Inhaling Alcohol Vapour or Mist: An International Study of Use, Effects and Harms

TITLE PAGE

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Competing interests: ARW is the founder and owner of Global Drug Survey (GDS) and ELD is part of the GDS expert advisory group.

Statement of contribution: ARW developed Global Drug Survey, directed data collection, and drafted the manuscript. CJW conducted the literature review and drafted the introduction. ELD contributed to survey questions on alcohol, analysed the data and drafted the results section. All authors contributed to and agreed on the final manuscript.

Word count 2835

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ABSTRACT

Objectives: To determine the prevalence, patterns of use and consequences of inhaling alcohol vapour or mist.

Design: Cross-sectional survey recruiting an international non-probability sample of people who use alcohol and other drugs as part of the annual Global Drug Survey (GDS).

Setting: Online questionnaire translated into 19 languages.

Participants: 110,557 people took part in GDS2020 and 88,124 completed a question about inhaling alcohol in the last 12 months. The focus of this study is GDS2020 respondents who reported inhaling alcohol mist/vapour from a balloon in the last 12 months.

Main outcomes: Last 12-month use of alcohol vapour, onset duration, intensity of effects, value for money compared with alcohol, and incidence of falls/injuries.

Results: A total of 803 people reported the use of alcohol vapour in the last 12 months, with 51% of the sample coming from 3 countries: Australia, Denmark and England. Two-thirds were male, and they were more likely to be under 25. 45.7% reported that they were a bit/very drunk before they inhaled alcohol. 51.3% reported that the effects lasted for less than 5 minutes. Both the intensity of effect and perceived value for money showed a normal distribution on a 10-point scale. 12.7% of respondents reported falling/injuring themselves.

Conclusion: Inhaling alcohol vapour appears to be more common among younger, higher-risk drinkers. The rapid onset of action and inability to titrate consumption to effect is a risk for acute injury. We consider that alcohol is harmful enough through oral consumption without adding to the risk of injury by offering such a potentially risky additional administration method.

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Highlights

- Alcohol is usually taken orally, but a recent trend to inhale its vapours or mists has emerged and little is known about this experience and its effects.
- In a global study, respondents from Australia, Denmark and England had tried this practice; 45.7% were already drunk when they did so, and 12.7% of whom had fallen or injured themselves afterwards.
- Inhaling alcohol vapours or mists may contribute to excessive intoxication and harm. Further research is needed to understand more about the associated risks and harms in order to inform public health policy and licensing decisions.

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INTRODUCTION

The practice of inhaling vapours for therapeutic and recreational purposes has a long history with evidence of its use reported in various ancient cultures, those of which include: Ancient Egypt, Babylonia, China, India and Greece (Butrica, 2002; Gage, 2020). Although the inhalation of vapours is an uncommon route of drug delivery for recreational purposes in modern times, it is seen with nitrous oxide (Winstock & Ferris, 2019), volatile nitrites (Davies et al., 2017) and solvents (Beckley & Woodward, 2013). In this paper we explore the inhalation of alcohol vapour, an unusual and risky novel method of recreational alcohol consumption.

Alcohol is the most commonly used drug in the world; it is ubiquitous in its use and availability, responsible for 4% of the world's global burden of disease (WHO, 2018). Alcohol taken orally is absorbed from the gastrointestinal tract (mostly in the small intestine), typically having an onset of effect within 20 minutes (Nutt, 2020). The presence of food, particularly fatty food, delays the rate of absorption owing to the closure of the pyloric sphincter (Gentry, 2000). Alcohol undergoes first-pass metabolism; alcohol undergoes an initial breakdown to acetaldehyde by alcohol dehydrogenase, the major enzyme system involved in its metabolism, with subsequent oxidation to acetate. At higher alcohol concentrations, cytochrome P450 pathways are recruited (Cederbaum, 2012). Alcohol can also be expelled through vomiting, which can follow excessive drinking, and should be regarded as a protective mechanism in the face of acute toxicity (Nutt, 2020).

Ethanol (C_2H_5OH), also known as ethyl alcohol (or simply just referred to as alcohol) is a small, hydrophilic, polar, organic molecule with a molecular weight of 46 g mol^{-1} (Ratner et al., 2020); its characteristics allow it to move easily across cell membranes (Patra et al., 2006). Ethanol is also a volatile liquid with a boiling point of 78.2°C and a vapour density greater than that of air.

Alcohol's chemistry means it can also be absorbed via other routes, including intravenously and via inhalation (MacLean et al., 2017).

