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# The impact of bodyweight and body mass index on subjective intoxication and alcohol hangover severity

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## Abstract

Anecdotal evidence suggests that individuals with greater body weight report lower levels of subjective intoxication (i.e., drunkenness), experience hangovers less frequently, and report lower hangover severity scores compared to individuals of lower body weight. The aim of this study was to evaluate the relationship of body weight and body mass index (BMI) with subjective intoxication, hangover frequency, and hangover severity. Data were combined from two online surveys conducted among adults aged 18–94 years in the Netherlands, the United Kingdom, and Ireland. Information on weekly alcohol consumption and the heaviest drinking occasion in the past month was collected. Subjective intoxication, hangover frequency in the past year, and hangover severity on the past month's heaviest drinking occasion were compared across BMI groups (underweight, normal weight, pre-obesity, and obesity classes I, II, and III). Age, sex, alcohol intake, and drinking duration during the past month's heaviest drinking occasion were taken into account as covariates (confounding variables). Controlling for these confounders, partial correlations were computed between body weight and BMI with subjective intoxication, hangover frequency, and hangover severity. Data from 1,615 social drinkers (mean age: 37.9 years; 74.7% females) were analyzed. No significant differences were found between BMI groups for subjective intoxication, hangover frequency, and hangover severity. Similarly, partial correlations of body weight and BMI with these outcomes were not statistically significant. In conclusion, no evidence was found for a significant relationship between body weight or BMI and subjective intoxication, hangover frequency, and hangover severity.

***Keywords:*** Body weight; Body mass index; Subjective intoxication; Hangover frequency; Hangover severity; Immune fitness; Age; Sex

## 1. Introduction

The alcohol hangover is defined as the combination of negative mental and physical symptoms which can be experienced after a single episode of alcohol consumption, starting when blood alcohol concentration (BAC) approaches zero.[1] Hangovers are characterized by a variety of symptoms, including headache, nausea, and fatigue, which can impair occupational functioning and cognitive performance.[2] Examples of the impact on daily activities include reduced managerial performance at work,[3] increased risk of surgical errors,[4] and impaired ability to drive a car[5] or ride a bicycle.[6]

Furthermore, absenteeism (i.e., days not worked) and presenteeism (i.e., reduced productivity while at work) due to hangovers are associated with significant economic losses.[7-9] In 2019, hangover-related absenteeism and presenteeism were estimated to have cost the Dutch economy nearly 2.7 billion euros.[10] Beyond the economic burden, alcohol hangover represents a major public health concern. Turner *et al.*,[11] summarized evidence showing that alcohol consumption elicits an inflammatory response that may underlie the alcohol hangover. The strength of this response, together with associated oxidative stress and bioenergetic changes, may determine the presence, severity, and duration of hangover symptoms. Moreover, Išerić *et al.*,[12] hypothesized that occasional hangovers lead to temporary elevations in immune biomarkers (e.g., cytokines) and oxidative stress, which return to baseline once the hangover resolves. However, when hangovers occur more frequently or are more severe (often following greater alcohol intake), biomarker levels may remain elevated, potentially causing chronic systemic inflammation. This is concerning, as chronic systemic inflammation predicts poorer health outcomes and is associated with an increased risk of chronic diseases such as diabetes or cardiovascular disease.[13,14] In addition, frequent hangovers have been hypothesized to increase vulnerability to alcohol use disorders.[15,16]

Despite an increasing body of scientific evidence implicating the immune system in the pathogenesis of alcohol hangover, beliefs about its causes have remained diverse among both scientists and the general public. A popular and persistent belief is that hangovers result from dehydration.[17] This belief, however, is not supported by scientific data.[18] Mackus *et al.*,[18] reviewed the available evidence and concluded that alcohol-induced hangovers and dehydration are co-occurring but distinct processes. Other widely held lay perspectives include the assumption that body weight influences the level of intoxication during drinking and the severity of the subsequent hangover. Anecdotal evidence suggests that individuals with higher body weight feel less intoxicated[19] and subsequently experience less severe hangovers in comparison to those of lower body weight. The rationale for this assumption is that alcohol distributes throughout body tissues; thus, in individuals with greater body weight, alcohol concentration is more "diluted," resulting in a lower BAC.[20,21] Empirical research has demonstrated a significant positive correlation between BAC and subjective intoxication.[22] Therefore, it could be assumed that individuals with higher body weight experience less severe alcohol intoxication.

