

Article

Susceptibility to Alcohol Hangovers: Not Just a Matter of Being Resilient

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Abstract

Introduction: Although most drinkers have experienced a hangover the day following heavy alcohol consumption, a minority claims to be hangover resistant despite consuming the same large quantities of alcohol as those reporting alcohol hangover. The aim of the current study was to examine if susceptibility to experiencing hangovers is related to a drinker's interpretation of well-being and psychological assets to bounce back.

Methods: A survey was conducted among 2295 Dutch students assessing their past month alcohol consumption patterns, and measuring mental resilience and wellbeing. Estimated peak blood alcohol concentration (e-pBAC) for their heaviest drinking occasion in the past month was computed for each participant. Data from participants who reported a past month hangover, i.e. hangover sensitive drinkers, were compared with hangover resistant drinkers. The analyses were conducted for (a) all participants reaching an e-pBAC $\geq 0.11\%$ ($N = 986$, of which 24.6% claimed to be hangover resistant) and (b) participants reaching an e-pBAC $\geq 0.18\%$ ($N = 480$, of which 16.7% claimed to be hangover resistant).

Results: For both e-pBAC cut-off values, no significant differences between hangover sensitive and hangover resistant drinkers were found for mental resilience and wellbeing.

Conclusion: The current findings suggest that having a hangover is not simply an expression of poor psychological coping with the next-day consequences of heavy alcohol consumption.

INTRODUCTION

The alcohol hangover refers to the combination of mental and physical symptoms, experienced the day after a single episode of heavy drinking, starting when blood alcohol concentration (BAC) approaches zero (Van Schroyen Lantman *et al.*, 2016). Whereas the majority of drinkers experiences a hangover following heavy drinking, the minority claims to be hangover resistant despite consuming large quantities of alcohol (Howland *et al.*, 2008; Verster *et al.*, 2013; Kruisselbrink *et al.*, 2017).

As much on the pathology of the alcohol hangover is unknown (Penning *et al.*, 2010), currently no effective treatment is available (Penning *et al.*, 2010; Verster and Penning, 2010). In the search for an effective hangover treatment, and to elucidate the pathology of the alcohol hangover, recent research has been comparing social drinkers who experience hangovers with those who claim to be hangover resistant. For example, Hogewoning *et al.* (2016) compared many demographic characteristics of both groups and found

that drinkers with a hangover did not significantly differ from hangover resistant drinkers with regard to alcohol consumption and estimated BAC on a heavy drinking session in a naturalistic study. The groups did not differ in body mass index or age, and reported a similar sensitivity to the effects of alcohol on the Self-Rating of the Effects of alcohol (SRE) form. However, drinkers who had hangovers did score significantly higher on the Alcohol Use Disorders Identification Test (AUDIT) when compared to hangover resistant drinkers, but this difference could in part be explained by one item asking on experiencing next-day consequences of drinking.

Identifying in what respect hangover sensitive and hangover resistant drinkers differ may help elucidating the pathology of the alcohol hangover. These differences may be genetic or physiological, but could also be psychological. For example, susceptibility to experiencing hangovers may simply be related to a drinker's interpretation of wellbeing and adverse events, or his psychological assets to bounce back. Therefore, the aim of the current study was to examine whether drinkers with a hangover differ from hangover resistant drinkers with regard to their levels of mental resilience and wellbeing.

METHODS

Participants and procedures

Dutch students, aged 18–30 years old, were invited to complete an online survey. The survey was designed using www.surveymonkey.com, and advertised via www.facebook.com. The University of Groningen Psychology Ethics Committee approved the study. Online informed consent was obtained from all participants.

Measurements

Alcohol consumption and hangover status

Past month alcohol consumption (frequency and quantity) was assessed with questions adapted from the Quick Drinking Screen (Sobell *et al.*, 2003). Demographics included weight and gender. This data allowed calculating their estimated peak BAC (e-pBAC) for their past month heaviest drinking occasion, applying a modified Widmark equation (Watson *et al.*, 1981). The alcohol consumption questions also included a question whether participants experienced a hangover during the past month (answering possibility: yes or no), which was used to allocate participants to either the (a) hangover sensitive group or (b) hangover resistant group.

