5.75)	9.84 (6.13)	9.56 (6.46)	7.48 (5.29)	7.04 (5.23)	6.70 (5.59)	7.99 (5.37)	8.94 (5.89)	7.88 (5.31)	5.42 (5.00)	6.33 (6.01)
Risk categories, n (%)															
Low (<8)	210 (43.66)	118 (32.96)	121 (41.02)	42 (53.16)	85 (61.59)	64 (41.83)	51 (46.36)	49 (59.76)	15 (57.69)	33 (66.00)	64 (52.89)	45 (41.67)	48 (56.47)	20 (83.33)	27 (69.23)
Moderate (8-15)	191 (39.71)	162 (45.25)	122 (41.36)	25 (31.65)	42 (30.43)	62 (40.52)	41 (37.27)	27 (32.93)	9 (34.62)	12 (24.00)	47 (38.84)	49 (45.37)	31 (36.47)	2 (8.33)	8 (20.51)
High (16-19)	48 (9.98)	47 (13.13)	26 (8.81)	8 (10.13)	4 (2.90)	14 (9.15)	10 (9.09)	3 (3.66)	1 (3.85)	2 (4.00)	5 (4.13)	8 (7.41)	2 (2.35)	1 (4.17)	2 (5.13)
Hazardous (>19)	32 (6.65)	31 (8.66)	26 (8.81)	4 (5.06)	7 (5.07)	13 (8.50)	8 (7.27)	3 (3.66)	1 (3.85)	3 (6.00)	5 (4.13)	6 (5.56)	4 (4.71)	1 (4.17)	2 (5.13)

Note: GE = graduate entry

Table 2

Means (SDs) and reliability alphas for social identification, alcohol norms, and bar and night club expectations

	Mean (SD)			Alpha		
Scale/subscale	Baseline	3-months	6-months	Baseline	3-months	6-months
Social identification as a clubber (5 items)	2.58 (0.90)	2.48 (0.89)	2.52 (0.91)	0.88	0.89	0.89
Injunctive alcohol norms (4 items)	2.15 (0.71)	2.30 (0.69)	2.29 (0.71)	0.79	0.78	0.83
Descriptive alcohol norms (2 items)*	4.04 (0.79)	4.03 (0.80)	3.93 (0.84)	0.33	0.32	0.40
Bar and night club expectations						
Intoxication (7 items)	3.24 (0.72)	3.13 (0.73)	3.17 (0.70)	0.62	0.58	0.61
Socialization (4 items)	4.17 (0.58)	4.14 (0.59)	4.12 (0.56)	0.67	0.69	0.68
Romance/sex-seeking (6 items)	3.05 (0.96)	2.92 (0.99)	2.98 (0.94)	0.66	0.65	0.67
Problem relief (4 items)	3.27 (0.83)	3.18 (0.84)	3.25 (0.83)	0.67	0.66	0.73

*Reliability assessed with Pearson's correlation coefficient

Table 3

Baseline correlations between social identification, normative perceptions and bar and night club expectations

	Social identification	Injunctive norm	Descriptive norm	Intoxication	Socialization	Romance/sex seeking	Problem relief	AUDIT
Social identification	1	-0.01	0.33**	0.39**	0.37**	0.37**	0.29**	0.40**
Injunctive norm		1	-0.28**	-0.16**	-0.05	-0.004	0.01	-0.07*
Descriptive norm			1	0.56**	0.29**	0.26**	0.23**	0.50**
Intoxication				1	0.24**	0.40**	0.30**	0.58**
Socialization					1	0.18**	0.36**	0.14**
Romance/sex seeking						1	0.28**	0.33**
Problem relief							1	0.25**
AUDIT								1

* $p<0.05$
** $p<0.01$

Table 4

Estimated effects of baseline demographics, personal characteristics, social identification, norms and expectations on baseline AUDIT

