Author’s response to reviews

Title: Drinking behaviours and blood alcohol concentration in four European drinking environments: a cross-sectional study

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Author’s response to reviews: see over
Dear Jimmar Dizon,

We are pleased to submit a revised version of our manuscript: *Drinking behaviours and blood alcohol concentration in four European drinking environments: a cross-sectional study.*

We have revised our manuscript in line with the comments received from the referees and below have detailed how we have dealt with each point raised. Changes to the text are also marked in red text in the manuscript file. We would like to thank the referees for their constructive comments and believe the manuscript has improved as a result of their input.

We hope the changes we have made meet with your approval and if you require any further information or revisions to the manuscript please do not hesitate to contact me

Best wishes

Karen Hughes

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**Responses to referees’ comments**

**Referee 1:**

**Minor essential revisions**

1. The eligibility criteria for the study are not clearly laid out – on page 6, there is discussion of respondents being excluded for a variety of reasons (age and nationality in particular), but it’s not clear to the reader who is being excluded here. Were tourists excluded from the study? Respondents over certain ages? This needs to be explicit in the methods section.

   We have added the following text to clarify this:

   “the eligibility criteria was being a 16-35 year old drinker, using bars and nightclubs in the relevant city on the night of survey, and being a national of the survey country”.

2. I think the authors need to discuss the potential biases that arise via the exclusions of heavily intoxicated people. It’s striking that the most exclusions came from Spain, whose actual respondents were among the lowest drinkers. Is it possible that interviewers’ perceptions of how intoxicated is too intoxicated were culturally determined such that people in the UK were interviewed who would have been excluded in Spain?

   This is a good point and we have now covered it in the limitations section of the discussion:

   “Further, individuals who were severely intoxicated were excluded to meet ethical requirements, meaning reported alcohol consumption and median BAC are likely to be underestimated. Despite training researchers in identifying such individuals for exclusion, differences in researchers’ cultural and personal perceptions of intoxication may have introduced further bias to the samples obtained. However, even in Spain where the number excluded was highest, such individuals represented only 5.8% of potential participants.”

3. I think the paper needs to be a bit clearer about what it’s setting out to do – a paragraph extending the last para of the end of the introduction laying out clearly what questions are being answered and why they matter here would help orient the reader a bit.

   As suggested, we have extended the background section as follows:
The objectives of this study were to examine the amount of alcohol young adults reported drinking across the course of a night out in the four cities, and to measure BAC among drinkers during their night out. The study aimed to establish and test a cross-national methodology to measure drinking behaviours in nightlife environments, and to provide an initial assessment of variation in drinking patterns and intoxication across different European nightlife settings. Developing this knowledge is important in understanding differences in nightlife alcohol consumption across cultures and consequently in informing the development of appropriate and culturally relevant measures to reduce harm in drinking environments. Thus, analyses explore differences between city samples in reported drinking behaviours and BAC levels over a night out.

4. Similarly, a brief discussion of the characteristics of the cities chosen for the study would help set this study up – should we be expecting great differences in drinking across these four sites? Is there any relevant qualitative literature on the night-time economy in these four countries that might provide a framing to the quantitative data presented here? It might be worth having a quick look at the England, Spain and Netherlands chapters of Nightlife and Crime (edited by Phil Hadfield) to see if it provides any useful context.

We agree this is needed and we have added the following information to the background section:

While each city cannot be considered nationally representative, all are popular nightlife locations selected to be indicative of a range of nightlife cultures. Thus, UK nightlife is typically characterised by high levels of alcohol use and related harm, including violence [22-24], while reports suggest that alcohol use and associated violence have been increasing in Dutch nightlife settings [25]. The Mediterranean island of Mallorca in Spain has a long history of nightlife linked to international tourism, yet heavy alcohol use has traditionally been limited largely to tourists. However, increasing alcohol use in local youth has become a cause of concern, linked to the practice of botellón – the gathering of young people in public places to consume off licensed alcohol (often before visiting bars and nightclubs)[26]. Research on nightlife behaviours in Slovenia is scarce; while levels of adolescent alcohol use are relatively high [27] little is known about nightlife drinking behaviours, although associated problems such as violence are considered rare [28].

We have also added data on the number of bars etc. in each location:

At the time of this study, Utrecht (population ~300,000) city centre had around 160 nightlife venues (pubs, bars and nightclubs), with most closing between 2am and 5am. Liverpool (population ~435,000) city centre had 304 nightlife venues, over half of which were licensed to stay open later than 2am. Despite being the only capital city studied, Ljubljana (population ~277,000) had the smallest number of city centre nightlife venues (n=41) that closed between midnight and 5am. Palma (population ~400,000) reported 500 nightlife venues within its broader municipality area, including those in tourist resorts surrounding the city; however our study focused on city centre drinking environments popular with locals, where closing times were largely between 4am and 6am. In Liverpool, Ljubljana and Palma, the legal age for alcohol sales was 18. In Utrecht, beer and wine sales were permitted at age 16, with stronger alcohol sales (i.e. spirits) restricted to those aged 18 and over.