Only a limited number of studies have examined the links between alcohol consumption, subjective intoxication, and body weight or body mass index (BMI). For example, Dumesnil *et al.*,[23] reported a negative relationship between BMI and the frequency of alcohol intake. Given that body weight is incorporated in the Widmark equation – the most commonly used formula for estimating BAC[24] – it can be hypothesized that body weight may predict both subjective intoxication and hangover severity. However, both subjective intoxication and hangover severity are influenced by several additional factors, including the amount of alcohol consumed, the duration of the drinking session, and individual differences in age and sex. Therefore, it is essential to account for these covariates when investigating potential relationships between body weight, BMI, subjective intoxication, and hangover severity.

In addition to alcohol consumption variables, sex and age represent important covariates. Both alcohol intake per drinking occasion and hangover frequency decrease with age.[25,26] Moreover, with increasing age, muscle mass declines and the proportion of adipose tissue rises, resulting in reduced total body water per kilogram of body weight, particularly in men. Consequently, older men reach higher BAC levels than younger men when ingesting the same ethanol dose per kilogram.[27] Thus, age should be considered a key covariate. Clear sex differences also exist in alcohol consumption and ethanol pharmacokinetics. Men typically consume more alcohol than women and, as a result, experience more negative alcohol-related consequences, such as hangovers.[28,29] However, when consuming the same amount of alcohol, women usually report higher levels of subjective intoxication than men. This difference is likely attributable to in body water–fat ratios, which result in a faster ethanol elimination rate in men.[30]

To date, only one study has directly assessed the possible impact of body weight and BMI on subjective intoxication and hangover severity. Verster *et al.*,[22] conducted a survey among 333 young adults on holiday in Fiji. Regression analyses that included a large number of demographic factors, health correlates, and drinking variables found that neither body weight nor BMI was a significant predictor of subjective intoxication or hangover severity. Instead, estimated BAC was the strongest predictor of subjective intoxication, while subjective intoxication itself was the strongest predictor of hangover severity. Nevertheless, the finding that body weight and BMI were not significant predictors in these models does not necessarily preclude the existence of associations with subjective intoxication or hangover severity.

The aim of the current study was to further investigate the potential relationships of body weight and BMI with subjective intoxication and hangover severity in a larger sample. Analyses were adjusted for alcohol consumption, duration of drinking, and individual differences in age and sex. It was hypothesized that individuals with higher body weight or BMI would report lower levels of subjective intoxication and experience less severe hangovers.

## 2. Methods

### 2.1. Data collection

Data from two online surveys were combined for the current analysis.[31,32] The first survey, described by Kiani *et al.*,[33] was conducted in 2020 in the Netherlands among members of the general population aged 18–94 years. The study was approved by the Ethics Committee of the Faculty of Social and Behavioral Sciences of Utrecht University (approval code: FETC17–061), and all participants provided electronic informed consent. The survey collected data on the effects of the COVID-19 lockdown on health (for a detailed methodological description, see[33]). For the current analysis, only pre-COVID-19 baseline data were used. The second survey, described by Verster *et al.*,[34] was conducted in 2024 and focused on alcohol consumption and correlates of immune fitness. It was administered among adults in the United Kingdom (UK) and Ireland aged 18–71 years who were enrolled in psychology courses at the Open University. The study was approved by the Open University Human Research Ethics Committee (approval code: HREC/4628), and all participants provided electronic informed consent.

In both surveys, demographic data were collected, including age, sex (male or female), body weight (kg), and height (m). BMI was calculated as kg/m$^2$.[31,35] Immune fitness, as a proxy of health, was also assessed. Immune fitness refers to the body's capacity to respond to health challenges (e.g., infections) by activating an appropriate immune response.[32] Past-year immune fitness was measured using the immune status questionnaire (ISQ).[36] The ISQ consists of seven items – common cold, diarrhea, sudden high fever, headache, muscle and joint pain, skin problems (e.g., acne and eczema), and coughing – each scored on a 5-point Likert scale. Participants indicated the frequency of experiencing each symptom during the past year (response options: never, sometimes, regularly, often, [almost] always). After recoding,[36] the ISQ sum score ranged from 0 (very poor) to 10 (excellent).

