TITLE

Correlates of alcohol consumption on heavy drinking occasions of young risky drinkers: event versus personal characteristics.

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Abstract

Aims. Risky single occasion drinking (RSOD) by young people is a serious public health issue, yet little is known about the specific circumstances of risky drinking occasions. This study examined the independent effects of event- and individual-specific variables on RSOD.

Design. Longitudinal cohort study measuring self-reported RSOD and event- and individual-specific variables across two drinking occasions approximately one year apart.

Setting. Metropolitan Melbourne, Australia.

Participants. A sample of 710 young risky drinkers aged between 18 and 25 years and defined as engaging in risky drinking practices (males: consumed alcohol in excess of 10 Australian Standard Drinks [ASDs: 10g ethanol] in a single occasion in the previous year; females: consumed alcohol in excess of 7 ASDs for females in a single occasion in the previous year).

Measurements. Random digit dial telephone landline survey of the most recent heavy drinking occasion and socio-demographic variables. The primary outcome was the log of the total drinks consumed in the most recent heavy drinking occasion. Event-specific (e.g. number of drinking locations) and time-varying (e.g. weekly income) and time-invariant (e.g. sex) individual–specific variables were examined as correlates of total drinks consumed.

Findings. Changes in event-specific characteristics including the length of the drinking occasion (Wald $\chi^2(2)=29.9$, $p<0.001$), the number of drinking locations (Wald $\chi^2(1)=7.6$, $p=0.006$) and the number of different drink types (Wald $\chi^2(1)=13.6$, $p<0.001$) were associated with increases in total drinks consumed, after adjustment for time-invariant and time-variant individual-specific variables such as gender, income level and weekly consumption. Few other effects were noted.

Conclusions. Event-specific characteristics are important predictors of the number of drinks consumed during risky single occasion drinking (RSOD) and illustrate the importance of event contexts when considering interventions targeting RSOD. The total number of drinks consumed in a RSOD session appears to rise independently with the duration of the drinking event, the number of drinking locations, and the number of different types of beverage consumed.

Introduction

Risky single occasion drinking (RSOD) is common among young people in developed countries. In the US, monthly rates of heavy episodic drinking among those aged 20-25 years have been estimated at 35-45% (1), with similar rates evident in other countries and early adulthood typically being the peak for RSOD prevalence (2). In Australia, the situation is such that among 18-24 year old respondents to the 2013 Australian National Drug Strategy Household Survey, 47% reported consuming more than four Australian Standard Drinks (ASDs: 10g ethanol) at least monthly, and 18% reported consuming more than 10 (3). Although recent evidence suggests rates of RSOD among young people have been declining globally (4, 5), the consequences of RSOD by young people remain significant, including morbidity and mortality related directly to the RSOD occasion itself, as well as serving to entrench high levels of consumption that that lead to harms in later life (6-8). The importance of RSOD is recognised in new research that has focused on specific RSOD events, with a view to understanding the actual consumption behaviours that take place during these events (9, 10), the links to harm (11, 12) and possible points of intervention (13, 14).

Previous work has highlighted how environmental contexts, such as the characteristics of bars and nightclubs, influence drinking behaviour (15). Much of the recent event-specific research on RSOD has focused on pre-drinking and related issues (10, 16-18). For example, Labhart et al. examined the environmental and personal factors associated with pre-drinking as they relate to event-specific consumption (17). They showed that individual-specific variables (age, usual number of drinks consumed in the past year) were unrelated to the amount consumed in distinct events measured across Thursday-Saturday nights over the course of a three-month period. In contrast, pre-drinking and event-specific variables such as drinking duration, type of beverage and pace of drinking were strongly related to the total amount consumed across these events in multilevel models. Indeed, pre-drinking has been shown to be a more important predictor of levels of consumption than other environmental characteristics of bars and nightclubs (18, 19). However, these studies have examined only a few individual-specific characteristics such as age and gender, with other variables known to be related to consumption such as disposable income (20), or even regression to the mean over time (21), unaccounted for to date.