Further, in the discussion we have added the following text:

Drinking behaviours in European nightlife settings will be influenced by a range of social, cultural, economic and environmental factors, including the availability and affordability of alcohol. For example, although findings are mixed, studies suggest that greater density of alcohol outlets and longer opening hours are associated with increased alcohol use and related harms [51,52]. The price of alcohol also has a strong influence, particularly in young people, and studies show that alcohol has become more affordable in most European countries over recent years [53]. However, national economic analyses say little about local conditions, and factors including cheap drinks promotions in nightlife venues and large discrepancies between on and off licensed alcohol prices will impact on how and where young people drink over the course of a night out. Equally, the drinking environment in licensed premises (e.g. crowding, poor cleanliness), bar manager and staff practice (e.g. service of alcohol to drunk customers), and local alcohol policy and enforcement activity (e.g. policing of problem premises, punishment of sales of alcohol
to minors) may all affect drinking behaviours and alcohol-related harm [22,38]. There is currently a lack of data on such factors within different European drinking environments and whether they are driving the differences in drinking patterns identified in this study.”

5. Some discussion of the validity of the variables based around respondents expectancies (i.e. how many drinks will you have, how long will you stay out etc) would be helpful. How often do people end up drinking as much as they intend to when they're out on the town?

We have now raised this in the limitations section:

“Further, the validity of responses to questions on expected behaviours (alcohol use, home time) post survey could not be verified in our study, and in particular several participants (n=147, 17.5%) felt unable to provide an estimate of how much additional alcohol they would consume that night.”

We are unaware of any research that has examined the intended versus actual nightlife behaviours in real life situations but are grateful to the reviewer for raising this point and it is certainly something we will think about for future work.

6. Page 7: The brief explanation of ‘botellon’ that is included in the results would be better placed here for readers not familiar with it.

We have now moved our explanation of botellón in the background section and repeated this in the results to assist readers.

Discretionary revisions

7. Table 3: This is a relatively minor issue, but I’m not a fan of using the conditional step-wise model building approaches that stats packages allow you to – I’d prefer that the authors presented here a model with all the covariates included, unless issues of collinearity require some exclusions.

As suggested, we have now used a model including all variables and removed all reference to backward conditional logistic regression.

8. One of the problems is that there’s so much interesting data in this paper that the reader is left with questions that don’t get answered or discussed in any great depth. The data presented is rich and bits and pieces jumped out at me that I’d have appreciated some further discussion of – for example, the gender differences in pre-loading in the UK seem substantial (and greater than the other sites); the low prevalence of pre-drinking in Slovenia (are on-premise drinks not as expensive there?); the disparities between BAC and self-reported units – particularly where gender differences existed on one and not the other in Spain. Etc. I’m not sure how to squeeze these issues into the current paper, but perhaps if the research questions are laid out more clearly than the reader’s expectations will be more appropriate. It might be worth a brief discussion of areas for further research that come out of this study – there’s plenty to move onto.

We have included discussion on the potential drivers behind the higher preloading levels in UK females, and suggested this should be the focus of further research (see below). We have also suggested that the lower levels of preloading in Slovenia should be explored. However we have not suggested reasons for this, as there is unfortunately not enough information available on the situation in Slovenia. Available figures suggest that there is little difference in alcohol affordability in Slovenia compared with the UK (it is more affordable in Netherlands than both locations with no data available on Spain). We have noted elsewhere in the text that alcohol has become more affordable in general in most European countries in recent years, yet that national data does not necessarily reflect the local situation in drinking environments. The disparities between reported consumption and BAC are discussed in the limitations section.

“Gender differences in preloading were only significant in the UK, where females reported higher levels than males. Preloading can be undertaken for a variety of reasons including to save money (through consumption of cheaper off-licensed alcohol), to achieve drunkenness and to socialise with friends. This
latter reason may be particularly important for British females, for whom the act of getting ready to go out is often a protracted social process that can itself form a key part of the night out [45]. Although the drivers behind female preloading in the UK have yet to be fully explored [46], factors around safety, confidence and group bonding may also be important for young women preparing to visit an environment perceived as sexually and physically aggressive. These issues require further research, as do the lower levels of preloading identified among the sample from Slovenia”.

Referee 2:

Minor essential revisions

It is a bit ‘imperialistic’ to use the outdated and somewhat inaccurate UK unit as the base of measurement, considering that the three other countries in the study normally have units containing 10g alcohol. Given that almost all epidemiological studies in the short and the long term are based on grams, the results should be given in grams, which are after all an internationally agreed unit of measure. This should apply to all the text, tables and graphs. It will not be very time consuming to do this.

We are happy with this suggestion and have reported all findings in grams of alcohol as requested.