Alcohol can be inhaled once it has been converted into a vapour or liquid aerosol (MacLean et al., 2017). Alcohol vapour is the gaseous form of liquid ethanol, often produced as a result of heating until evaporation. A liquid aerosol, on the other hand, is a suspension of small droplets of liquid ethanol in the air which has the appearance of mist. However, both terms are commonly used interchangeably. Vaporisation of ethanol provides a larger surface area for the alcohol to be absorbed directly across the alveolar capillaries and into the blood, bypassing first-pass metabolism (MacLean et al., 2017). Nebulised (aerosolised) ethanol has also been used therapeutically (Weyl, 1955; Zhang et al., 2011) whilst its recreational use is uncommon.

There have been various methods devised in order to inhale alcohol, most notably a device marketed as AWOL (alcohol without liquid), a commercial product which has been available since 2004 that acts as nebuliser, in this case agitating the liquid ethanol to form an aerosol by combining it with oxygen under pressure (Le Foll & Loheswaran, 2014). When the device was launched in the US, regulators were so concerned that it was pre-emptively banned in 22 states. Alternative commercial products are also available, including the Vaportini - a lower cost, low-tech apparatus, comprised of a glass globe suspended on a metal ring over a glass containing a flame (Heffer, 2014). More recently, some UK clubs have started to market alcohol balloons, using devices provided by the company, Vapshot, which are legal to operate and sell under UK legislation (Sharpe, 2019; Vapshot, 2018). Homemade alternatives include using a bicycle pump with a corked plastic bottle containing alcohol – the pressure is increased within the bottle and then released, causing the alcohol to vaporise; and pouring ethanol over dry ice – the solid CO_2 sublimes into a gas on contact with ethanol and causes the ethanol vapour above to condense into a liquid aerosol which can subsequently be inhaled. Online communities for e-cigarette users contain advice for 'do-it-yourself' recipes for vaping alcohol (Valentine et al., 2016).

To our knowledge there have been no publications addressing the use, subjective effects, and acute risks of inhaling alcohol mist. As part of the Global Drug Survey's work on patterns of use, pleasures and harms related to the use of drugs, we included a brief section on alcohol vaping in GDS2020, conducted from November 9 – December 31, 2019. We sought to describe the demographics and risk-drinking profiles of people who reported alcohol vaping, how drunk they were prior to inhaling, and the characteristics of the experience (*e.g.* time to onset and strength of effect). We also asked whether they had fallen over/injured themselves following inhalation and how they would rate inhaling versus drinking alcohol in terms of value for money.

METHOD

The Global Drug Survey (GDS) is an independent research organization that collects data on drug use patterns and trends worldwide. GDS2020 launched on November 9, 2019 and ran until December 31, 2019. It was translated into 19 languages (English, Albanian, Azerbaijani, Brazil, Czech, Danish, Dutch, Finnish, French, German, Hungarian, Italian, Lithuanian, Portuguese, Romanian, Serbian, Slovak, Spanish, and Turkish) and received data from 110,557 people. Respondents were recruited opportunistically via various media partners and collaborating institutions worldwide, such as Vice, Mixmag, The Guardian, Fairfax Media, and global social media networks such as Facebook and Twitter. There are no incentives for taking part. The full survey takes between 20-50 minutes depending on each participant's experience with substances and their decision on whether to complete any of the optional specialist sections included throughout the survey. To account for invalid responses, there a fake drug is included in the drug screen section, and responses from people who report using this drug are excluded from the data set. There are more in-depth details about the recruitment of GDS participants available elsewhere (Barratt et al., 2017).

While web surveys such as GDS are not representative of the general population, they can offer a timely and realistic picture of new emerging trends in drug use (EMCDDA, 2020) and are able to reach more hidden populations, such as people who use drugs (Barratt et al., 2017). Ethical approval was obtained from the University College London Research Ethics Committee (No: 141/02), the University of Queensland (No: 2017001452) and The University of New South Wales (HREC HC17769) Research Ethics Committees.

Measures

Alcohol consumption: respondents completed the Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001). AUDIT has ten items resulting in a total score of 0-40 which is further categorised as: lower risk consumption (0-7), increasing risk (8-15), higher risk (16-19) and possible alcohol dependence (20+).

