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Abstract: Alcohol's function as a regulator of emotions has long been denoted in figures of speech, most famously 'in vino, veritas' (in wine, truth). In contrast, we ask whether an individual's alcohol-related behaviors can be inferred from the words they use to write about alcohol. Participants completed an open-ended essay as part of a survey on alcohol attitudes and behaviors. We used a computerized technique, the Meaning Extraction Method, to summarize the responses into thematic tropes, and correlated these with quantitative measurements of demographics, attitudes and behaviors. Participants were recruited using a random population postal survey in the U.K (n=1229). Principal components analysis identified co-occurring words to locate themes in the responses. Seven themes were identified that corresponded to both negative and positive aspects of alcohol consumption ranging from concern for the influence of alcohol on others (e.g., children and family) to participants' own enjoyment of alcohol (e.g., social drinking). Significant correlations suggested a relationship between the essay responses and individual consumption patterns and attitudes. This study therefore examines how individuals in UK drinking cultures commonly construe alcohol consumption in their own words.

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As author of Cameron D, Thomas M, Madden S, Thornton C, Bergmark A, Garretsen H, & Terzidou, M. (2000) Intoxicated across Europe: in search of meaning. *Addiction Research*, 8, 233-242. Douglas Cameron is one of the few psychiatrists concerned with alcohol to have written on the role of language in the topic.

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Markus Wolf is familiar with the methodologies used in this paper e.g., Wolf, M., Sedway, J., Bulik, C. M. and Kordy, H. (2007), Linguistic analyses of natural written language: Unobtrusive assessment of cognitive style in eating disorders. *Int. J. Eat. Disord.*, 40: 711-717. doi: 10.1002/eat.20445

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- The study looks at whether individual's alcohol-related behaviors can be inferred from the words use when describing alcohol.
- Participants completed an open-ended essay as part of a survey on alcohol attitudes and behaviors, this was analysed by the computerized Meaning Extraction Method.
- Seven themes were identified that corresponded to both negative and positive aspects of alcohol consumption ranging from concern for the influence of alcohol on others (e.g., children and family) to participants' own enjoyment of alcohol (e.g., social drinking).
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Running head: IN VERBIS, VINUM?

In verbis, vinum?

Relating themes in an open-ended writing task to alcohol behaviors

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### Abstract

Alcohol's function as a regulator of emotions has long been denoted in figures of speech, most famously 'in vino, veritas' (in wine, truth). In contrast, we ask whether an individual's alcohol-related behaviors can be inferred from the words they use to write about alcohol. Participants completed an open-ended essay as part of a survey on alcohol attitudes and behaviors. We used a computerized technique, the Meaning Extraction Method, to summarize the responses into thematic tropes, and correlated these with quantitative measurements of demographics, attitudes and behaviors. Participants were recruited using a random population postal survey in the U.K (n=1229). Principal components analysis identified co-occurring words to locate themes in the responses. Seven themes were identified that corresponded to both negative and positive aspects of alcohol consumption ranging from concern for the influence of alcohol on others (e.g., children and family) to participants' own enjoyment of alcohol (e.g., social drinking). Significant correlations suggested a relationship between the essay responses and individual consumption patterns and attitudes. This study therefore examines how individuals in UK drinking cultures commonly construe alcohol consumption in their own words.

Key words: Alcohol Consumption, Meaning Extraction Method, Survey Methodology, Language, Drinking Cultures

### In verbis, vinum?

#### Relating themes in an open-ended writing task to alcohol behaviors

As is illustrated by the Latin phrase *in vino veritas* (in wine truth), it has long been assumed that alcohol consumption exerts a powerful influence on how we use language. In many cultures, even the word ‘drink’ is synonymous with ‘alcohol’ (Mandelbaum, 1965). However, despite alcohol’s occurrence in figures of speech across historical periods and in diverse cultural contexts (Koch, 1987; Mandelbaum, 1965) no research has attempted to answer the question of whether alcohol-related behaviors can be inferred from the words people use about alcohol. Therefore, in this study, we asked a random population sample to write an open-ended essay about alcohol and examined how people's words relate to their behaviors.

Previous studies that have considered language use in relation to alcohol have concentrated intoxication, for example comparing the words used to denote states of drunkenness (Cameron et al., 2000; Levine, 1981; Levitt, Sher, & Bartholow, 2009). This study shifts the emphasis of research from this problem-focused approach into commonplace drinking in a random population sample.