Referee 3:

Major Compulsory Revisions:

This paper provides some interesting data on what appears to be a preliminary study. The cross cultural comparison of BAC rates could be of great interest and policy relevance. However, the paper as it stands makes claims far beyond its capacity. The sample is four cities – not four countries. The authors make a gross overgeneralisation regarding drinking cultures in specific cities to whole countries. This suggests a very poor level of critical reflection about the study’s design and what it can tell them. Different cities have extremely different drinking cultures based on a very wide range of factors – none of which the authors mention. Issues such as price, density and most importantly – trading hours – can have huge impacts on the findings. Without such contextual information, the paper suggests relationships it cannot support.

We have now stressed clearly in the background section that each city cannot be considered nationally representative. We have also added information on nightlife structures (i.e. numbers of nightlife venues and opening times) in each city, and nightlife cultures in the four countries. We have included a paragraph on the different factors that may affect drinking behaviours in European drinking environments in the discussion, highlighting the further research needed in this area. All additional text is shown in the response to Referee 1, point 4.

Another issue is the simple sample size. This is ultimately an extremely small sample for such grand claims. This looks like a pilot study, and if so, the authors should acknowledge that and make claims more appropriate to their sample. The methods are interesting, but the current presentation undermines their validity.

We have added the sample size as a limitation in the discussion.

The sample size for the study was set based on a previous study implemented in the UK and as noted in the paper we did not intend to recruit a representative sample in each city, but rather one indicative of the range of individuals using each nightlife environment. As the reviewer rightly mentions in point 1, the study was a preliminary study in the sense that it is the first time this type of research has been conducted cross-nationally, using the same methodologies and tools in each location. However, it was not a pilot study, but as stated in the manuscript was implemented as part of a larger programme of research examining alcohol-related harm in drinking venues in the four cities. This part of the study to develop
knowledge of drinking behaviours in each city was imperative as only one site (Liverpool) had data available on drinking patterns, alcohol consumption and BAC in nightlife users.

**A further design issue is the sampling on Thurs/Fri/Sat nights. Each of these would normally reflect quite different cultures and you would expect peaks in intoxication at different times.**

This is correct and the study design permitted research leads in each country to identify peak nightlife periods and locations for implementing the survey in their city. This resulted in variation in surveying times/days between the four sites reflecting local nightlife cultures. To ensure research teams did not simply target one specific location or time, the sampling framework was developed to require research teams to recruit participants from a range of different locations within their city for one hour at a time, thus surveying across several locations on one night. We have now included timing issues in the limitations section.

**Discretionary Revisions:**

- **N's should be included in all tables (e.g., to show how many people had high BAC)**

  We had initially attempted to include Ns in Table 2 but as it is already a large table we struggled to fit these in. Instead, we included missing data as a footnote to the table. We have now done this for Table 3 also. If it is preferable for us to include Ns then it is possible that we could split the table into two to provide more space for this?

- **It would be helpful if the authors provided some indication of the availability and cost of alcohol in each city/country- particularly if there have been changes to the cost or availability of spirits for example •**

  We have included information on the number of bars and nightclubs in the methods section (see above). There are few data available to discuss the cost of alcohol in each city but we have included reference in the discussion to the affordability of alcohol, noting that this has increased in most European countries in recent years. The collection and analysis of data on the cost of alcohol in drinking premises in each of the four cities will form part of the later stage of our study.

  **It would be good to report the legal drinking age in each country**

  We have now included a sentence giving the legal alcohol sale age in each country:

  “In Liverpool, Ljubljana and Palma, the legal age for alcohol sales was 18. In Utrecht, beer and wine sales are permitted at age 16, with stronger alcohol sales (i.e. spirits) restricted to those aged 18 and over.”

  **Differences in consumption are reported across cities/countries, but there's currently no mention of different nightlife 'settings' in these cities. A brief paragraph describing the nightlife/entertainment precincts and types of venues in each city might be worthwhile.**

  This has now been included (see response to comment by Referee 1)

- **There's currently no mention of the role/prevalence of illicit (party?) drug use in these cities/countries. Could alcohol consumption be lower in some countries because of a higher prevalence of 'other' drug use?**

  We thank the reviewer for raising this point. We did ask participants if they had, or intended to, use drugs on the night of survey but had not included these data in the paper due to the number of existing issues to discuss around alcohol. However, we have now included findings showing that Spanish participants were significantly more likely to admit to drug use than other nationalities. We have now also included drug use as a variable in our revised logistic regression analysis for high BAC, finding no independent relationship (see Table 3).
“In addition to alcohol consumption, 10.7% of the sample reported having used, or intending to use, illicit drugs on the night of survey, predominantly cannabis (73.3%) followed by cocaine (30.2%). Drug use was most commonly reported by Spanish participants (21.3%, compared with 6.0%, 8.1% and 9.0% in the Dutch, British and Slovenian samples respectively).”

- I think ‘compliance’ (58.9%) should be mentioned in the limitations

We have included this as suggested:

*With study implementation limited to one city in each country, sample sizes relatively small and overall compliance at 58.9%, findings should only be extrapolated with caution.*