The Young Adults Alcohol Study (YAAS) allows the examination of episodes of high risk drinking by young people who engage in RSOD at a population level. We have previously reported behaviours by the sample in relation to their most recent heavy drinking occasion, highlighting their levels of consumption, expenditure and the number of venues visited (22). In this paper we examine associations between the total drinks consumed on these heavy (or high-risk) drinking occasions at both baseline and 12-month follow-up and individual- and event-specific variables at the same

drinking episodes. More specifically we aimed to determine: (1) the independent association between event-specific variables (e.g. the duration of the drinking event, the number of locations and drinking event start time etc.) and total drinks consumed, (2) the independent association between individual-specific variables (e.g. average drinking levels, education status etc.) and total drinks consumed, and (3) the comparison between event-specific and individual-specific variables in explaining the total number of drinks consumed. On the basis of Labhart et al.'s (17) work, we hypothesised that changes in individual-specific personal variables such as average drinking level would be largely unrelated to the amount consumed, whereas event-specific variables such as the number of different drinking locations would be associated with the amount consumed on these high-risk drinking occasions.

Methods

Design

Longitudinal cohort study measuring RSOD and event- and individual-specific variables across two drinking occasions approximately one year apart.

Sample and recruitment

This study is based on data obtained from reports of recent RSOD from a sample of 802 young Melburnians recruited as part of the Young Adults and Alcohol Study (YAAS) who were interviewed using Computer Assisted Telephone Interviewing (CATI) in 2012 (baseline) and then again 12 months later (follow-up) (22). Briefly, households were contacted by a contracted market research provider (the Social Research Centre) using Random Digit Dialling (RDD). Households were first screened for potential participants aged between 18 and 25 years, after which potential participants were further screened for consumption in excess of 10 Australian Standard Drinks (ASDs; 10g ethanol) for males or in excess of 7 ASD for females in a single occasion in the previous year. The original response rate was 52% (including in the base the estimated proportion of eligible cases among those of unknown eligibility) ((Response Rate 3 - 23)). Further details on the methods used in recruiting and surveying the sample have been described elsewhere (22).

Questionnaire and outcome

Eligible participants were administered a structured questionnaire at both time-points which collected detailed information on their most recent heavy drinking occasion (>10 ASD males, >7 ASD females). Here, they were asked to nominate the first location where they consumed alcohol on the occasion (thereby including any so-called 'pre-drinking') and provide details about their consumption at that location including the types and amounts of alcohol consumed. They were then asked whether

they moved to another location, in which case they were asked to provide the same details about consumption in that location and so on for up to 10 different locations. The amount reported as consumed at each location (in ASD) was summed to generate the outcome total drinks.

Exposure variables

Four *event-specific* variables were examined; the number (no.) of drinking locations, no. of different beverage types consumed (beer, wine, spirits/liquor, cider, ready to drink spirits, energy drink mixed with spirits, fortified wine and other), the event start time (before 12pm, 12pm-6pm, 6pm-12am) and duration of the drinking event (hours).

A range of *individual-specific time-varying* socio-demographic and drinking variables related to drinking in previous research were also included. These included: sexual orientation (heterosexual/other), average weekly drinking (<21 ASD, 21-35ASD, 35ASD+), average weekly recreational spending money (AUD0-80, AUD80-160, AUD160+) and income (AUD0-249, AUD250-599, AUD600+), highest education (<year 12, year 12, tertiary or diploma), current study status (full-time/part-time/not studying), living situation (with parents/other), personal wellbeing (measured through the Personal Wellbeing Index (PWI 24)), and number of social supports other than spouse or partner (persons the respondent feels confident to talk to about important personal problems, categorised as <4 people, 4 people+). Additional *time-invariant individual-specific* variables included were: gender (M/F), age at baseline (18-21 years, >21 years), country of birth (Australia/other).