		Univariable analyses			Multivariable analysis Adjusted R-squared = 0.42		
		Estimated effect	95% CI	p-value	Estimated effect	95% CI	p-value
Gender	Female	Ref			Ref		
	Male	1.30	0.61 to 1.99	<0.001	1.39	0.79 to 1.99	<0.001
Age		-0.23	-0.33 to -0.14	<0.001	0.14	-0.06 to 0.34	0.16
Sexuality	Straight	Ref					
	Gay/lesbian	-0.43	-2.32 to 1.46				
	Bisexual	-0.08	-1.37 to 1.21	0.16			
	Other or prefer not to say	-2.14	-4.01 to -0.27				
Ethnicity	White	Ref			Ref		
	Black	-1.92	-6.56 to 2.71		-1.87	-5.87 to 2.13	
	Asian	-3.08	-4.34 to -1.82	<0.001	0.13	-1.12 to 1.38	0.25
	Mixed	-1.60	-3.32 to 0.12		0.22	-1.19 to 1.64	
	Other/prefer not to say	-2.17	-4.21 to -0.12		-1.92	-3.74 to -0.11	
High school type	State	Ref					
	Independent/fee-paying	0.59	-0.11 to 1.30	0.10			
High school composition	Mixed	Ref					
	Single sex	0.32	-0.44 to 1.08	0.41			
Relationship status	Single	Ref			Ref		
	In a relationship	-0.75	-1.43 to -0.06	0.03	-0.23	-0.88 to 0.41	0.48
University year of study	1	Ref			Ref		
	2	1.40	0.55 to 2.25		-0.06	-0.78 to 0.66	
	3	0.38	-0.52 to 1.28	<0.001	-1.09	-1.93 to -0.25	0.05
	4+	-0.68	-2.16 to 0.79		-1.24	-2.55 to 0.07	
	Graduate entry	-2.42	-3.59 to -1.24		-0.64	-2.20 to 0.92	
Social identification		2.70	2.35 to 3.05	<0.001	1.11	0.73 to 1.49	<0.001
Alcohol norms	Injunctive norm	-0.59	-1.08 to -0.10	0.02	0.49	0.09 to 0.90	0.02
	Descriptive norm	3.80	3.42 to 4.18	<0.001	1.99	1.54 to 2.44	<0.001
Bar/club expectations	Intoxication subscale	4.80	4.41 to 5.20	<0.001	2.97	2.47 to 3.48	<0.001
	Socialising with friends subscale	1.43	0.84 to 2.02	<0.001	-0.90	-1.46 to -0.34	0.002
	Romance/sex-seeking behavior subscale	2.09	1.75 to 2.43	<0.001	0.25	-0.13 to 0.62	0.20
	Problem relief subscale	1.79	1.39 to 2.19	<0.001	0.36	0.05 to 0.78	0.06

Table 5

Estimated effects of baseline AUDIT, demographics, personal characteristics, social identification, norms and expectations on 6-month AUDIT

		Univariable analyses			Multivariable analysis Adjusted R-squared = 0.60		
		Estimated effect	95% CI	p-value	Estimated effect	95% CI	p-value
AUDIT		0.72	0.67 to 0.78	<0.001	0.70	0.61 to 0.79	<0.001
Gender	Female	Ref			Ref		
	Male	1.64	0.45 to 2.83	0.01	0.47	-0.40 to 1.34	0.29
Age		-0.14	-0.29 to 0.002	0.05			
Sexuality	Straight	Ref					
	Gay/lesbian	0.65	-2.60 to 3.89				
	Bisexual	-0.71	-2.79 to 1.36	0.89			
	Other or prefer not to say	0.06	-2.85 to 2.98				
Ethnicity	White	Ref					
	Black	-1.24	-12.19 to 9.71				
	Asian	-2.76	-4.95 to -0.57	0.07			
	Mixed	-2.43	-5.23 to 0.37				
	Other/prefer not to say	-1.10	-5.28 to 3.08				
High school type	State	Ref					
	Independent/fee-paying	0.50	-0.70 to 1.69	0.42			
High school composition	Mixed	Ref					
	Single sex	-0.31	-1.65 to 1.02	0.65			
Relationship status	Single	Ref					
	In a relationship	-0.39	-1.54 to 0.76	0.51			
University year of study	1	Ref			Ref		
	2	0.94	-0.50 to 2.39		-0.66	-1.65 to 0.33	
	3	-0.11	-1.65 to 1.43	0.02	-0.07	-1.15 to 1.00	0.28
	4+	-2.58	-5.01 to -0.14		-1.18	-2.82 to 0.45	
	Graduate entry	-1.66	-3.66 to 0.35		0.67	-0.98 to 2.32	
Social identification		1.84	1.23 to 2.45	<0.001	0.18	-0.36 to 0.72	0.51
Alcohol norms	Injunctive norm	-0.51	-1.46 to 0.44	0.29			
	Descriptive norm	2.95	2.22 to 3.67	<0.001	-0.12	-0.79 to 0.56	0.74
Bar/club expectations	Intoxication subscale	3.58	2.88 to 4.27	<0.001	0.33	-0.41 to 1.07	0.38
	Socialising with friends subscale	0.38	-0.66 to 1.41	0.48			
	Romance/sex-seeking behavior subscale	1.54	0.95 to 2.13	<0.001	-0.43	-0.91 to 0.05	0.08
	Problem relief subscale	1.37	0.63 to 2.11	<0.001	0.27	-0.26 to 0.81	0.32

Supplementary Material

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