Mental resilience

Mental resilience was assessed using the Brief Resilience Scale (BRS) (Smith *et al.*, 2008). The BRS consists of six items and measures the ability to recover from stress, i.e. to bounce back. BRS items are can be endorsed on a 5-point Likert scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'). A higher BRS score indicates higher mental resilience. The BRS has a Cronbach's alpha ranging from 0.80 to 0.91 (Smith *et al.*, 2008). The BRS showed to correlate significantly with various personality characteristics, psychological coping strategies and health outcomes (Smith *et al.*, 2008; Van Schroyen Lantman *et al.*, 2017).

Psychological wellbeing

Psychological wellbeing was assessed using the 5-item World Health Organization (WHO-5) Well-Being Index (De Wit *et al.*, 2007; Topp *et al.*, 2015). Each item of the WHO-5 could be answered on

a 5-point Likert scale ranging from 0 ('At no time') to 5 ('All of the time'), choosing the answer being closest to the participant has been feeling over the past 2 weeks. The raw score ranging from 0 to 25 is multiplied by 4 to give the final score. Higher scores represent better wellbeing. Cronbach's alpha of the WHO-5 is 0.82 (De Wit *et al.*, 2007). Previous research showed that scores on the WHO-5 significantly correlated with mental health (e.g. depression scores) and psychological constructs such as self-esteem (De Wit *et al.*, 2007).

Statistical analysis

The data were analysed using SPSS, version 24. To be included in the statistical analyses, participants had to have an e-pBAC of at least 0.18% on their heaviest past month drinking occasion. This cut-off value was chosen as it corresponds to the average e-pBAC we recently observed in a naturalistic hangover study (Hogewoning *et al.*, 2016), and ensures that participants have consumed a sufficient amount of alcohol to experience a hangover per se (Verster *et al.*, 2013, Krusselbrink *et al.*, 2017). Participants reporting a past month hangover (i.e. hangover sensitive drinkers) were compared to hangover resistant drinkers. Depending on whether the data had a normal distribution ANOVA or a nonparametric independent samples Mann-Whitney *U* test was applied. Differences between the groups were regarded significant if $P < 0.05$.

The same analyses were also conducted for all subjects with an e-pBAC of at least 0.11%, i.e. the lower limit BAC for provoking hangovers suggested in 2010 by the Alcohol Hangover Research Group (Verster *et al.*, 2010).

RESULTS

A total of $N = 2295$ subjects completed the survey (83.4% women). Of these, $N = 1937$ reported consuming alcohol. About half of them (51.1%) reported having had a hangover during the past month. Mental resilience correlated significantly to wellbeing ($r = 0.464$, $P = 0.0001$). In the current dataset, Cronbach's alpha for the BRS and WHO-5 were 0.86 and 0.79, respectively.

e-pBAC cut-off of 0.18%

Data from $N = 480$ participants with an e-pBAC of at least 0.18% were included in the statistical analyses. Of them, $N = 100$ were males and $N = 380$ were females. Mental resilience correlated significantly to wellbeing ($r = 0.465$, $P = 0.0001$). $N = 400$ reported having a hangover during the past month (i.e. the hangover sensitive group), and $N = 80$ reported no hangover (i.e. the hangover resistant group). Results from the between group comparisons are summarized in Table 1.

No significant differences between the groups were found for mental resilience and wellbeing scores. When conducting the analyses separate for men and women, similar nonsignificant results were found, and the small age difference between the groups was no longer significant.

e-pBAC cut-off of 0.11%

There were $N = 986$ drinkers with an e-pBAC of at least 0.11%. Of them, $N = 196$ were males and $N = 790$ were females. Mental resilience correlated significantly to wellbeing ($r = 0.440$, $P = 0.0001$). $N = 743$ reported having a hangover during the past month and $N = 243$ reported no hangover. Results from the between group comparisons are summarized in Table 2.

Table 1. Comparisons between hangover sensitive drinkers and hangover resistant drinkers after achieving an estimated peak BAC of at least 0.18%

	Hangover sensitive group N = 400 Mean (SD)	Hangover resistant group N = 80 Mean (SD)	P-value
Age (years)	21.1 (1.9)	20.7 (2.0)	0.047*
BMI (kg/m ²)	22.3 (2.8)	22.3 (3.3)	0.992
e-pBAC (%)	0.27 (0.1)	0.25 (0.1)	0.123
Mental resilience	20.2 (4.1)	20.7 (4.5)	0.367
Wellbeing	52.0 (15.2)	51.6 (17.6)	0.988

Data on mental resilience and wellbeing were compared using the independent samples Mann–Whitney *U* test. Independent *t*-test were applied to compare data that was normally distributed. Differences between the groups are significant if $P < 0.05$, indicated by asterisk.

