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What reminds young people that they drank more than intended on weekend nights – an event-level study

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Abstract

Objective: Young people often drink more alcohol than intended over the course of a night. This study investigates individual- and night-specific factors predicting young people's acknowledgement of having drunk more than intended.

Method: Using the Youth@Night smartphone application, 176 people aged 16 to 25 documented 757 Friday and Saturday nights. Participants recorded their drinking intentions at the beginning of the night, the composition of the social and physical environment over the course of the night, and, the next morning, the previous night's total consumption and whether they had drunk more than intended or experienced other consequences. Bivariate statistics and multilevel logistic regressions were used based on the 361 nights during which 139 participants (53.2% men, mean age = 19.3) exceeded their drinking intentions.

Results: Participants acknowledged higher consumption than intended on 36.7% of nights. At the night level, higher drinking intentions than usual (OR = 1.36; CI: 1.13-1.65), attending a larger number of locations than usual (OR = 1.84; CI: 1.11-3.04), having a hangover the next morning (OR = 3.23; CI: 1.50-6.95), orspending more money than planned (OR = 3.12; CI: 1.56-6.26) were associated with acknowledgement of drinking more than intended. No individual characteristics were associated with acknowledgement of exceeding drinking intentions.

Conclusions: Young people not only tend to drink more than intended on weekend nights but also often fail to acknowledge this the next morning. Event-based prevention measures aimed at narrowing the gap between drinking intentions and quantities of alcohol consumed are recommended.

Keywords: Behavioral intentions, young adults, person-mean centering, alcohol-related consequences, ecological momentary assessment

Introduction

In order to reduce heavy drinking and its related harms, person-centered prevention approaches presuppose people's ability to set and respect drinking intentions (Webb et al., 2010). Several protective behavioral strategies, such as deciding in advance not to exceed a set number of drinks and keeping track of the number of drinks consumed (Martens et al., 2005; Pearson, 2013), directly depend on young people's monitoring ability and self-control over the course of the drinking occasion. However, exceeding one's drinking intentions over the course of a night appears quite common, as suggested by a recent study of young adult nightlife-goers showing that more alcohol was consumed than intended on 47.7% of all weekend nights (Labhart et al., 2017). Similar figures were found in a study of young adult students, with 93% of respondents scoring positively on the DSM-IV 'Longer/Larger' criterion of alcohol use disorder (Slade et al., 2013), assessed with the question: 'In the past year, have you had times when you ended up drinking more, or longer, than you intended?' (National Institute of Health, 2014).

Exceeding one's drinking intentions on a given occasion might be part of a conscious process when people are, for exemple, 'enjoying the moment' or 'feeling their peers' influence' (Slade et al., 2013). Additionally, specific social and contextual characteristics of the occasion, such as the size of the drinking group, starting drinking early in the night, and attending multiple locations, were found to contribute to drinking more than intended (Labhart et al., 2017). Since laboratory experiments showed that even with moderate alcohol doses (0.65 g/kg), contextual alcohol cues (such as images of alcoholic drinks) are likely to compromise an individual's control over the amounts consumed during a given drinking occasion (Weafer and Fillmore, 2008, 2015), drinking intentions might often be overridden by external influences without an individual's awareness. This limits the effectiveness of protective behavioral strategies at the drinking-occasion level and prospectively, since the

unnoticed additional drinks consumed cannot be taken into account to adjust plans for on-going and future drinking occasions, and increases the probability of false negatives in the detection of impaired control over a persons drinking using the 'Longer/Larger' DSM-IV and DSM-5 criterion (Caetano & Babor, 2006, Martin & Chung 2009). It is therefore crucial to understand under which circumstances people are able to acknowlegde having exceeded their drinking intentions.

Using an event-level longitudinal design, this study aims firstly to investigate the extent to which young people acknwnoledge having drunk more than intended and secondly to identify event- and individual-specific predictors of that acknowledgement. At the event level, the most obvious indicator of having drunk more than intended should be the number of additional drinks consumed in excess of intentions. Yet, one or two additional drinks might easily go unnoticed, meaning that the deviation from their intentions might have to be larger for them to notice. Additionally, particular circumstances such as predrinking (Labhart et al., 2013), drinking within large groups of people (Thrul and Kuntsche, 2015) or attending multiple locations (e.g., pub crawls), and the occurrence of adverse consequences might also constitute salient signs of higher consumption than intended. The link between individual characteristics and acknowledgement of drinking in excess of intentions is less clear and we could not find any literature on this topic. We will therefore explore, over and above the night-level circumstances described above, whether age, gender, usual drinking and nightlife habits are associated with acknowledging a heavier consumption than intended.