Inhaling alcohol: first of all, respondents were asked, *'Have you inhaled alcohol mist/vapour from a balloon in the last 12 months?'.* Those who answered 'yes' were directed to further questions to elicit their experiences starting with, '*Before you tried the alcohol balloon were you totally sober/had drunk some alcohol but basically normal/a bit drunk/very drunk?'.* They were then asked, '*On a scale of 0-10, how strong would you rate the alcohol effect after inhaling?'* and *'How long did the effects last for, in minutes* (between 0-120 minutes)*?'.* Respondents were also asked, *'Did you fall over/injure yourself during the experience?'.* Finally, they were asked, *'In terms of value for money, how does it compare with drinking alcohol?'.* Response options were much better/better/the same worse/much worse.

Study Population

110,557 people took part in GDS2020 and 88,124 completed the question about inhaling alcohol in the last 12 months. The focus of this study is GDS2020 respondents who reported inhaling alcohol mist/vapour from a balloon in the last 12 months (N = 803).

RESULTS

Analysis

Descriptive statistics and χ^2 were used to explore the differences in demographic characteristics and AUDIT scores between respondents who reported inhaling alcohol in the last 12 months and those who did not. Descriptive statistics and χ^2 were also used to explore associations between alcohol inhalation experiences and falling over/being injured. Not all of the 803 who reported inhaling alcohol in the last year answered all of the questions, but we retained all cases and used pairwise deletion. We also used pairwise deletion when comparing those who reported inhaling with those who did not (see Table 1).

Sample characteristics

The final sample included 803 respondents who reported inhaling alcohol mist or vapour in the last 12 months. Two-thirds of this sample (536; 66.7%) were men, 240 (29.9%) were women, 18 (2.2%) were non-binary and 9 (1.1%) were a different gender identity. There were 206 (25.7%) respondents from Australia, 109 (13.6%) from Denmark, 94 (11.7%) from England, 61 (7.6%) from Germany, 59 (7.3%) from the United States, with the remainder of participants from other countries.

Characteristics of people who had inhaled alcohol in the last year compared with those who had not

The sample that reported inhaling alcohol in the last year were compared with 87,321 respondents from GDS2020 who said they had not engaged in this behaviour (Table 1). A greater proportion of non-binary and different gender identity respondents had inhaled alcohol compared with the overall sample. People who had inhaled alcohol were more likely to be in the 16-24 age group and were more likely to be in the increasing, higher and possible dependence risk categories on AUDIT compared with those who had not inhaled alcohol.

[Insert Table 1]

State of intoxication before alcohol was inhaled, duration, and the strength of the effects

Almost a third (32.7%) of respondents said that they were a bit drunk before they inhaled alcohol the last time that they had engaged in this behaviour; 13% were very drunk (Figure 1). However, 26.1% reported that they were totally sober before they inhaled alcohol. For the majority of respondents, the effects of inhaling alcohol were short-lived – at between 1-5 minutes. However, for 8.1% of respondents, the effects lasted for more than 60 minutes (Figure 2). In terms of the strength of the effect of inhaling alcohol, respondents tended to rate this around the midpoint of the scale (median = 5; IQR = 4), but 3.2% said it had no effect, and 8.7% rated the experience as having a very strong effect (Figure 3). There was a significant association between the state of intoxication prior to inhaling alcohol and the subjective rating of the strength of the effects (χ^2 = 88.18, p<.001, V=.219). People who were already more drunk rated the effects as stronger, and no one who said they were already 'very drunk' said that they felt no effect from inhaling alcohol.

[Insert Figures 1-3]

Falling over/injuries

In total, 83 (12.7%) of respondents who answered the question (N = 655) reported falling over/injuring themselves after inhaling alcohol (Table 2). Respondents who were already more intoxicated when they inhaled alcohol were more likely to say they fell over/injured themselves. Those in the possible dependence category were more likely to say they fell over/injured themselves, whereas those in the low risk or increasing risk groups were less likely. There was a significant association between gender and falling over/injuring oneself; men, non-binary and different identity participants were more likely to have this experience.

Value for money

Finally, we asked respondents to rate inhaled alcohol in terms of value for money compared with drinking alcohol (Figure 4). Again, responses were around the midpoint of the scale (median = 3; IQR = 2), but 13.4% said it was better value, and 11.5% said it was worse value. Interestingly, a χ^2 test showed an association between falling over and value for money (χ^2 = 24.58, p<.001, V =.198); those who fell over or injured themselves were more likely to rate the experience as better value for money than drinking alcohol.