Furthermore, this study allows participants to write about alcohol in their own words. Surveys have typically limited the responses available to participants (Paulhus & Vazire, 2007), however, with advances in computerized text analysis methods, it is now possible to analyze much longer streams of open-ended text. The current study uses the Meaning Extraction Method (MEM: Chung & Pennebaker, 2008) to summarize participants’ responses in an efficient

## IN VERBIS, VINUM?

manner. We then relate the themes derived from the MEM to self-reported alcohol consumption, attitudes and demographics.

When combined, the computerized text analysis method and rating scale methods produce an in-depth summary of the commonplace reasons our respondents give for their own and others' drinking behaviors. This allows us to move beyond considering individual or social factors of alcohol in isolation, and to see how they combine.

## **Method**

### **Participants**

The study was conducted in the U.K. Participants were selected via random allocation probability sampling and invited in a letter to complete the "National Drinking Cultures Survey". An initial letter invited participation, a second letter one week later included a copy of the survey and prepaid envelope, and details of a website for online completion. A reminder letter followed two-weeks later.

A sample of 1,229 (757 female) was achieved, a response rate of 14.5%. Eight respondents were excluded due to missing data. Participants were aged between 16-95 years (mean 53.4 years, S.D. = 15.3). 91.4% of respondents were white British/Irish, 3.8% were white 'other', 2.2% were South Asian, 1.8% were black African/Caribbean, 0.7% declared mixed backgrounds and 1.0% of participants did not respond to this question. Whilst there is an over-representation of female, white British, and older participants, the analytic methods used in this study allow under-represented groups to be visible in the analysis. The resultant clusters of co-occurring words and the correlations show patterns associated with under-represented demographics such as younger or male participants.

**Measures: The Drinking Cultures Survey**

Before any scale items were presented, participants were given the open-ended writing task: *We are trying to understand when and why people drink alcohol. Could you spend a few minutes and tell us your thoughts about this? Why do you think people drink in general? If you drink, when and why do you do it? If you don't drink, why don't you? Write as much or as little as you like. If you need more space, please continue on [the blank page provided].*

**Drinking behaviors**

**Regularity of drinking.** Participants were asked how often they had consumed alcohol in the last 12 months, with ten responses from 'Every day/nearly every day' to 'Did not drink alcohol in the last year'. These were converted to 'days per year' for analysis (from 365 to zero).

**Annual alcohol intake.** Respondents' annual consumption of alcohol was calculated using the expanded quantity/frequency measure (WHO, 2006). Participants were presented with a color picture showing the amount of alcohol of popular beverages (measured in UK units – approximately 1cl of absolute alcohol). Five questions gauged the participant's regular drinking behavior (e.g., 'How many units of alcohol did you usually have on days when you drank during the last 12 months?').

There are several measurements of alcohol intake, each having benefits and limitations. The simple quantity/frequency measurement is acknowledged to under-estimate consumption amounts (e.g. Rehm et al., 1999; Stockwell, Donath, Cooper-Stanbury, Chikritzhs, & Catalano, 2004). Other measures such as the 'last week' method offer more accurate sample-level estimations, but fare less well at individual consumption amounts or limit the measurement to very specific time periods (e.g., Stockwell et al., 2004). The expanded quantity/frequency



IN VERBIS, VINUM?

measurement used in this study includes extra questions in order to capture exceptional drinking periods whilst offering an annual approximation of each individual's consumption (Dawson & Room, 2000).

***Largest number of units on a single day.*** This single item measure recorded the largest amount of alcohol participants reported drinking in a single day during the last year.

***Number of drinking sessions above 10 units.*** Participants answered two questions on the frequency that they drank between 10-19 units on a single day, and above 20 units. The results were converted to the median number of days per annum, and summed together to give the number of days per year that participants' drinking exceeded 10 units.

### **Psychosocial measures**

***Attitudes.*** Five items asked participants to complete the sentence 'Drinking alcohol is...' by selecting a point on a seven-part scale between contrasting word pairs such as Good/Bad (Ajzen, 1991). All participants completed this scale. The Cronbach alpha coefficient for these items was .86.