Participants who consumed alcohol were asked to report their average weekly alcohol consumption in units. Guidance was provided on the typical size of different drink types and their corresponding alcohol units. Participants also reported the average number of drinking days per week and the average number of hangovers experienced per month. For their heaviest drinking occasion in the past month, participants reported the number of alcoholic drinks consumed and the duration (hours) of the drinking episode. Subjective intoxication was assessed on a scale ranging from 0 (absent) to 10 (extremely drunk),[37] and next-day hangover severity was assessed on a scale ranging from 0 (absent) to 10 (extreme).[38]

### 2.2. Statistical analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) (IBM SPSS Statistics for Windows, Version 30.0. IBM Corp., USA). According to the World Health Organization classification,[39] participants were categorized into the following BMI groups:

(i) Underweight (BMI <18.5)
(ii) Normal weight (BMI 18.5–24.9)
(iii) Pre-obesity (BMI 25.0–29.9)
(iv) Obesity class I (BMI 30.0–34.9)
(v) Obesity class II (BMI 35.0–39.9)
(vi) Obesity class III (BMI >40).

For each variable, means and standard deviations were computed. Subjective intoxication and hangover severity were compared across BMI groups using univariate analysis of variance, with age, sex, alcohol intake, and drinking duration on the heaviest drinking occasion in the past month entered as covariates. Differences from the normal-weight group, after Bonferroni correction for multiple comparisons, were considered statistically significant at $p<0.01$.

Spearman's correlations were computed between body weight/BMI and hangover frequency and severity. In addition, partial correlations between body weight/BMI and hangover severity were calculated while controlling for age, sex, and alcohol intake on the past month's heaviest drinking occasion. Correlations were considered statistically significant at $p<0.05$.

## 3. Results

A total of 1,615 individuals who consumed alcohol were included in the analysis. The mean age was 37.9 years (range:

18–94 years), and the majority of the sample (74.7%) were female. An overview of demographic characteristics and study outcomes by sex is presented in Table 1.

Women were significantly younger, shorter, and reported lower body weight than men. They also consumed less alcohol per week and reported fewer drinking days per week. On the heaviest drinking occasion in the past month, women consumed significantly less alcohol than men (6.1 vs. 7.7) but reported significantly greater subjective intoxication (4.2 vs. 3.5) and significantly greater next-day hangover severity (2.2 vs. 2.8). Univariate analysis of variance, with the amount of alcohol consumed and duration of drinking as covariates, revealed that sex differences in subjective intoxication ($F_{(1,1554)}$ = 70.3, $p$<0.001) and hangover severity ($F_{(1,1554)}$ = 39.9, $p$<0.001) remained statistically significant. Women also reported significantly poorer immune fitness compared to men. No sex differences were found for hangover frequency and BMI.

The study outcomes by BMI group are summarized in Table 2. As expected given the categorization, the groups differed significantly in weight, height, and BMI. Compared to the normal-weight group, immune fitness was significantly poorer in the obesity class II ($p$<0.001) and obesity class III groups ($p$<0.001). Drinking duration was significantly shorter for the pre-obesity ($p$=0.003) and obesity class I groups ($p$=0.003). The obesity class III group also reported significantly fewer drinking days per week ($p$=0.003). No significant differences between BMI groups were observed for weekly alcohol consumption ($p$=0.811) or for the number of alcoholic drinks consumed on the heaviest drinking occasion in the past month ($p$=0.164)

To allow meaningful group comparisons for hangover severity and subjective intoxication, analyses were adjusted for age, sex, alcohol consumption, and drinking duration on the past month's heaviest drinking occasion. No significant differences were found between BMI groups for subjective intoxication ($F_{(5, 1547)}$ = 0.458, $p$=0.808) or hangover severity ($F_{(5, 1547)}$ = 0.151, $p$=0.981). Similar nonsignificant results were found when hangover severity was analyzed separately for the Dutch and UK/Irish samples ($F_{(5, 700)}$ = 0.354, $p$=0.880 and $F_{(5, 837)}$ = 0.915, $p$=0.470, respectively). For subjective intoxication, no significant differences were found between BMI groups in the Dutch sample ($F_{(5, 700)}$ = 0.620, $p$=0.684). In contrast, significant differences were observed in the UK/Irish sample ($F_{(5, 837)}$ = 3.508, $p$=0.004), with slightly but significantly lower subjective intoxication ratings reported by participants in the obesity class I ($p$=0.007), obesity class II ($p$=0.009), and obesity class III groups ($p$=0.004). However, the magnitude of these differences (<0.8 on the 11-point subjective intoxication scale) is unlikely to be clinically meaningful.

