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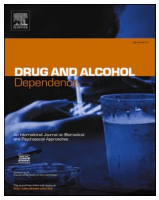

# Drinking on empty: Daily associations between food and alcohol disturbance, subjective alcohol intoxication, and negative consequences

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ABSTRACT

*Background:* Food and alcohol disturbance (FAD) refers to restricting caloric intake prior to, or during a drinking episode to increase/quicken alcohol's effects (FAD-intoxication) or to offset calories consumed from alcohol (FAD-calories). FAD is common among college students and is associated with alcohol-related harms cross-sectionally. However, to date there is limited research examining FAD's association with negative alcohol-related consequences, as well as mechanisms linking FAD and negative consequences, at the event level.
*Basic procedure:* The present study utilized a within-person, day-level design to assess whether individuals reported higher levels of subjective alcohol intoxication on days when they engaged in FAD compared to drinking days absent of FAD. In turn, we examined whether increased subjective alcohol intoxication positively associated with same-day negative consequences. The sample included 72 college students (73.8 % female; 51.4 % White non-Hispanic; $M_{age}$=19.64) who completed up to two surveys daily (Wednesday-Sunday) for five weeks.
*Main findings:* For FAD-intoxication analyses, we found a significant mediation effect such that on days when students engaged in FAD-intoxication they reported higher subjective alcohol intoxication than on days when they consumed alcohol absent of FAD-intoxication. In turn, on days when students reported higher subjective alcohol intoxication they also reported more negative alcohol-related consequences. In contrast, the mediation effect for the FAD-calories model was not significant.
*Conclusions:* These findings further highlight the risk associated with engaging in FAD-intoxication and provides preliminary evidence that FAD-intoxication should be considered in interventions aiming to reduce event-level alcohol-related harms among college students.

## 1. Introduction

Despite widespread prevention efforts, alcohol misuse among college students remains a major challenge to public health. According to the most recent National Survey on Drug Use and Health (Substance Abuse and Mental Health Services Administration, 2023), nearly half of students report past-month use, placing them at increased risk for a wide range of serious same-day consequences, including blackouts, sexual assault, and personal injury (Chikritzhs and Livingston, 2021; Dardis et al., 2021; Voloshyna et al., 2018). While much of the existing intervention work has targeted overall consumption, research suggests that alcohol use alone explains less than a quarter of the variance in alcohol-related harms among this population (Prince et al., 2018). This highlights the importance of considering additional factors surrounding a drinking episode when designing interventions aimed at reducing alcohol-related negative consequences. One such factor that may elevate college students' risk of experiencing negative consequences is engagement in food and alcohol disturbance (FAD). FAD is defined as the use of any disordered eating behavior (e.g., food restriction, purging, laxative use, excessive exercise) prior to, during, or after a drinking episode to compensate for the calories consumed from alcohol and/or to enhance alcohol's effects (Choquette et al., 2018). Although FAD encompasses many disordered eating behaviors (see Berry et al., 2024 for a review), for the present study, we focus on restricting caloric intake prior to, or during drinking alcohol to quicken/intensify intoxication (FAD-intoxication) and/or to offset calories from alcohol (FAD-calories). We have chosen to focus on this subset of FAD behaviors for two primary reasons: 1) behaviors occurring before or during an alcohol use episode are the most relevant for addressing event-level alcohol-related consequences, and 2) caloric restriction during this timeframe is the most

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prevalent FAD behavior (Choquette, 2021; Landry et al., 2022), making interventions targeting this practice more broadly applicable to college students.