***Drinking Motivations.*** Twelve questions considered participants' motivations for drinking (Cooper, 1994; Kuntsche & Kuntsche, 2009). Four motivations were assessed: social, coping, enhancement and conformity. The Cronbach alpha coefficients were acceptable (social .84; coping .86; enhancement .73; conformity .82).

Analyses

### ***The Meaning Extraction Method (MEM)***

The 1,221 open-ended response files were processed using WordSmith (Scott, 2008), a software listing the frequency of use of each word in the corpus. Of these 1,221 files, 82 were blank, resulting in 1,139 files with a mean of 75.32 words (SD = 68.42; Max = 739).

## IN VERBIS, VINUM?

Content words used by at least 20 people in the corpus were formatted into a custom Linguistic Inquiry and Word Count (LIWC: Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007) dictionary. Function words (e.g., pronouns and prepositions) were excluded, in order to consider the topics being written about rather than participants' writing styles (Chung & Pennebaker, 2008). The dictionary included each of the 154 top content words and all of its forms (e.g., "escape" included "escaped", "escapes", etc.). LIWC was used to process all 1,139 responses using the custom dictionary. The resultant output was a 1,139 essay X 154 word matrix, indicating whether a word had been used in a response. A principal components analysis with Varimax rotation was conducted on the matrix, including only responses that included at least 20 words ( $n=1,001$ ).

Diagnostic tests indicated that a component model was appropriate for the data ( $KMO = .60$ ), Bartlett's test of sphericity  $\chi^2(11781) = 24748.95$ ,  $p < .001$ . Three steps determined the appropriate number of components for extraction. A scree plot was ambiguous and possible inflexions occurred at six or seven components. The component groupings for both component solutions were examined to consider their interpretability. In both cases, the components made apparent sense, with very similar content. For this reason the seven component solution was explored further as a potentially more complete solution. Parallel Analysis did not contradict the seven component extraction; each of the extracted components had an eigenvalue exceeding the corresponding criterion value for a randomly generated data matrix of the same size (154 variables x 1,001 participants: Factor 7 random value: 1.7121, observed value: 2.004). This solution explained 13.71% of the variance. This figure is comparable to other MEM research (Chung & Pennebaker, 2008).

### *Correlations of MEM Themes to Survey Measures*

## IN VERBIS, VINUM?

Regression-based component scores were computed for each participant on each MEM component, which indexed the degree to which each response included words on a particular component. These regression-based scores were then correlated with other measures in the study. As some components correlated significantly with gender and age (reported below), these were controlled for in the behavioral and psychosocial measures through the use of partial correlations.

### Results

The MEM produced seven components, each made up of a list of words that tended to co-occur across responses (see Table 1). Only words with loadings with an absolute value greater than .30 are reported. The seven components extracted appeared to be related to the following seven themes: Children and Family, Consequences, Meal, Weekend, Peer Pressure, Social Drinker and Special Occasion. To check the validity of the labels and explore what types of narratives the components represent, we qualitatively examined the ten essays with the highest regression-based scores for each component.

As expected, the relationship between children and alcohol was discussed in all of the top ten essays in the first component. Eight out of ten participants discussed the role of alcohol in their own family relationships. Although these relationships varied, the importance of moderation was mentioned in all essays:

Participant #508 (female, 51 years): I never binge drink. I never drink and drive. Alcohol for me is a positive thing but I could easily live without it. Young people seem largely to regard binge drinking as an essential part of their culture. [...] This is less the case for my generation but I worry if this pressure is going to continue for my children as they progress through life.

## IN VERBIS, VINUM?

The top ten essays in the Consequences component discussed possible alcohol outcomes. Although the same words recurred, the variety of meanings attached to them signifies the potential range of concerns. For example, eight out of the ten participants used the word *control* which appeared ten times in total: five times to describe participants' control over their own behavior; twice in regards to others losing control; twice to describe parental control over children; once to state that the government has no control over the marketing of alcohol. Despite these differences, all of these essays exemplify concern that alcohol-use can lead to negative consequences. For example, the following extract focuses on the personal consequences of her experiences:

Participant #632 (female, 51 years): [...] I must admit for most of my life I have enjoyed drinking. However I now find that it is more like a bad habit which is difficult to get out of. I drink when I am stressed but it now only makes me happy for 2 out of every 5 occasions. So now I drink less because I don't like the horrors I get in the middle of the night and the following morning...