Group comparisons for hangover frequency were adjusted for age, sex, weekly alcohol consumption, and number of drinking days per week. Hangover frequency did not differ significantly between BMI groups ($F_{(5, 1550)}$ = 0.527, $p$=0.756). Similar nonsignificant results were observed when the analyses were conducted separately for the Dutch sample ($F_{(5, 700)}$ = 0.916, $p$=0.470) and the UK/Irish sample ($F_{(5, 840)}$ = 0.286, $p$=0.921).

The partial correlation between body weight and hangover severity, controlling for age, sex, alcohol consumption, and drinking duration on the past month's heaviest drinking occasion, was not statistically significant ($r$ = −0.032, $p$=0.203). Similar nonsignificant partial correlations were found for the Dutch sample ($r$ = −0.052, $p$=0.171) and the UK/Irish sample ($r$ = −0.050, $p$=0.148).

The partial correlation between BMI and hangover severity, controlling for age, sex, alcohol consumption, and drinking duration on the past month's heaviest drinking occasion, was not statistically significant ($r$ = −0.019, $p$=0.448). Similar non-significant partial correlations were found for the Dutch sample ($r$ = −0.050, $p$=0.182) and the UK/Irish sample ($r$ = −0.066, $p$=0.056). The partial

**Table 1. Baseline sample characteristics and study outcomes by sex**

| Characteristics/ outcomes | Overall ($n$=1,615) | Men ($n$=408) | Women ($n$=1,207) | $p$-value |
|---|---|---|---|---|
| Demographics | | | | |
| Age (years) | 37.9 (15.9) | 44.8 (18.1) | 35.5 (14.3) | <0.001* |
| Body weight (kg) | 77.0 (18.0) | 85.8 (15.4) | 74.0 (17.8) | <0.001* |
| Height (m) | 1.70 (0.10) | 1.81 (0.08) | 1.66 (0.08) | <0.001* |
| BMI (kg/m²) | 26.7 (6.2) | 26.4 (4.9) | 26.8 (6.5) | 0.431 |
| Immune fitness (ISQ) | 6.2 (2.7) | 7.5 (2.2) | 5.8 (2.7) | <0.001* |
| Alcohol consumption | | | | |
| Standard alcoholic units per week | 7.5 (10.3) | 9.4 (11.5) | 6.9 (9.9) | <0.001* |
| Drinking days per week | 2.2 (1.8) | 2.8 (2.1) | 2.0 (1.6) | <0.001* |
| Hangover frequency | 0.9 (1.4) | 1.1 (1.7) | 0.9 (1.3) | 0.881 |
| Past month's heaviest drinking occasion | | | | |
| Number of alcoholic drinks | 6.5 (5.7) | 7.7 (7.2) | 6.1 (5.0) | 0.015* |
| Drinking duration (hour) | 4.6 (3.1) | 4.6 (3.5) | 4.6 (2.9) | 0.144 |
| Subjective intoxication | 4.0 (3.2) | 3.5 (3.3) | 4.2 (3.1) | <0.001* |
| Hangover severity | 2.6 (3.0) | 2.2 (2.9) | 2.8 (3.1) | <0.001* |

Notes: Values are mean (SD). Sex differences were considered statistically significant at $p$<0.05 and are indicated by *.
Abbreviations: BMI: Body mass index; ISQ: Immune status questionnaire.