DISCUSSION

To our knowledge, this is the first paper to explore people's experiences of inhaling alcohol vapour/mist. In a large international sample of people who drink alcohol, 803 people reported having had this experience in the last year, the majority of whom were from Australia and Denmark. Compared with other people in the sample, these respondents were more likely to be in higher AUDIT categories and to be aged 16-24 compared with 25+. They were also more likely to be male, non-binary or a different gender identity compared with the wider sample. Nearly half of those who had inhaled alcohol were already a bit or very drunk when they did so. The effects were generally short-lived, although some people rated them as lasting more than an hour. However, given that so many were already drunk when they inhaled alcohol, it may have been difficult to disentangle the effects from consuming drinks and the effects from inhaling alcohol. We found that 12.7% of respondents had fallen over or injured themselves after inhaling alcohol, although we did not determine whether this was immediately after inhaling or sometime later. However our findings are consistent with a previous study on the inhalation of e-cigarettes containing ethanol that found them to impact psychomotor control in young adult participants (Valentine et al., 2016). Heavier drinkers, according to their AUDIT scores, were more likely to report injuries, as well as male, non-binary, and different identity respondents. While we acknowledge that there are only small numbers of non-binary and different identity respondents, other GDS research suggests that this group is more at risk of alcohol-related harms (Connolly et al., 2020).

Other than novelty and the offer of a rapid intoxicating effect, there are other potential reasons why inhaling alcohol vapour may be attractive to some people. Some may consider it a less calorific way of becoming intoxicated with alcohol compared with oral consumption since the overall quantity of alcohol absorbed is far less than with typical oral dosing (Le Foll & Loheswaran, 2014). The caloric content of ethanol, the source of the majority of alcohol's calories is, however, still absorbed and broken down in the body, irrespective of the method of consumption; it is just at much lower levels (Schaffer, 2004); a typical Vapshot balloon, for example, contains 39 mg of alcohol according to the company's website (Vapshot, 2018). What is more important are the additional potential risks of inhaling alcohol mist, which include the rapid absorption of alcohol through the lungs directly into the bloodstream, resulting in the rapid rise in blood alcohol levels; this leads to intense alcohol effects, with the associated risk of falls and accidents, as highlighted in this paper. Additionally, there is no way of expelling the alcohol consumed after inhalation (unlike vomiting when taken orally). Compounding these acute risks, the novel method of delivery and the limited relevance of standard units in measuring the quantity of alcohol consumed means it is difficult to ascertain how much is being consumed, with risks of excessive intoxication and harm. Additionally, the inhalation of alcohol can cause irritation and lead to the drying of the nasal lining and respiratory tract; this could increase the prevalence of inflammatory lung conditions, exacerbated in those with asthma or in those who smoke (Heffer, 2014).

Of note, nearly half of respondents said that they were drunk before using the balloon, with 13% saying that they were very drunk. As a large number of respondents resided in Australia, where it is illegal to be served alcohol when obviously intoxicated (Australian Government Department of Health, 2019; NHMRC, 2020), it appears that vendors may be violating the laws, and putting patrons at increased risk.

Limitations

The screening question used to identify people who had inhaled alcohol vapour was restrictive since it only mentioned inhaling alcohol vapour using a balloon. Thus, the paper may have underestimated the number of people who had vaped alcohol by other methods. The study was, therefore, unable to explore which other methods were commonly employed, whether the device used was homemade or commercially produced and what the possible impact was upon the subjective experience and risk. Since this was an exploratory study, we used a very limited set of questions and omitted important questions on the frequency of the behaviour and the environment in which it was consumed. In addition, we did not differentiate between vapour and aerosol, or the number of balloons and the person's estimate of how much alcohol was inhaled. These limitations have left us unable to explore the relationship between the frequency of alcohol inhalation and the risk, and to emphasise that the results may not be generalisable to all individuals who have inhaled alcohol vapour. Finally, although GDS is a non-probability sample, when investigating the use of a novel drug or delivery mechanism, it is unlikely that more representative surveys will collect enough data to address the consequences of a relatively rare behaviour (Davies et al., 2017; Winstock & Ferris, 2019).

Nevertheless, this is the first study to explore demographics of people who have inhaled/misted alcohol, how drunk they were prior to inhaling, characteristics of the experience and whether they had fallen over/injured themselves afterwards. Further research should elaborate on our findings to determine motivations for engaging in this behaviour, and to understand more about the associated risks and harms in order to inform public health policy and licensing decisions.