Analysis

Longitudinal contingency table analyses for categorical variables, longitudinal descriptive statistics for continuous variables and the study outcome were used to provide descriptive estimates of the extent of between- and within-participant variation across the two drinking occasions derived from the two interview waves. Initial analyses revealed that the outcome variable (total drinks) was moderately positively skewed so the natural log (ln) was taken for analysis. Using linear multilevel modelling with maximum likelihood, we implemented a hybrid multilevel regression approach (25). This modelling approach permitted us to estimate the independent effect of key event-specific variables, where fixed effects for time-varying variables (both event- and individual-specific) and random effects for individual-specific time-invariant variables were estimated simultaneously. This approach entailed using longitudinal person-period data, where fixed effects estimates were generated by regressing the ln of total drinks on person-specific mean deviations for each of the time-varying event- and individual-specific variables. This approach, also referred to in the multi-level modelling literature as *group-mean centring*, provides (fixed) effect estimates which implicitly control for *all*

potential measured or unmeasured time-invariant confounding factors – effectively producing a longitudinal analysis of the differences between study participants' ln of total drinks and differences in each exposure across the two study time-points (26).

The key difference between random- and fixed-effects estimators is how they treat unobserved cluster-specific differences (in our case, differences between individuals). These differences induce correlation in longitudinal responses which must be accounted for in analyses. Random effects analyses assume that these differences are best accounted for by a set of random variables uncorrelated with the vector of observed variables being modelled; whereas fixed effects analyses effectively treat these differences as fixed constants in the model, permitted to correlate with the vector of observed time -varying covariates and effectively enabling individuals to act as their own controls in longitudinal analyses. Further, the inclusion of measured time-invariant variables and respective between-person means for each time-varying factor in the same multilevel model provides estimates of independent effects for time-invariant covariates and also permits testing of whether unmeasured person-specific effects (i.e. the random effects) are independent of the time-varying factors in the model (i.e. the key assumption of random effect orthogonality).

Likelihood ratio (LR) tests were used to estimate the comparative model fit of less-constrained models as it related to: a) modelling the functional form (i.e. exploring linearity) of the association between continuous event-specific variables and in total drinks, b) the joint significance of the individual-specific time-varying variables and c) specific effect interactions between event-specific variables and gender. Joint Wald tests were used to test the effects of the polytomous exposures and also on the differences in effect between between-person mean and person-specific mean deviation variables – i.e. assessing the extent to which the assumption of random effect orthogonality (its independence from the vector of modelled covariates) held given the model. We report exponentiated coefficients where the coefficient represents the ratio of expected geometric mean difference in total drinks consumed between exposure levels or groups. Given the estimation method (maximum likelihood) and its application using all valid observations for individuals regardless of response balance across the two time-points, effect estimates are unbiased assuming attrition takes a missing at random (MAR) process (26). All statistical analyses were undertaken using Stata Version 13.1.

Results

Sixty-six per cent (531/802) of the original sample completed follow-up interviews, providing a total of n=1,333 (531+802) person-specific observations across the two time-points. Of these, approximately 11% (n=141) were excluded from analyses due to missing data on either the exposure variables or outcome. A further 9% (n=119) were excluded as outliers (> ±3.29 standard deviations [SD] from sample means, i.e. $p < 0.001$) with respect to the total drinks measure or the other

continuous event-specific variables. The final study sample comprised 710 participants providing 1,073 person-period observations (an average of 1.51 observations per participant). There was no significant difference ($F(1,786)=2.02$, $p=0.156$) in total drinks consumed between those included (mean=11.2 drinks) and those excluded (mean=10.5 drinks) from analyses.

Between and within-person descriptive statistics are shown in Table 1 and cross-sectional means for event-specific factors by interview in Table 2. In terms of the socio-demographic characteristics of study participants, at baseline around half of the sample was aged less than 21 years (52%), half were male and the large majority (90%) were born in Australia. The large majority identified as heterosexual (93%), most were studying full-time at the time of the interview (57%), had more than AUD160 weekly recreational spending money (58%), a weekly income of between AUD250 and AUD600 (47%), were educated to Year 12 level (68%) and were living with their parents (92%). In terms of mental health and social support, study participants exhibited an above average mean PWI score of 80 (Aust. 18-25 yrs norm = 74.6(24)), and the majority of the sample reported greater than four social supports (83%). As the "within per cent" estimates in Table 1 indicate, for these socio-demographic factors there was noticeable within-person variation between interviews. For example, weekly income and weekly recreational spending money varied between interviews for approximately 18% of study participants, with those earning the most per week (AUD600; 85%) and those with the most recreational spending money available per week (AUD160; 86%), not surprisingly, exhibiting the greatest consistency in income and spending behaviour over time.