Methods

Study design

Participants were recruited on the streets of the entertainment districts in Lausanne and Zurich in September 2014. Applying the Geographical Proportional-to-size Street-Intercept Sampling method (Labhart et al., 2017), recruiters approached passers-by on Friday and

Saturday nights between 9 p.m. and midnight in popular nightlife areas. Eligibility criteria was being aged between 16 to 25, owning an Android smartphone, having consumed alcohol at least once in the past month, and having been out in the city at least twice in the past month. Volunteers then automatically received an invitation email containing links to the study website and the online consent form. After signing the consent form and completing a baseline questionnaire, they were requested to document their Friday or Saturday nights, including the drinks consumed, the locations visited, and the social and physical contexts, over seven consecutive weekends using the specifically developed Youth@Night smartphone application (Santani et al., 2016)(Santani et al, 2018). The study was approved by the Lausanne and Zurich Cantonal Ethics Committees for Research on Human Beings (protocol 145/14).

Sample

Of the 3,902 young people approached, 629 signed the online consent form, 241 installed the smartphone application, and 176 provided full information on events over 757 entire nights (Labhart et al., 2017). For this study, we retained only the 361 nights (47.7%) during which 139 participants (79.0%) drank more than intended. No selection effect was found between the 139 participants who drank more intended and those who did not in terms of gender (male: 53.2% vs. 40.5%; $\chi^2_{(1)}$=1.89, p=.170) and age (mean=19.3 (SD=2.5) vs. 18.7 (SD=1.8); $t_{(174)}$=-1.38, p=.169), while drinking intentions were slightly higher among the former (mean=2.8 (SD=2.8) vs. 2.2 (SD=2.8); $F_{(1, 175)}$=-4.31, p=.039).

Measures

Night-level independent variables. On Friday and Saturday nights, the smartphone application prompted participants at 5 p.m. to indicate the number of alcoholic drinks they *intended to consume* that night and, at 8 p.m., to indicate the number of *drinks they had consumed between 5 and 8 p.m.*

From 8 p.m. until the end of the night, participants were asked to report the number of friends present – separately for male and females friends (range: '0' to '10 or more' [coded as 15] for each category) and intimate partners – every time they had a new drink. A summary score was created by averaging the total *number of friends* per report over the entire night. Additionally, at 8 p.m. and whenever they changed location, participants were asked to report the type of location they were at. Response options were: 'Bar/pub,' 'Club,' 'Coffee shop/bakery,' 'Event space (sports, concert, art, etc.),' 'Restaurant,' 'Public place/space,' 'Private place,' 'Traveling,' and 'Other.' A summary score was created by adding up the *number of different locations* attended over the entire night.

At 10 a.m. the next morning, participants indicated the total number of alcoholic drinks they had consumed the previous night. The number of *additional drinks* was calculated by subtracting the number of drinks participants intended to consume from the total number of drinks consumed. Additionally, they reported whether the following *consequences* occurred as a result of the previous night's events: 'Hangover (headache, upset stomach, etc.),' 'Spending more money than originally intended,' or 'Doing impulsive things that you later regretted.' These consequences were selected since they represent salient signs that unusual or unplanned events might have happened the previous night.

Person-mean centering (also called 'group-mean centering', if considering that each participant documented a goup of nights) was applied to all continuous night-level variables. This procedure consists of subtracting the mean of the night-level observations per participant (Enders and Tofighi, 2007; Hoffman and Stawski, 2009) in order to distinguish participants' night-specific behaviors (e.g., consuming four drinks more than usual) from each participants' usual behavior across the study (e.g., usually consuming two drinks; see individual-level independent variables below). Person-mean centering was based on the full sample of 757

nights in order to reflect participants' habits and deviations from these habits in general, rather than only on nights with higher consumption than intended.

Individual-level independent variables. *Age* and *sex* were recorded in the baseline questionnaire.

Typical drinking and nightlife habits – namely average levels of drinking intentions, usual deviation from intentions, usual number of drinks before 8 p.m., usual size of drinking group, and usual number of locations visited – were computed by taking the mean of the night-level variables described above.