REFERENCES

Australian Government Department of Health. (2019). *Alcohol laws in Australia*. https://www.health.gov.au/health-topics/alcohol/about-alcohol/alcohol-laws-in-australia#laws-that-apply-anywhere-in-australia

Babor, T., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *The Alcohol Use Disorders Identification Test, Guidelines for Use in Primary Care*.

Barratt, M. J., Ferris, J. A., Zahnow, R., Palamar, J. J., Maier, L. J., & Winstock, A. R. (2017). Moving on from representativeness: testing the utility of the Global Drug Survey. *Substance Abuse: Research and Treatment* https://doi.org/10.1177/1178221817716391

Beckley, J., T. , & Woodward, J., J. . (2013). Volatile Solvents as Drugs of Abuse: Focus on the Cortico-Mesolimbic Circuitry. *Neuropsychopharmacology, 38*, 2555-2567.

Butrica, J. L. (2002). The Medical Use of Cannabis Among the Greeks and Romans. *Journal of Cannabis Therapeutics, 2*(2), 51-70. https://doi.org/10.1300/J175v02n02_04

Cederbaum, A. I. (2012). Alcohol metabolism. *Clin Liver Dis, 16*(4), 667-685. https://doi.org/10.1016/j.cld.2012.08.002

Connolly, D., Davies, E. L., Lynskey, M., Barratt, M. J., Maier, L., Ferris, J., Winstock, A., & Gilchrist, G. (2020). Comparing intentions to reduce substance use and willingness to seek help among transgender and cisgender participants from the Global Drug Survey. *Journal of Substance Abuse Treatment, 112*, 86-91. https://doi.org/https://doi.org/10.1016/j.jsat.2020.03.001

Davies, A. J., Borschmann, R., Kelly, S. P., Ramsey, J., Ferris, J., & Winstock, A. R. (2017). The prevalence of visual symptoms in poppers users: a global survey. *BMJ open ophthalmology, 1*(1), e000015-e000015. https://doi.org/10.1136/bmjophth-2016-000015

EMCDDA. (2020). *Impact of COVID-19 on drug services and help-seeking in Europe*.

Gage, S. (2020). *Say Why to Drugs*. Hodder & Stoughton.

Gentry, R. T. (2000). Effect of food on the pharmacokinetics of alcohol absorption. *Alcohol Clin Exp Res, 24*(4), 403-404.

Heffer, G. (2014). Experts warn about 'unsafe' new 'Vaportini' drinking craze. *Express*. https://www.express.co.uk/news/uk/463441/Experts-warn-new-Vaportini-drinking-craze-is-unsafe

Le Foll, B., & Loheswaran, G. (2014). Alcohol inhalation. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne, 186*(10), E399. https://doi.org/10.1503/cmaj.131763

MacLean, R. R., Valentine, G. W., Jatlow, P. I., & Sofuoglu, M. (2017). Inhalation of Alcohol Vapor: Measurement and Implications. *Alcoholism: Clinical and Experimental Research, 41*(2), 238-250. https://doi.org/10.1111/acer.13291

NHMRC. (2020). *Draft Australian Guidelines to Reduce Health Risks from Drinking Alcohol*. https://www.nhmrc.gov.au/health-advice/alcohol

Nutt, D. (2020). *Drink? The New Science of Alcohol and Your Health*. Yellow Kite.

Patra, M., Salonen, E., Terama, E., Vattulainen, I., Faller, R., Lee, B. W., Holopainen, J., & Karttunen, M. (2006). Under the influence of alcohol: the effect of ethanol and methanol on lipid bilayers. *Biophys J, 90*(4), 1121-1135. https://doi.org/10.1529/biophysj.105.062364

Ratner, M. H., Ewing, W. M., & Rutchik, J. S. (2020). Neurological effects of chronic occupational exposure to alcohol mists and vapors in a machinist. *Toxicology Communications, 4*(1), 43-48. https://doi.org/10.1080/24734306.2020.1768341

Schaffer, A. (2004). Vaporize Me: Is inhalable alcohol a good idea? *Slate*. https://slate.com/technology/2004/09/is-inhalable-alcohol-a-good-idea.html

Sharpe, A. (2019). Inhaling vodka from balloons is bizarre new 'get high' craze loved by partygoers. *Mirror*. https://www.mirror.co.uk/news/uk-news/inhaling-vodka-balloons-bizarre-new-18953626

Valentine, G. W., Jatlow, P. I., Coffman, M., Nadim, H., Gueorguieva, R., & Sofuoglu, M. (2016). The effects of alcohol-containing e-cigarettes on young adult smokers. *Drug Alcohol Depend, 159*, 272-276. https://doi.org/10.1016/j.drugalcdep.2015.12.011

Vapshot. (2018). *Can science potentially make consuming alcohol safer and more enjoyable?* Vapshot. Retrieved 17th June from https://vapshot.com/pages/is-it-safe

Weyl, R. (1955). Alcohol inhalation in the treatment of acute pulmonary edema in the immediate postoperative period. *The Illinois medical journal, 108*(5), 265.