There was also considerable person-level variation in average weekly drinking levels between the two time-points (Table 1). Most participants (81%, 'between' column of Table 1) reported drinking less than 21 drinks per week on average at least once across the two time points, with 19% also reporting drinking between 21 and 35 drinks per week at least once. The large majority (94%, 'within' column of Table 1) of those who reported drinking less than 21 drinks per week on at least one of the two interviews did this consistently across interviews, whereas those drinking between 21-35 drinks (74%) and 35 or more drinks (77%) per week were less consistent in their pattern of average drinking observed across interview waves.

Table 2 shows that in the sample as a whole there were only small changes in event-level variables between interview waves. Nonetheless, there was considerable person-level variation in the time-varying event-specific variables between interview waves (Table 1). The variation in total drinks consumed between time points for the same study participant (SD=2.3) was almost half the variation between participants (SD=4.9) across the sample. On average, drinking events lasted 7.5 hours across an average of 1.9 locations - again with considerable variation evident between time points for the

same study participants (duration: SD=2.1 hours; No. of locations: SD=0.81 locations) relative to variations between participants (duration: SD=3.4 hours; No. of locations: SD=0.82 locations) across the sample.

The large majority of participants reported drinking episodes that began between 6pm and midnight (86%, 'between' column of Table 1), but over a quarter also reported at least one drinking occasion that started between midday and 6pm. Compared to those reporting a drinking event starting after 6pm (91%, 'within' column of Table 1), those reporting a drinking occasion starting between midday and 6pm were less homogenous across the two occasions (72%) in terms of when they initiated a drinking episode.

Factors associated with total drinks consumed during events

Table 3 shows the results from our hybrid linear regression modelling showing fixed (time-variant) and random (time-invariant) effect associations for both event- and individual-specific variables on ln total drinks consumed.

Event-specific variables

The duration of the drinking event, the number of drinking locations and the number of different beverage types consumed were independently associated with increases in total drinks. The association between event duration and total drinks was non-linear (polynomial for duration: LR $\chi^2(2)=24.43$, $p<0.001$), such that the increase in total drinks associated with increased event duration was attenuated as event duration increased. For example, the hour increase in event duration from one to two hours, independent of other factors, was associated with in an increase in total drinks of around half a drink. In contrast, an hour increase at hour 10 was associated with an average increase in total drinks of only one-fifth of a drink. For every additional drinking location visited participants reported a 6% increase in total drinks (translating into an increase of around one quarter of a drink). We also observed a 9% increase in total drinks consumed for every different type of drink (i.e. beverage type) that a person chose to drink on a drinking occasion. The time a person's drinking event began (joint Wald $\chi^2(2)=1.78$, $p=0.411$) was not associated with the number of total drinks consumed. Independent of other event- and individual-specific factors, there was a marginally significant (Wald $\chi^2(1)=3.92$, $p=0.048$) average decrease of 5% in total drinks consumed between interview waves. There were no gender-specific differences in effect on numbers of drinks or the duration of the drinking event (LR $\chi^2(2)=0.53$, $p=0.769$), the number of drinking locations visited (LR $\chi^2(1)=0.14$, $p=0.708$), nor the number of different drink types consumed (LR $\chi^2(1)=1.35$, $p=0.245$).

Individual-specific variables

Few individual-specific variables (as modelled in analyses) were related to variation in total drinks. Shifting from no study to full-time study was associated with an increase of 16% in the number of total drinks consumed (Wald $\chi^2(1)=7.73$, $p=0.005$). There was a similar increase in total drinks for the shift from not studying to part-time study (13%); however, this association was not statistically significant (Wald $\chi^2(1)=2.96$, $p=0.086$). The difference in total number of drinks between studying full- and part-time was not statistically significant (Wald $\chi^2(1)=0.20$, $p=0.658$). Females reported drinking 38% less total drinks than males (Wald $\chi^2(1)=136.19$, $p<0.001$, although note the differences in eligibility criteria). No other individual-specific variables, including average weekly alcohol consumption, were significantly associated with the number of total drinks consumed (Table 2). The joint contribution of time-varying individual-specific factors to improvement in fit (i.e. over and above event-specific factors) of the fixed effects model was not statistically significant (LR $\chi^2(14)=18.05$, $p=0.205$).