The words in the Meal component refer to drinks and drinking apparatus (e.g., *spirits* and *wine*, and *glass* and *bottle*), to the *evening*, and to the activity of eating (*meal*). Eating appears to be a particular organizing feature around the essays; every single author in the ten essays discussed their own drinking as occurring whilst they eat.

Although some participants mentioned negative effects associated with excessive alcohol intake, their essays also considered the enjoyment of taste and flavor complements:

Participant #553 (female, 56 years): I like to drink a glass of wine with my evening meal. If it is nice wine I like to drink more than 1 glass, but rarely more than 2 except at a party.

## IN VERBIS, VINUM?

I drink more on holiday - usually in Italy- when I may also have a glass at lunchtime. I sometimes drink the odd aperitif e.g. campari - very rarely spirits or beer. I like the taste of good wine and feel it complements the food I eat...

The words within the Weekend component focused on post-work drinking on Friday evenings and weekends. Seven out of ten participants stated that they do most of their drinking at this time. A taxi driver described how he works at the weekend taking others out socializing and drinks on his own days off. Only one participant invoked the weekend to describe other people's drinking as a menace. The highest participant on the fourth component displayed the symbolic significance of Friday evening:

Participant #922 (female, 42 years): I have a couple of glasses of wine on a Friday/ Saturday night after the children have gone to bed. I think it signifies a start to the weekend when me and my husband can relax [...]

The fifth component, Peer Pressure, was the least distinct of those generated through the MEM. The words included in the component (*escape, inhibitory, peer, people, pressure, relax* and *social*) point to a combination of incentives and pressures for drinking alcohol. All participants who scored highest on this component described both their own and other's drinking, and it is perhaps this that draws out the mix of words seen in this component.

Participant #900 illustrated this combination by writing about a series of different motivations for alcohol-drinking:

Participant #900 (female, 25 years): I believe the majority of people drink to be sociable or to fit in to a crowd. Whether this refers to teenagers and their peers or workers and

## IN VERBIS, VINUM?

their colleagues. Some people I think use it as a form of relaxation to chill after a hard day at work. [...] When I drink it is usually for the sociability with friends...

Six of the ten participants with the highest scores in the Social Drinker component describe regular visits to public houses for social occasions, and one further participant discussed socializing over drinks in other locations. Participant #1120 (male, 65 years) stated this plainly: *In terms of my present drinking habits - I visit my local public house twice a week and drink 2 pints of bitter on each occasion. While there I meet and chat with friends.* The three remaining participants discussed pub drinking in negative tones.

Each of the highest-scoring participants for the seventh component, Special Occasions, discussed drinking in terms of noteworthy instances, and most listed similar events to those that are described in the component. For example, the highest loading write-up, from participant #1186 (female, 31 years) began *I only drink on special occasions like a birthday, wedding or Christmas.* In these essays most of the participants explicitly described their own drinking as very moderate.

### **Correlations of MEM Themes to Survey Measures**

The correlations between the MEM themes and gender and age items are reported in Table Two. Because these two items are shown to correlate significantly with some of the MEM themes, partial correlations between the themes and behavioral and psychological measures are reported in Table Three, controlling for gender and age in order to avoid the demographic differences between groups masking other relationships.

The Children and Family component correlated positively with both demographic items, indicating that women and older participants were more likely to use words that occur in this

## IN VERBIS, VINUM?

component. Significant partial correlations indicated that use of family-based words was associated with self-reported non-drinking, and for those participants who did drink alcohol with lower annual alcohol intake and less regular drinking occasions. Participants who wrote about children and family in their essays tended to have less favorable attitudes towards drinking, and were less likely to report using alcohol to cope with their problems or to drink for enhancement.

The Consequences component was not correlated significantly with age or gender. Participants who wrote about the negative consequences of alcohol consumed less: it was negatively correlated with annual alcohol intake, the largest number of units consumed on a single day and the number of drinking occasions over ten units. They were also less likely to report drinking for coping or enhancement.

The Meal component was positively correlated with age, so older participants used more of the words in this component. Writing about mealtimes was positively correlated with likelihood of being an alcohol drinker, and a high loading on this component correlated significantly with greater regularity of drinking and higher alcohol intake. However, there was a significant negative correlation with number of drinking occasions over ten units, suggesting alcohol consumption occurred regularly but in moderation. Participants who wrote about mealtimes had positive attitudes towards alcohol.