BMI = body mass index.

Table 2. Comparisons between hangover sensitive drinkers and hangover resistant drinkers after achieving an estimated peak BAC of at least 0.11%

	Hangover sensitive group N = 743 Mean (SD)	Hangover resistant group N = 243 Mean (SD)	P-value
Age (years)	21.4 (2.0)	20.7 (2.0)	0.000*
BMI (kg/m ²)	22.4 (2.8)	22.3 (2.9)	0.664
e-pBAC (%)	0.21 (0.1)	0.18 (0.1)	0.000*
Mental resilience	20.2 (4.1)	20.7 (4.4)	0.097
Wellbeing	52.7 (15.0)	53.3 (16.1)	0.499

Data on mental resilience and wellbeing were compared using the independent samples Mann–Whitney *U* test. Independent *t*-test were applied to compare data that was normally distributed. Differences between the groups are significant if $P < 0.05$, indicated by asterisk.

BMI = body mass index.

The hangover resistant group showed to be significantly younger. Again, no significant differences were observed between hangover sensitive drinkers ($N = 743$) and hangover resistant drinkers ($N = 243$) with regards to mental resilience and wellbeing. However, it should be taken into account that the hangover resistant group had a significantly lower e-pBAC than the hangover sensitive group. Similar findings were observed when analysing the data separately for men and women.

DISCUSSION

Mental resilience can be viewed as a trait that enables an individual to recover from stress and to face the next stressor with optimism (Shastri, 2013; Hu *et al.*, 2015). People with resilient traits are considered to have a better mental and physical health. It was hypothesized that alcohol could be regarded as an example of a stressor that may be better dealt with by drinkers with higher levels of mental resilience. However, the current analyses revealed that hangover sensitive drinkers do not significantly differ from hangover resistant drinkers with regards to mental resilience, and psychological wellbeing.

There are several limitations that should be mentioned. First, we used e-pBAC levels to include subjects into the statistical analysis. Although these were based on a generally accepted (modified) formula by Widmark, the data to calculate the e-pBAC values are self-reported and may therefore differ from actually achieved BAC levels (Watson *et al.*, 1981). However, the sample size of both groups is sufficiently large, and there is no reason to assume that people from the hangover sensitive and hangover resistant groups may differ in terms of recall bias. Second, interpretation of the results from the analyses for participants with an e-pBAC of at least 0.18% is straightforward, and the

outcomes are easy to interpret as the groups do not differ in estimated e-pBAC. This is however not the case for the analyses that used a cut-off value of e-pBAC 0.11%. In this analysis, the e-pBAC of the hangover sensitive group was significantly higher than that of the hangover resistant group (0.21 versus 0.18%). In theory, this may have had an impact on the outcomes on mental resilience and wellbeing. However, as we did observe the same findings with the higher cut-off value of e-pBAC 0.18%, we are confident to conclude that experiencing alcohol hangovers is unrelated to ones' level of mental resilience or wellbeing.

Finally, women were overrepresented in this survey. This reflects in part the gender distribution at Dutch universities, but may also be related to the advertisement of the survey. This stated the survey was on 'food and health', a topic that perhaps appeals more to females than males. Nevertheless, the sample size was sufficiently large to conduct analyses for men and women separately. These analyses revealed no significant differences between men and women.

Other factors related to personality and general mood state may be related to whether heavy drinkers experience alcohol hangovers. The observed null findings with respect to mental resilience and wellbeing do not rule out that other psychological constructs (e.g. coping measures, distress tolerance) could be related to hangover experiences or reporting.

Also, the setting of the drinking session (e.g. at home versus in a bar) and activities during drinking (e.g. watching a movie versus dancing in a club) may have an impact on experiencing an alcohol hangover, and its severity. Future research should examine potential psychosocial effectors, in addition to biomarkers of the alcohol hangover state.

Taken together, the current findings suggest that having hangovers is not simply an expression of poor psychological coping with the next-day consequences of heavy alcohol consumption.

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CONFLICT OF INTEREST STATEMENT

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