Dependent variable. Alongside the previous night's consumption and the alcohol-related consequences assessed the next morning (see above), participants were asked whether or not (Yes/No) they 'drank more alcohol than originally intended' the previous night. Since the analyses were conducted for the subset of nights with higher consumption than intended, a positive answer was considered to be an *acknowledgement of a higher alcohol consumption than intended*.

Analytic strategy

Prior to the analyses, extreme outliers in drinking intentions and total number of drinks consumed were winsorized at three standard deviations to better approximate a normal distribution (Tabachnick and Fidell, 2001).

Besides descriptive statistics, bivariate associations between acknowledgement of higher consumption than intended and drinking intentions, number of additional drinks, drinks before 8 p.m., average number of people present, number of locations attended, and occurrence of alcohol-related consequences were tested using mean and proportion tests. Standard errors were adjusted to account for the effect of nights being nested within individuals using the software STATA 14 (StataCorp, 2015).

Subsequently, a multilevel logistic regression model was estimated to determine the contribution of age, gender, the invidiual-level and the night-level independent variables to the acknowledgement of higher consumption than intended. Since continuous night-level variables were person-mean-centered (i.e. representing participants' habits), the night-level scores represented the contribution of the deviation from these habits to the independent variable. The model was estimated in Mplus 7.3 (Muthén and Muthén, 1998-2015) using the maximum likelihood robust estimator. Reported effect sizes were odds ratios (OR), 95%-confidence intervals, and explained variance (R-squared).

Results

Participants acknowledged having drunk more than intended on slightly more than one-third of nights (36.7%, Table 1). Bivariate analyses showed that acknowledgement of a higher consumption than intended was independent of levels of drinking intentions, starting drinking early in the evening, and impulsive actions that were later regretted, but was associated with a higher number of additional drinks consumed above intentions (4.3 additional drinks vs. 2.8), a higher number of locations attended, drinking in larger groups, with the co-occurrence of hangover and spending more money than intended.

---Table 1---

Results of the multilevel logistic regression (Table 1) showed that, at the night level, the likelihood of acknowledging higher consumption than intended was significantly associated with a higher number of locations visited than usual, a higher the number of additional drinks than usual, as well as having a hangover and spending more money than intended. However, the number of friends present was not significantly associated when taking the other predictors into account. Finally, no individual-level characteristics were associated with the likelihood of acknowledging higher consumption than intended.

Discussion

The first aim of this study was to investigate the extent to which participants acknowledged, the next morning, to having drunk more than intended on the previous night, and the results showed that they did so on only one-third of nights, despite an average additional consumption of 2.8 drinks. One possible explanation for this widespread tendency not to acknowledge a heavier consumption than intended is that, in the absence of a strong commitment to keep to the intended amount, participants have changed their drinking intentions over the course of the night. Also, given that they were asked about the previous night's consumption and whether it exceeded their intentions in the same questionnaire, participants may also have been attempting to avoid cognitive dissonance (Festinger, 1962; Mäkelä, 1997) by revising their original intentions to more closely match the amounts they actually consumed.

The second aim was to investigate the circumstances in which young people would acknowledge having drunk more than intended. It appears that only particularly salient (i.e. difficult-to-ignore) signs of heavier drinking than usual, namely consuming an additional amount that almost qualifies as binge drinking (+4.3 drinks on average), having a hangover, and exceeding one's monetary budget, were likely to make participants aware that the previous night had not gone as intended. In contrast, other contextual aspects that relate to consumption in excess of intentions but do not impact wellbeing the next morning might easily be ignored or forgotten.

In terms of clinical practice, these results add new evidence to the discussion on the operationalization of exceeding one's intentions as a symptom of an alcohol use disorder in the DSM-IV and DSM-5. This criterion has been criticized as difficult to measure using retrospective questionnaires and as often misunderstood by young people among whom drinking more than intended is common (Caetano & Babor, 2006, Martin & Chung 2009, Slade et al., 2013). Our results show that event-level data collection methods are more

sensitive for detecting occasions with heavier consumption than intended than self-reports, since people tend to acknowledge only occasions with much larger intake than intended or with the co-occurrence of salient consequences. However, given that participants acknowledged heavier drinking than intended mainly after such 'at risk' occasions, self-acknowledgment appears as a more accurate sign of an alcohol use disorder among young adults, as conceptualized in the DSM-IV and DSM-5, than automatic detection using event-level questionnaires.