The component Weekend was correlated significantly with women, and correlated negatively with age. Participants who wrote about weekend drinking were more likely to be drinkers, with significant positive correlations with regularity of drinking, annual alcohol intake, and largest number of drinks consumed in a single day.

The component loading on Peer Pressure correlated significantly negatively with age. There were no significant correlations with behavioral or psychosocial measures. This suggests

## IN VERBIS, VINUM?

that instead of capturing a relationship between the words and alcohol, it may instead capture words more likely to be used by younger participants across the range of alcohol behaviors.

The Social Drinker component was significantly correlated with men. Participants who wrote about social drinking were regular drinkers with higher annual consumption. They expressed social motivations for drinking.

Women were more likely to write about Special Occasions. These participants showed less regular drinking and a lower annual alcohol intake.

## Discussion

The seven components of co-occurring words derived from responses to the open-ended question suggest that the words that people choose to write about alcohol relate to their own drinking styles, attitudes and motivations. Further, the relationships highlight the value of incorporating open-ended questions into large-scale surveys, in that the MEM can produce meaningful quantitative results.

The seven components reveal recurring themes that arose when participants in the survey were asked to conduct unrestrained writing about alcohol. Although the topic of intoxication appears to run through some of the components identified, it is not the only topic of interest to respondents. For example, the word list of Component Two: Consequences has the word *drunk*, which can be tied with *behaviour*(sic), and *control* to voice concern about the intoxicating effects of alcohol, and this is supported by the high-scoring essays that suggest that a concern with drunkenness runs through this component.



## IN VERBIS, VINUM?

If drunkenness (and its many similes) is one of the topics of discussion, then it must be emphasized that the components identified do not solely focus on negative aspects of alcohol imbibing. The components Meal, Weekend and Social Drinker all appear to invoke positive portrayals of alcohol and the component Special Occasions is a list of celebratory events. Whilst alcohol is often portrayed as negative for health, public order and other reasons (e.g., Babor et al., 2010; Hobbs, Hadfield, Lister, & Winlow, 2005; Winlow & Hall, 2006), it is important to point to common topics that individuals identify with alcohol that are more positive. Such alternative topics indicate that campaigns targeted at reducing alcohol consumption by focusing on its associated negative consequences may fail to address reasons why individuals drink alcohol.

The correlations between the participants' loadings on each identified component and the demographic, behavioral and psychosocial measures provide further illustration of the relationship between the words used to discuss alcohol and respondents' drinking practices. Although the correlations are low, they should not be discounted for this reason (Tausczik & Pennebaker, 2010). Instead, it should be recognized that there is huge scope for variability as the source for the correlations consists of freely generated words responding to an invitation to write about a topic with very little further instruction. The significant correlations observed in the study suggest that there are regular topics that arise in the data, which relate to the alcohol-behaviors of the participants.

These correlations add meaning to the components and make sense of them, sometimes in unexpected ways. For example, the component Special Occasions signifies a list of celebratory events. However, its negative correlations with drinking intake and regularity suggest that the celebratory events are highlighted as exceptional moments of drinking, against a backdrop of

## IN VERBIS, VINUM?

relative abstinence. However, in contrast to Children and Family (Component One) the lower consumption rates are not combined with negative attitudes towards alcohol; instead, participants recognize their own pleasure from occasional consumption. This research suggests that there is merit in future studies investigating systematically how individuals' alcohol-related concerns and behaviors relate to wider cultural discourses surrounding alcohol (e.g., gender-based discourses: Newcombe, McCarthy, Cronin, & McCarthy, 2012).