**Table 2. Sample characteristics and study outcomes by BMI group**

| Characteristics/outcomes | Normal weight (*n*=742) | Underweight (*n*=46) | Pre-obesity (*n*=434) | Obesity class I (*n*=223) | Obesity class II (*n*=107) | Obesity class III (*n*=62) |
|---|---|---|---|---|---|---|
| Demographics | | | | | | |
| Sex (m/f) | 170/572 | 8/38 | 149/285 | 61/162 | 13/94 | 6/56 |
| Age (years) | 34.8 (15.3) | 27.7 (9.3) | 42.3 (16.9) | 40.2 (15.5) | 40.2 (14.3) | 38.9 (12.5) |
| Body weight (kg) | 65.1 (9.3) | 50.8 (6.7)* | 80.5 (10.5)* | 92.7 (11.1)* | 101.3 (11.8)* | 115.9 (13.2)* |
| Height (m) | 1.71 (0.1) | 1.70 (0.1) | 1.71 (0.1) | 1.69 (0.1) | 1.65 (0.1)* | 1.62 (0.1)* |
| BMI (kg/m$^2$) | 22.2 (1.7) | 17.5 (1.1)* | 27.3 (1.4)* | 32.3 (1.4)* | 37.0 (1.3)* | 44.4 (4.0)* |
| Immune fitness (ISQ) | 6.4 (2.5) | 5.8 (2.9) | 6.5 (2.6) | 5.9 (2.9) | 5.3 (2.8)* | 4.6 (2.6)* |
| Alcohol consumption | | | | | | |
| Alcoholic units per week | 7.1 (9.0) | 5.8 (7.6) | 8.0 (11.4) | 7.0 (9.8) | 8.3 (10.7) | 10.9 (17.4) |
| Drinking days per week | 2.2 (1.7) | 2.0 (1.8) | 2.3 (1.9) | 2.1 (1.8) | 2.0 (1.6) | 1.6 (1.2)* |
| Hangover frequency | 1.0 (1.5) | 1.2 (1.6) | 0.8 (1.4) | 0.8 (1.5) | 0.9 (1.3) | 1.0 (1.5) |
| Past month heaviest drinking occasion | | | | | | |
| Alcoholic drinks | 6.8 (5.5) | 5.4 (3.4) | 6.4 (5.8) | 6.1 (5.7) | 6.5 (6.0) | 6.8 (7.0) |
| Drinking duration (hour) | 4.8 (3.1) | 4.7 (2.1) | 4.4 (3.1)* | 4.2 (3.0)* | 4.5 (3.2) | 4.6 (3.8) |
| Subjective intoxication | 4.3 (3.1) | 4.2 (3.0) | 3.6 (3.2) | 3.6 (3.2) | 3.7 (3.2) | 3.9 (2.8) |
| Hangover severity | 2.8 (3.1) | 2.5 (2.8) | 2.4 (3.0) | 2.4 (3.0) | 2.5 (3.1) | 2.9 (3.1) |

Notes: Hangover frequency was assessed as occasions per month, while subjective intoxication and hangover severity were rated on a Likert scale ranging from 0 (absent) to 10 (extreme). Values are mean (SD). Differences from the normal-weight group, after Bonferroni correction for multiple comparisons, were considered statistically significant at $p<0.01$ and are indicated by *.
Abbreviations: BMI: Body mass index; ISQ: Immune status questionnaire.

correlation between body weight and hangover frequency, controlling for age, sex, weekly alcohol consumption, and number of drinking days, was also nonsignificant ($r = -0.014$, $p=0.594$). Comparable nonsignificant partial correlations were found in the Dutch sample ($r = 0.003$, $p$=0931) and the UK/Irish sample ($r = -0.030$, $p=0.383$). Similarly, the partial correlation between BMI and hangover frequency, adjusted for the same covariates, was not statistically significant ($r = -0.023$, $p=0.365$), with comparable results in the Dutch ($r = -0.029$, $p=0.442$) and UK/Irish samples ($r = -0.040$, $p=0.240$).

Small but significant negative Spearman's correlations were observed between immune fitness and hangover severity (overall: $r = -0.056$, $p=0.027$; the Netherlands: $r = 0.021$, $p=0.573$; UK/Ireland: $r = -0.004$, $p=0.912$), between immune fitness and hangover frequency (overall: $r = -0.053$, $p=0.036$; the Netherlands: $r = 0.006$, $p=0.870$; UK/Ireland: $r = -0.018$, $p=0.606$), and between immune fitness and BMI (overall: $r = -0.149$, $p<0.001$; the Netherlands: $r = -0.066$, $p=0.071$; UK/Ireland: $r = -0.179$, $p<0.001$). Both body weight (overall: $r = 0.270$, $p<0.001$; the Netherlands: $r = 0.321$, $p<0.001$; UK/Ireland: $r = 0.185$, $p<0.001$) and BMI (overall: $r = 0.245$, $p<0.001$; the Netherlands: $r = 0.367$, $p<0.001$; UK/Ireland: $r = 0.169$, $p<0.001$) increased with age. In addition, age showed a small but significant positive correlation with weekly alcohol consumption (overall: $r = 0.065$, $p=0.011$; the Netherlands: $r = 0.078$, $p=0.037$; UK/Ireland: $r = 0.130$, $p<0.001$). In contrast, age correlated negatively with hangover frequency (partial correlation controlling for weekly alcohol consumption and number of drinking days: overall: $r = -0.281$, $p<0.001$; the Netherlands: $r = -0.393$, $p<0.001$; UK/Ireland: $r = -0.120$, $p<0.001$), subjective intoxication (partial correlation controlling for the number of alcoholic drinks consumed and drinking duration on the past month's heaviest drinking occasion: overall: $r = -0.371$, $p<0.001$; the Netherlands: $r = -0.441$, $p<0.001$; UK/Ireland: $r = -0.077$, $p=0.025$), and hangover severity (partial correlation controlling for the number of alcoholic drinks consumed and drinking duration on the past month's heaviest drinking occasion: overall: $r = -0.184$, $p<0.001$; the Netherlands: $r = 0.322$, $p<0.001$; UK/Ireland: $r = 0.048$, $p=0.166$).