### 1.1. FAD and alcohol-related negative consequences

A study across six U.S. universities found that 39.8 % of women and 23.2 % of men engaged in FAD-intoxication at least once in the past month, while 26.4 % of women and 15.5 % of men participated in FAD-calories (Herchenroeder et al., 2024). Notably, another study found the prevalence of these behaviors rises to over 80 % among students who report binge drinking (defined as 5 + drinks for men and 4 + drinks for women within a two-hour period; Herchenroeder et al., 2023). The ubiquity of FAD on college campuses is particularly concerning given research indicating that FAD, for both caloric compensation and intoxication motives, is positively associated with alcohol-related negative consequences (e.g., blackouts, physical altercations, unwanted sexual experiences; Giles et al., 2009; Herchenroeder et al., 2020; Herchenroeder and Yeung, 2024; Speed et al., 2023). Further, students who engage in FAD-intoxication and/or FAD-calories are more likely to experience negative consequences compared to those who drink but do not engage in FAD (Looby et al., 2025). Importantly, in their study, Looby et al. (2025) included all compensatory behaviors (e.g., purging, excessive exercising) in their measure of FAD-calories. Overall, the literature suggests that individuals who engage in FAD for either motivation (caloric compensation or increased/quicker intoxication) tend to report higher alcohol-related harms on average (Berry et al., 2924). However, it remains unclear whether they experience more negative consequences on days when they engage in FAD compared to days when they drink without engaging in FAD.

To answer this question, within-person, day-level data is necessary. However, only a handful of studies have examined FAD engagement at the daily level. Buchholz et al. (2018) set out to determine whether women reported higher alcohol consumption and related negative consequences on days when they intended to restrict their caloric intake. Their analyses revealed that on days when women intended to reduce their caloric intake, they reported more alcohol consumption and related negative consequences. However, the authors only measured *intended* dietary restraint, actual dietary restraint was not assessed. Moreover, the majority of women reported intending to limit their caloric intake for reasons beyond enhancing alcohol's effects/offsetting calories, begging the question of whether the intended restriction should be constituted as FAD (Berry et al., 2024). In another study, Mason et al. (2021) extended this work by assessing actual caloric restriction and binge drinking among a sample of women with binge eating disorders. Their findings revealed that when women reported recent caloric restriction to control their weight, they were more likely to binge drink. Unfortunately, the authors did not assess whether the women restricted their caloric intake to offset alcohol-related calories, leaving doubt on whether these behaviors qualify as FAD. Finally, two dissertation studies (Choquette, 2021; Horvath, 2022) assessed actual dietary restraint as well as other compensatory behaviors (e.g., purging) directly linked to alcohol use events. However, neither study examined the association between FAD and negative consequences at the daily level. Instead, results suggested that on days when individuals engaged in FAD, they did not report greater alcohol use compared to days absent of FAD.

While these studies provide valuable insights, due to their various limitations, they do not provide evidence of whether individuals experience more negative consequences on days when they engage in FAD compared to days when they consume alcohol absent of FAD. Addressing this gap in the literature is essential for informing whether interventions to reduce alcohol-related harms should consider targeting FAD at the daily level. In addition, to better understand why FAD may confer additional risks to college students beyond alcohol consumption alone, the present study will examine whether subjective alcohol intoxication is a mechanism linking FAD and alcohol-related negative consequences at the daily level.

### 1.2. Subjective alcohol intoxication as a mechanism linking FAD and negative consequences

Consuming little to no food before drinking alcohol accelerates the absorption of alcohol into the bloodstream (Li et al., 2001; Ramchandani et al., 2001), leading to quicker intoxication and requiring less alcohol to feel its effects. This is important as faster rates of intoxication are positively associated with day-level negative consequences (e.g., blackouts, getting sick) even after accounting for the amount of alcohol consumed (Carpenter and Merrill, 2021). Moreover, drinking on an empty stomach increases peak blood alcohol concentration (Sedman et al., 1976), which is concerning as higher blood alcohol levels are linked to greater cognitive impairment (Droste et al., 2018; Martin et al., 2013), increased physical aggression (Giancola and Zeichner, 1995), and more severe motor vehicle accidents (Phillips and Brewer, 2011).

These findings suggest that, holding alcohol use constant, when individuals engage in FAD they may experience higher levels of intoxication compared to when they drink without engaging in FAD. In turn, when students reach higher levels of intoxication than they typically do, they may be more likely to experience negative consequences. To test this hypothesized mediation pathway, the present study will utilize a daily diary design to assess whether individuals report higher levels of subjective alcohol intoxication on days when they engage in FAD compared to drinking days absent of FAD. In turn, we will then examine whether increased subjective alcohol intoxication positively associates with same-day negative consequences. Assessing subjective alcohol intoxication is important as within-person variations in subjective intoxication predict event-level negative consequences including engaging in unsafe sex, property crime, and aggressive behavior above and beyond the effects of estimated blood alcohol concentration (Quinn and Fromme, 2011).