WHO. (2018). *Global status report on alcohol and health 2018*.

Winstock, A. R., & Ferris, J. A. (2019). Nitrous oxide causes peripheral neuropathy in a dose dependent manner among recreational users. *Journal of Psychopharmacology, 34*(2), 229-236. https://doi.org/10.1177/0269881119882532

Zhang, P., Yang, Z., Zhao, Y., Liu, Y., Zhang, L., & Shao, G. (2011). Inhalation of Alcohol Vapor Driven by Oxygen is a Useful Therapeutic Method for Postoperative Alcohol Withdrawal Syndrome in a Patient with Esophageal Cancer: a Case Report. *Alcohol and Alcoholism, 46*(4), 424-426. https://doi.org/10.1093/alcalc/agr037

TABLES AND FIGURES

Table 1: *Demographic characteristics of respondents who reported inhaling alcohol in the last year compared with the GDS2020 sample who did not report inhaling alcohol in the last 12 months*

	Inhaled alcohol in the last year N (%)	Did not inhale alcohol in the last year N (%)	χ^2, *p, V*
All respondents who answered vaping Q **N= 88,124**	803 (0.9)	87321 (99.1)	
Gender	N=803	N = 87321	χ^2 = 38.72, p<.001, V=.021
Male	536 (66.7) [a]	56182 (64.3) [a]	
Female	240 (29.9) [a]	30105 (34.5) [b]	
Non-binary	18 (2.2) [a]	761 (.09) [b]	
Different identity	9 (1.1) [a]	273 (0.3) [b]	
Age	N=803	N = 87321	χ^2 = 491.16, p<.001, V=.075
16-24	661 (82.3) [a]	37850 (43.3) [b]	
25+	142 (17.7) [a]	49471 (56.7) [b]	
AUDIT score	N=747	N = 80354	χ^2 = 505.75, p<.001, V=.079
Low risk	125 (16.7) [a]	36863 (45.9) [b]	
Increasing risk	336 (45.0) [a]	31784 (39.6) [b]	
Higher risk	121 (16.2) [a]	6897 (8.6) [b]	
Possible dependence	165 (22.1) [a]	4810 (6.0) [b]	

Notes: Cases were deleted pairwise for comparisons of those who reported inhaling alcohol verses those who did not on AUDIT scores. Different superscript letters denote categories that were significantly different from each other in post hoc tests using Bonferroni corrections

Table 2: *Association between falling over or injuring oneself after inhaling alcohol and other measures*

Falling over/injured	Yes N (%)	No N (%)	χ^2, *p*, *V*
All (N=655)	83 (12.7%)	572 (87.3%)	
Intoxication level (N=647)			χ^2 = 40.90, *p*<.001, *V* =.251
Totally sober (N= 168)	13 (16.0) [a]	155 (27.4) [b]	
Had some alcohol but basically normal (N=184)	13 (16.0) [a]	171 (30.2) [b]	
A bit drunk (N =210)	27 (33.3) [b]	183 (32.3) [a]	
Very drunk (N=85)	28 (34.6) [a]	57 (10.1) [b]	
AUDIT (N=615)			χ^2 = 54.47, *p*<.001, *V* =.298
Low risk (N=99)	4 (4.9) [a]	95 (17.8) [b]	
Increasing risk (N=279)	20 (24.4) [b]	259 (48.6) [b]	
Higher risk (N=107)	17 (20.7) [a]	90 (16.9) [a]	
Possible dependence (N=130)	41 (50.0) [a]	89 (14.5) [b]	
Gender			χ^2 = 16.99, *p*=.001, *V* =.161
Man (N =439)	45 (54.2) [a]	394 (68.9) [b]	
Woman (N=192)	29 (34.9) [a]	163 (28.5) [a]	
Non-binary (N=17)	6 (7.2) [a]	11 (1.9%) [b]	
Different id (N=7)	3 (3.6) [a]	4 (0.7%) [b]	