Finally, a post-estimation joint Wald test showed there was marked difference (joint Wald $\chi^2(21)=50.01$, $p<0.001$) in the effect estimates from the fixed effects estimator (person-specific mean deviation factors) and the random effects estimator (between-person mean factors). This indicated the presence of time-invariant confounding. This finding points to likely bias in effect estimation from a random effects approach with these data, hence suggesting that the fixed effect estimation we implemented is appropriate in this case.

Discussion

We examined the relationship between individual- and event-specific variables and total drinks consumed during RSOD events. Three of the event-specific variables we considered -- the number of different locations attended, the total hours of the drinking event and the number of different drink types consumed -- were associated with higher numbers of total drinks consumed. Drinking event start time was not associated with total drinks consumed. Importantly, these event-specific effects were evident after adjustment for an extensive range of individual-specific variables that would be expected to relate directly to total consumption (e.g. weekly drinking levels that showed an average decline over time). However, of the individual-specific variables we examined, only male gender and being in full-time study were associated with higher consumption on these most recent RSOD events. The effect of gender here is likely to reflect the higher drinking threshold (>10 ASDs for males and >7 ASDs for females) in our study. It is also important to note that estimates from our fixed-effects multilevel approach to examining the effects of event- and individual-specific time-varying variables

are not biased by time-invariant individual-specific variables (either those we measured such as age, or unmeasured variables such as familial history of drinking). Finally, the significantly improved model fit we observed when including event-level variables over and above the individual level effects shows that event-level variables explained more variance related to total drinks consumed than the individual-specific variables we examined.

Our findings are largely consistent with what we expected on the basis of previous research. However, one key contrast between our study and previous work is our use of an RDD sample. While our response and retention rates were not perfect, our sample is likely to be more representative of the general population than those obtained through market research panels (27), or other convenience sampling strategies (10, 17). Use of such a sampling technique is particularly rare for samples taken from such a specific segment of the general population (risky drinkers aged 18-25 years) and lacks the bias of samples recruited from in and around licensed premises, since heavy drinkers in other contexts are included in our sample. Furthermore, as mentioned previously, our modelling approach using longitudinal data implicitly controls for all individual-specific time-invariant variables (e.g. those measured such as gender and those not measured such as prior alcohol-related socialisation or parental history of alcohol use) that may confound the associations for time-varying variables estimated in our study. It is important to note, however, that the fixed effects analyses presented in this paper are susceptible to omitted variable bias with respect to variables that can vary across time, and similarly that the effect estimates for time-invariant variables (gender, country of birth and age at baseline) are susceptible to bias from omitted variables (both time-invariant and time-variant) in the random effects component of the hybrid model. Further it is important to note that we only examined two drinking occasions, meaning that only contemporaneous effects could be estimated in the longitudinal modelling. Therefore we were unable to delineate outcome and exposures over time and infer beyond rudimentary association.

Nevertheless, despite these differences in design, our findings on the comparative effects between individual- and event-specific variables on the amount consumed during RSOD events partially mirror those of previous studies (17, 18). The number of drinking locations was associated with an increase in the amount of drinking on these peak consumption events, which is similar to the findings reported by Sunderland et al. (27). Similarly, duration of the RSOD event was also independently related to the amount consumed, a finding similar to that reported by Labhart et al. (17). However, it should be noted that our study estimated effects for a more restricted range of event-specific variables than those included in other studies.

Our finding that the temporal duration of the drinking event was associated with higher levels of drinking is consistent with an older observational literature on drinking in bars, which (in an era of

fairly small standard drink-sizes) often found a drinking rate of about one drink every quarter-hour, often with an extra initial drink (28, 29). In such studies, the rate of drinking did not appear to vary with the number in the drinking group (30) – though the number in the drinking group affected the length of the occasion. These studies differed from our study in being of drinking occasions in a single site; multilocality may well have the effect of slowing down the drinking rate while nevertheless somewhat increasing the total amount consumed. While a number of factors may affect the rate of drinking on a "serious drinking" occasion like those in our study, including human physiology on the one hand and expectations and prompts from service staff on the other, a strong central tendency in drinking rate arises from the drinkers in the group matching each others' drinking rate (31), particularly in a cultural frame such as Australia where "shouting" (standing rounds) is common.