## 4. Discussion

The current study revealed no significant associations between body weight or BMI and subjective intoxication or hangover severity. These results remained unchanged after adjusting for potential confounding variables, including sex, age, quantity of alcohol consumed, and drinking duration on the heaviest drinking occasion in the past month. The results were consistent across the combined sample and the individual country subsamples. Taken together, these findings challenge the common belief that individuals with higher body weight or BMI become less intoxicated or experience less severe hangovers.

Studies on the pathology of alcohol hangover have revealed that dehydration is not the primary cause.[18] Instead, differences in ethanol metabolism,[40] and particularly the inflammatory response to alcohol consumption,[11] are important determinants of the occurrence and severity of hangovers. The relationship between baseline immune fitness and hangover frequency and severity, as suggested by Išerić *et al.*,[12] was supported by the significant negative correlations observed in the current study. Consistent with prior research, the study also confirmed that obesity is associated with poorer immune fitness. However, this reduced immune fitness was not reflected in significant correlations of body weight or BMI with subjective intoxication or hangover severity.

Key strengths of the present study include the large combined sample size. Although the Netherlands and the UK/Ireland share a Western cultural background, they also differ in important respects, particularly in drinking culture. Combining the two datasets, therefore, increases heterogeneity, which may influence the current study outcomes. To address this, results were also analyzed separately for each country. These analyses revealed consistent findings for the relationship between BMI and both hangover frequency and severity, supporting the appropriateness of combining the two datasets. However, some heterogeneity between countries was found in correlations with immune fitness and age, highlighting the importance of presenting both combined and country-specific results. Another strength of the present study is that correlations between body weight and hangover severity, as well as between BMI and hangover severity, were adjusted for potential confounding variables, including age, sex, alcohol consumption, and drinking duration on the past month's heaviest drinking occasion. In addition, the study included data from participants across a wide age range and from different countries. Finally, validated and reliable single-item assessment scales were used to assess subjective intoxication[37] and next-day hangover severity.[38]

A limitation of the current study is that the data were self-reported and collected retrospectively, which may introduce recall bias. Furthermore, since the correlational analyses were based on cross-sectional data, causal relationships cannot be inferred. It is also important to investigate the potential roles of body weight and BMI in populations with diverse cultural and genetic backgrounds. Prior studies have reported cross-cultural differences in alcohol metabolism and drinking behaviors. For example, individuals of Asian ancestry are more likely to experience severe intoxication symptoms due to variations in *ALDH2* alleles.[41,42] Several additional factors that influence alcohol metabolism were not taken into account in the current study. In addition to body weight, the ratio of body water to fat may be of importance in determining peak BAC,[43] which could, in turn, affect both subjective intoxication and hangover severity. Food intake also influences alcohol metabolism.[43] In view of these limitations, future prospective, long-term studies are warranted. Such studies should monitor participants' alcohol consumption, behavior, and lifestyle in real time, thereby reducing recall bias and providing more robust evidence.

The nonsignificant correlations with BMI and body weight in the current study suggest that other factors may play a more important role in determining hangover frequency and severity. Future research should therefore focus on additional potential determinants, such as the congener content of alcoholic beverages; socioeconomic, psychological, and genetic characteristics of drinkers; lifestyle factors such as diet, sleep, and physical activity; and overall health status.

## 5. Conclusion

The current study revealed no significant relationship between body weight or BMI and subjective intoxication or hangover severity. These findings challenge the common belief that individuals with higher body weight or BMI become less intoxicated or experience less severe hangovers.

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## Conflict of interest

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## Author contributions

*Conceptualization:* All authors
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## Ethics approval and consent to participate

The studies were approved by the Ethics Committee of the Faculty of Social and Behavioral Sciences of Utrecht University (approval code: FETC17-061) and the Open University Human Research Ethics Committee, HREC (approval code: HREC/4628). Electronic informed consent was obtained from all participants in the studies.

## Consent for publication

Electronic informed consent was obtained from all participants to publish their data.

## Availability of data

The data are available from the corresponding author upon reasonable request.

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