Note: different superscript letters denote categories that were significantly different from each other in post hoc tests using Bonferroni corrections

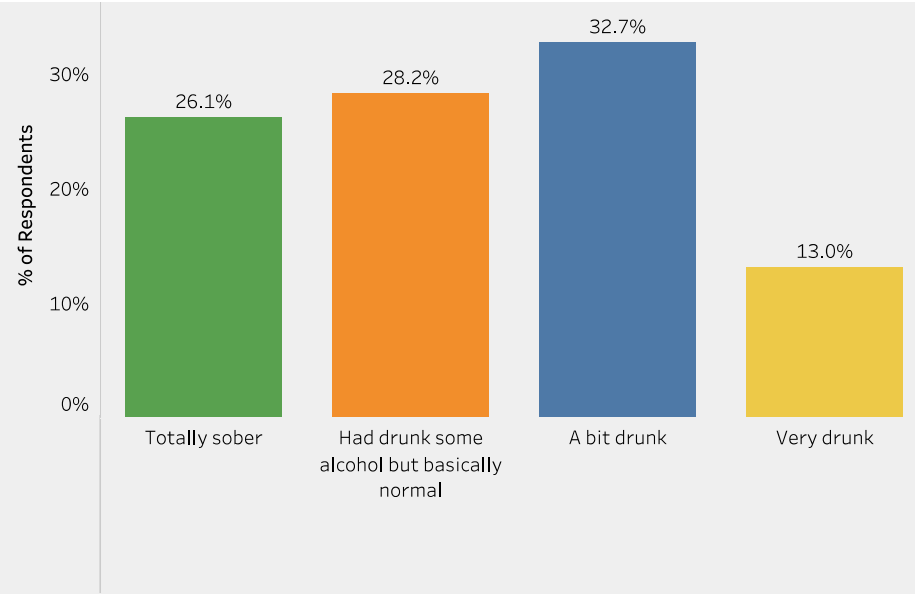

Figure 1: **State of intoxication before alcohol was inhaled**

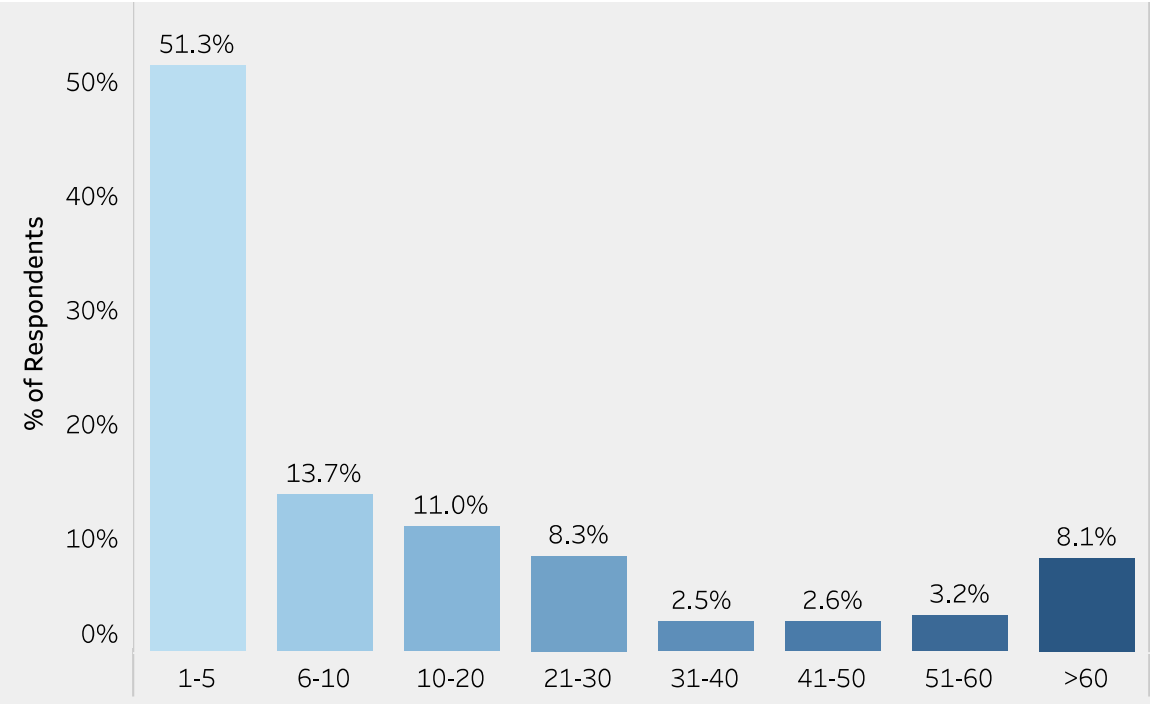