Conclusion

We found that characteristics of risky drinking events were associated with the total number of drinks consumed during specific events. In contrast, we found few characteristics of individual drinkers were related to the total drinks consumed. These findings suggest that intervention during drinking events may be a promising avenue for reducing harms related to RSOD. Importantly, the use of panel data in our study strengthen previous findings that suggest event-level variables influence consumption above and beyond individual-level variables when predicting heavy drinking. In future work with the YAAS sample we plan to examine a wider range of event-specific contextual variables such as the social circle present during the drinking occasion and consider how these effects and others such as pressures to drink less (32), or the experiences of harms, may further suggest avenues for intervention. Further work is also needed in order to understand levels of consumption within specific drinking locations and whether these event-level variables within heavy drinking episodes are important in the production of event-specific harm.

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Table 1: Longitudinal univariate sample characteristics: Means, within and between standard deviation (sd), counts (n) and within, between and overall per cent (%) (n=710).

		sd			*n (%)*		
Factors	***Mean***	*Overall**	*Between*[†]	*Within*[‡]	*Overall*	*Between*[^]	*Within*[#]
Event-specific time-variant							
No. of ASDs (geometric mean)	12.4 (11.2)	5.2	4.9	2.3			
No. of locations	1.9	0.8	0.7	0.4			
No. of different drink types	1.72	0.82	0.73	0.43			
Duration of drinking event (hours)	7.5	3.8	3.4	2.1			
Event start-time							
Before 12pm					31 (2.9)	29 (4.1)	68.9
12pm to 6pm					215 (20.0)	192 (27.0)	72.4
6pm to 12am					827 (77.1)	607 (85.5)	90.8
Individual-specific time-variant							
Average per weekly drinking							
< 21 drinks					824 (76.8)	576 (81.1)	93.6
21-35 drinks					143 (13.3)	133 (18.7)	73.7
35+ drinks					106 (9.9)	95 (13.4)	76.8
Average weekly spending money							
$0-$80					185 (17.2)	162 (22.8)	78.7
$80-$160					349 (32.5)	290 (40.9)	78.5
$160+					539 (50.2)	414 (58.3)	85.8
Weekly income							
$600+					350 (32.6)	279 (39.3)	85.3
$250-$599					418 (39.0)	334 (47.0)	80.2
0$-$249					305 (28.4)	253 (35.6)	80.6
Study							
Full-time					552 (51.4)	405 (57.0)	88.5
Part-time					125 (11.7)	110 (15.5)	80.0
Not-studying					396 (36.9)	315 (44.4)	83.7
Education							
< Year 12					655 (61.0)	474 (66.8)	92.5
Year 12					331 (30.9)	238 (33.5)	87.8

Tertiary or Diploma					87 (8.1)	77 (10.9)	81.2
Living situation							
With parents					948 (88.4)	652 (91.8)	96.3
Not with parents					125 (11.7)	106 (14.9)	77.4
Sexual identity							
Heterosexual					992 (92.5)	661 (93.1)	98.9
Other					81 (7.6)	63 (8.9)	88.9
Personal Wellbeing (PWI)	79.5	11.1	10.8	4.2			
Social support							
4+ people					826 (77.0)	586 (82.5)	93.5
< 4 people					247 (23.0)	200 (28.2)	81.0
Individual-specific time-invariant factors							
Gender (male)					544 (48.8)	355 (50.0)	100
Age at baseline							
< 21 years					549 (51.1)	368 (51.8)	100
21+ years					524 (48.8)	342 (48.2)	100
Country of birth							
Australia					969 (90.3)	637 (89.7)	100
Other country					104 (9.7)	73 (10.3)	100

[*] Overall standard deviation indicates variation in participant-specific observations relative to the overall sample mean
[†] Between standard deviation indicates variation in participant-specific means relative to the overall sample mean
[‡] Within standard deviation indicates variation in participant-specific observations relative to participant-specific means
^ Between per cent represents the percentage of participant responses across the two time-points with a specific value of a factor, where the denominator for this percentage is the number of study participants (n=710)
[#] Within per cent indicates the percentage of participants who indicated a respective behaviour/attribute and consistently indicated the same behaviour/attribute at each interview.