The seven themes point to the study's location in the UK, traditionally considered as a 'dry' drinking culture with similarities to other Northern European countries and the US (Séller & McCormick, 1982; Wilson, 2005). This term is applied to countries with low per capita alcohol consumption and where alcohol is not integrated into daily activities (e.g. glass of wine with a meal). These are often contrasted with 'wet' cultures, such as the predominantly wine-drinking Mediterranean countries, where alcohol is integrated into daily life and abstinence rates are low. Perhaps paradoxically, in dry cultures drinking to intoxication has in the past been found to be more common than in wet countries (e.g., Room, 2001). In the current study, we see themes associated with dry cultures: there are themes concerned with the negative effects of alcohol (e.g., Consequences) and the discussion of alcohol in specific timeslots (e.g., Weekend). However, more recent studies suggest a possible homogenisation of international drinking cultures (Leifman, 2001), and with the incorporation of alcohol into everyday themes (e.g., during Mealtimes) the study hints at shifts in the wet/dry dichotomy (Gordon, Heim, & MacAskill, 2012). International samples could allow greater investigation of the variation in national cultural practices surrounding alcohol.

Whilst the current study used broad sampling aimed at getting as wide and representative perspective on UK drinking as possible, it may also be of value to consider the drinking

## IN VERBIS, VINUM?

behaviors and essays of groups specifically considered to be at risk from abuses of alcohol, such as underage and youth samples with a view to informing intervention strategies.

### **Conclusions**

By empowering participants to express their own thoughts and experiences about alcohol, the MEM analyzed essays complement the scale-based questionnaire methodologies. It is possible to further consider the similarities and differences in the way that alcohol is written about. The differences appear to relate to behavioral and psychosocial measures as shown by the correlations between the components. This has value by showing how particular topics are used by individuals with different relationships with alcohol, for example contrasting the family and child concerns with the regular enjoyment of alcohol in a meal setting. This insight into the intersection of psychological and social aspects of alcohol demonstrates the possibility for similar research across domains where large-scale surveys are conducted.

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IN VERBIS, VINUM?

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## IN VERBIS, VINUM?

Table 1

*Contents of Themes Extracted from the Open-Ended Prompt about Why People Drink, and Individual Component Loadings*

1: Children and family	2: Consequences	3: Meal	4: Weekend	5: Peer pressure	6: Social drinker	7: Special occasions
Age .366	Alcohol .386	Beer .452	Day .339	Escape .403	Friend .432	Birthday .595
Children .419	Behaviour .418	Bottle .314	Friday .603	Inhibitory .313	Meet .365	Celebrate .419
Father .398	Control .410	Evening .438	Night .440	Peer .395	Pub .378	Christmas .538
Older .364	Culture.371	Glass .628	Saturday .612	People .338		Special .461
Parents .441	Drunk .360	Meal .489	Week .390	Pressure .458		Weddings .508
Peer .434	Society .338	Red .384	Work .416	Relax .344		
Pressure .390		Spirits .337		Social .396		
Teenagers .355		Wine .754				
Year .424						

IN VERBIS, VINUM?

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Younger .407

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*Note.* Only those loadings with an absolute value greater than .30 are reported.



## IN VERBIS, VINUM?

Table 2

*Correlations between Extracted Themes and Gender and Age*

	Children and Family	Consequences	Mealtime	Weekend	Peer pressure	Social drinker	Special occasions
Gender	.103**	.048	.064	.102**	.058	-.130**	.127**
Age	.115**	-.027	.200**	-.276**	-.170**	.023	-.020

\*p&lt;.01 \*\*p&lt;.001

Table 3

*Partial correlations between Extracted Themes and Demographics, Alcohol Behaviors and Attitudes, controlling for Gender and Age.*

	Children and family	Consequences	Mealtime	Weekend	Peer pressure	Social drinker	Special occasions
Drinker or non-drinker	-.142**	-.049	.195**	.102**	.009	.067	.040
Regularity of drinking (all participants)	-.100*	-.061	.219**	.082*	.043	.084*	-.087*
Annual alcohol intake	-.145**	-.143**	.107**	.152**	.051	.107**	-.160**
Largest number of Units on a single day	-.030	-.108**	-.073	.103*	-.017	.060	-.039
No. of drinking occasions over 10 units	-.020	-.103*	-.096*	.060	-.067	-.003	-.025
Attitudes	-.170**	-.041	.287**	.134**	.051	.068	-.047
Motivation: Social	-.083	-.019	-.032	.131**	.064	.107**	.001
Motivation: Coping	-.108**	-.098*	-.123**	.065	.049	.066	-.007
Motivation: Enhancement	-.127**	-.054	-.016	.106**	.091*	.085	-.059
Motivation: Conformity	-.009	-.011	-.066	.068	.042	.055	-.066

\*.01    \*\*.001