Figure 2: **Duration of the effects of inhaling alcohol, in minutes**

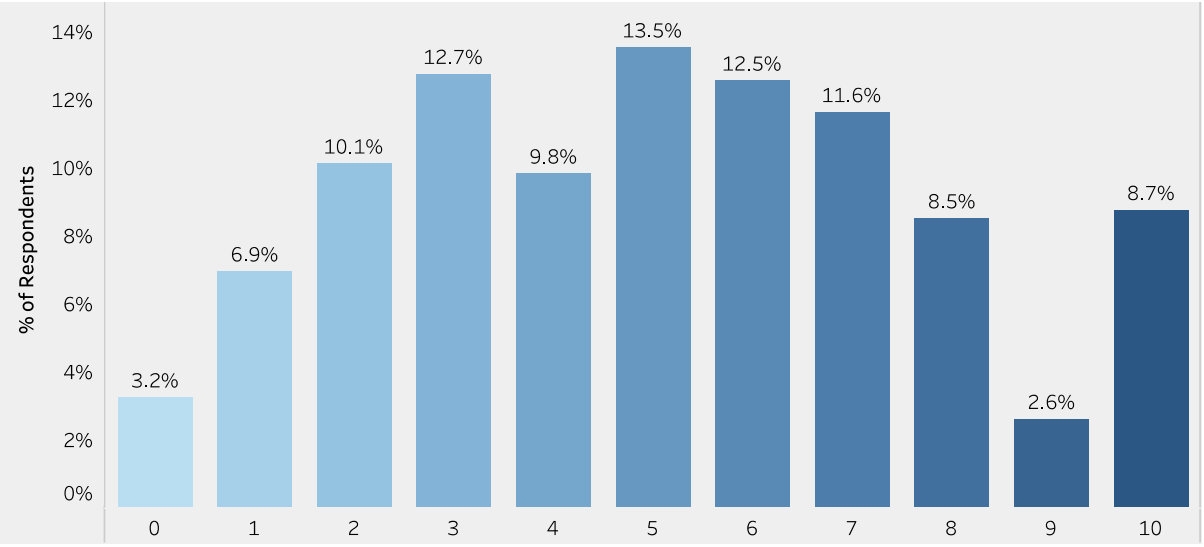

Figure 3: **Respondents' ratings of the strength of the effects of inhaling alcohol**

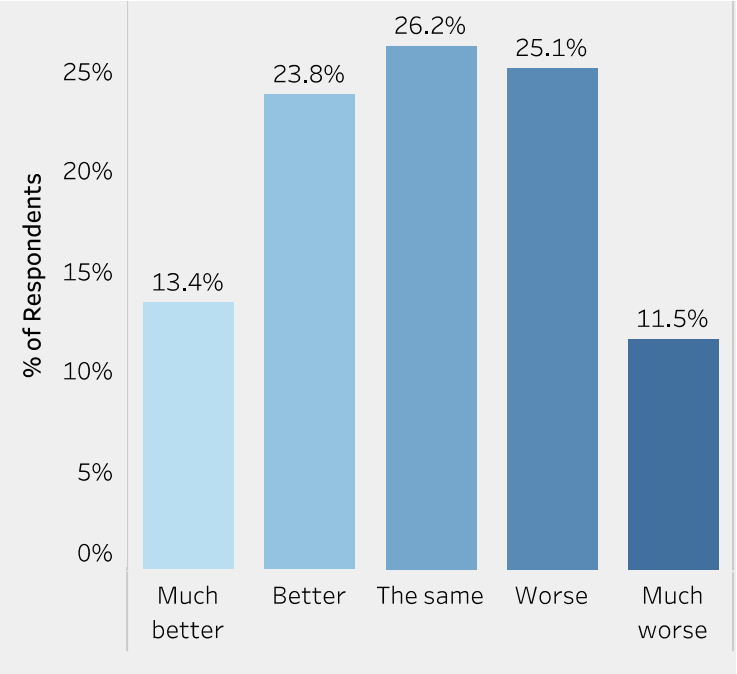

Figure 4: **How inhaling alcohol compared to drinking alcohol terms of value for money**