From a prevention perspective, combined with the observation that acknowledging heavier consumption than intended was completely independent of any of the individual characteristics investigated, the present findings suggest that the implementation of event-specific prevention programs (Neighbors et al., 2007) that reach young people when the 'deviation from intention' process is in progress, namely during a drinking occasion either in situ or using with smartphone-based interventions (Wright et al., 2017), may be beneficial. With the aim of narrowing the gap between drinking intentions and amounts consumed as well as raising peoples' awareness when they are deviating from their intentions, prevention programs might include a comparison of the current state of intoxication with initial drinking intentions, comparison of actual spending with intentions, and be sensitive to the influence of particular circumstances, such as predrinking and large drinking group size, which are known to increase drinking levels but apparently are not recognized as risk factors by young people.

Among the strengths of the present study is the collection of rich data in real-life settings, on multiple nights, from a substantial sample of individuals, and its event-level longitudinal design which enabled us to investigate within- and between-individual variations in drinking intentions and behaviors. A couple of shortcomings and limitations of the present study should also be mentioned. Firstly, drinking intentions were measured before the night started, but no information was collected on whether participants changed their intentions

over the course of the night. Given the general tendency to exceed drinking intentions, we might assume that some participants may have changed their intentions towards higher levels and, consequently, the rate of nights with heavier consumption that intentions (47.7%) would be lower and the acknowledgment rate (36.7%) would be higher. Implications on the model results are less clear. Therefore future research is needed to refine the present findings by investigating to what degree drinking intentions change during a drinking occasion and what factors or circumstances may be responsible for such a change. Secondly, the present study focused on contextual factors of drinking occasions associated with acknowledging heavier consumption than intended and did not investigate cognitive processes underlying such an acknowledgment. In line, with the previous limitation, future research on the cognitive processes underlying potential changes in drinking intentions, willingness to commit to the intended amounts and awareness of deviating from one's intentions is recommended.

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Table 1: Night and individual characteristics, bivariate comparisons, and multilevel logistic regression predicting the acknowledgement of higher alcohol consumption than intended

	Acknowledgement of higher alcohol consumption than intended		Bivariate test	Multilevel logistic regression
	NO	YES	$F(1, 138)$[a]	OR (95%-CI)
Night characteristics (N = 361)				
Number of nights	235 (63.3%)	136 (36.7%)		
Drinking intentions	2.5 (SD = 2.6)	3.2 (SD = 3.0)	3.62	1.10 (0.90-1.35)
Additional drinks[b]	2.8 (SD = 2.3)	4.3 (SD = 3.0)	22.82***	1.36** (1.13-1.65)
Number of drinks before 8 p.m.	1.5 (SD = 2.1)	1.4 (SD = 1.5)	0.09	0.76 (0.52-1.12)
Number of locations attended	1.4 (SD = 0.8)	1.7 (SD = 0.9)	9.14**	1.84* (1.11-3.04)
Number of friends present	4.4 (SD = 5.8)	6.0 (SD = 6.4)	6.03*	0.99 (0.94-1.04)
Hangover	18.3%	46.8%	27.97***	3.23** (1.50-6.95)
Spending more money than intended	8.9%	30.2%	27.99***	3.12** (1.56-6.26)
Impulsive actions that were later regretted	4.3%	7.1%	1.24	1.02 (0.22-4.68)
Individual characteristics (N = 139)				
Sex				0.63 (0.27-1.49)
Age				0.98 (0.87-1.10)
Drinking intentions[c]				1.13 (0.95-1.36)
Additional drinks[c]				1.21 (0.97-1.51)
Number of drinks before 8 p.m.[c]				0.81 (0.65-1.02)
Number of locations attended[c]				0.95 (0.48-1.90)
Number of friends present[c]				1.09 (0.98-1.20)
R-squared				
Night level				0.320***
Individual level				0.271

Note: * $p < .05$; ** $p < .01$; *** $p < .001$; [a] Standard errors of t-tests (continuous data) and χ^2-tests (proportions) were adjusted to account for the effect of nights being nested within individuals; [b] Total night consumption (i.e. the sum of 'drinking intentions' and 'additional drinks') was 5.4 (SD = 3.7) on nights without acknowledgement of drinking in excess of intentions and 7.6 (SD = 4.0) on nights with such acknowledgement; [c] Person-mean centered value.