Table 2: No. of Australian Standard Drinks (ASDs) during the event and event-specific factors by interview: mean and standard deviation (sd) (n=1,073*).

	Baseline	*Follow-up*
	(n=645)	**(n=428)**
No. of ASDs [geometric mean]	12.7 [11.6] (5.1)	11.8 [10.7] (5.3)
No. of locations	1.8 (0.84)	1.9 (0.79)
No. of different drink types	1.8 (0.85)	1.7 (0.76)
Duration of drinking event (hours)	7.8 (4.0)	7.1 (3.6)

*The original sample comprised n=802 study participants with n=1,333 person-specific observations across the two time-points. Of these n=141 were excluded from analyses due to missing data and n=119 were excluded as univariate outliers with respect to the total drinks measure or the other continuous event-specific variables; leaving n=710 participants with n=1,073 person-specific observations for analyses.

Table 3: Event- and individual-specific factors associated with log of number of total drinks from fixed- and random-effect regression analyses: Adjusted exponentiated regression coefficient (Exp. b), 95% confidence interval (95%CI) and probability value (p-value) (n=710[*])

	Exp. b†	95% CI	p- value
Fixed effect model‡			
Event-specific time-variant factors			
No. of locations	1.06	1.02-1.11	0.006
No. of different drink types	1.09	1.04-1.14	<0.001
Duration of drinking event (hours)			
Linear	1.06	1.04-1.09	<0.001
Quadratic^‡	0.99	0.99-0.99	<0.001
Event start-time			
Before 12pm	0.88	0.70-1.09	0.230
12pm to 6pm	1.02	0.93-1.11	0.712
6pm to 12am	ref.		
Interview			
Baseline	ref.		
Follow-up	0.95	0.89-1.00	0.048
Individual-specific time-variant factors			
Average per weekly drinking			
< 21 drinks	ref.		
21-35 drinks	0.95	0.85-1.07	0.437
35+ drinks	0.98	0.85-1.14	0.819
Average spending money			
$0-$80	ref.		
$80-$160	1.00	0.89-1.12	0.997
$160+	0.98	0.87-1.12	0.807
Income			
$600+	ref.		
$250-$599	1.01	0.90-1.12	0.916
0$-$249	1.05	0.92-1.20	0.492
Study			
Full-time	1.16	1.04-1.28	0.005

Part-time	1.13	0.98-1.29	0.086
Not-studying	ref.		
Education			
< Year 12	ref.		
Year 12	1.13	0.99-1.29	0.057
Tertiary or Diploma	0.97	0.82-1.14	0.689
Living situation			
With parents	ref.		
Not with parents	1.00	0.88-1.15	0.966
Sexual identity			
Heterosexual	ref.		
Other	1.15	0.90-1.45	0.262
Personal wellbeing (PWI index)	1.00	0.99-1.00	0.625
Social support			
4+ people	ref.		
< 4 people	0.91	0.85-1.14	0.076
Random effects model[#]			
Individual-specific time-invariant factors			
Gender (male)	1.38	1.30-1.45	<0.001
Age at baseline			
< 21 years	ref.		
21+ years	0.97	0.91-1.03	0.287
Country of birth			
Australia	ref.		
Other country	0.98	0.90-1.07	0.630

[*]The original sample comprised n=802 study participants with n=1,333 person-specific observations across the two time-points. Of these n=141 were excluded from analyses due to missing data and n=119 were excluded as univariate outliers with respect to the total drinks measure or the other continuous event-specific variables; leaving n=710 participants with n=1,073 person-specific observations for longitudinal analyses.
[‡]Exponentiated coefficients represent the ratio of expected geometric mean difference in ASD consumed for a one-unit change in a factor (i.e. The % change in ASD consumed for a one-unit change in exposure).
‡ Estimates from the fixed-effects component of the hybrid longitudinal modelling which are restricted to within-participant differences only.
^ To account for the non-linear functional form of the association between duration of the drinking event and ASD consumed, a quadratic term was estimated in the final model[#] Estimates from the random-effects component of the hybrid longitudinal modelling to provide effects estimates for time-invariant factors.
ref. = reference group