To our knowledge, this is the first daily diary study to examine whether FAD engagement is associated with higher subjective alcohol intoxication and, in turn, more alcohol-related harms above and beyond alcohol use at the daily level. We hypothesized that on days when students engage in FAD they will report higher levels of subjective alcohol intoxication and that in turn, will associate with more negative consequences compared to when they consume alcohol without engaging in FAD. Due to prior research suggesting that FAD-intoxication and FAD-calories should be assessed separately (Berry et al., 2024), we will run separate models for each motive.

## 2. Method

The present study is part of a larger data collection effort aiming to understand risk/protective factors and consequences of FAD. We recruited college students from the Psychology Department participant pool (SONA) at George Washington University for a five-week study. To be eligible, participants had to meet the following criteria: be 18–25 years old, have engaged in FAD at least twice in the past 30 days, report weekly alcohol use, and own a smartphone. These criteria were designed to maximize the likelihood of participants engaging in FAD while ensuring the inclusion criteria were not overly restrictive. Hox's (1998) "50/20" rule indicates a minimum of 50 level-2 observations and 20 level-1 observations are needed to detect main effects. As a result, we aimed to collect data from at least 50 participants. In the end, we recruited 73 participants, however, the final analytic sample consisted of 72 participants, as one participant was removed due to technical issues with the survey application.

Participants identified primarily as female (73.8 %) with a mean age of 19.64 ($SD$ = 1.35). Regarding race and ethnicity, participants identified as White non-Hispanic (51.4 %), Black or African American (11.1 %), Asian (9.7 %), multiracial (9.7 %), Middle Eastern or North African (2.8 %), and Hispanic (18.1 %). The racial/ethnic makeup of our

sample aligns closely with that of the university population it was sampled from. At baseline, participants reported consuming an average of 6.72 (*SD* = 5.03) standard drinks per week and engaging in FAD 3.85 (*SD* = 3.53) times in the past 30 days.

### 2.1. Procedure

#### 2.1.1. Screener and daily protocol training

First, participants completed a brief screener survey on Qualtrics to determine eligibility. Eligible participants were instructed to sign up for a virtual training session. During the training session we provided participants with an overview of the study protocols, reviewed standard drink definitions, and provided instructions on how to use the daily diary app (MetricWire Inc.) to submit their answers. At the completion of the training session, we instructed participants to download the daily diary app (MetricWire Inc.) and complete the baseline survey which asked them to provide consent to participate in the study before assessing demographics and past 30-day alcohol use and FAD engagement. Start dates for the baseline survey spanned from March 5th, 2024 to November 5th, 2024.

#### 2.1.2. Daily diary procedure

The daily diary portion of the study commenced on the Wednesday following the participant's completion of the baseline survey. Prior research suggests that high-risk drinking often occurs on Thursday, Friday, and Saturday nights (Kuntsche and Labhart, 2012). Therefore, we scheduled assessments to capture these drinking events. Additionally, we prompted participants on Wednesday to increase variability within the data. Specifically, on Thursday, Friday, Saturday, and Sunday, participants were prompted in the morning (10:30 AM) to report on their alcohol use, subjective alcohol intoxication, and related negative consequences as well as their FAD engagement from the prior day. In the evenings on Wednesday, Thursday, Friday, and Saturday (5:00 PM), we assessed affect to capture this covariate closer in time to actual FAD engagement and alcohol use. Participants had two and a half hours to complete each survey and were sent reminder prompts every 30 min for an hour and a half if they had not yet completed a prompt. The first prompt was delivered as a push notification and the next two prompts were text messages from the Metricwire app. All methods and procedures were approved by the Institutional Review Board at George Washington University.

#### 2.1.3. Participant compensation

Participants were compensated with research credits based on their level of study participation, which could be applied toward their Psychology Department research credit requirements. Completion of the baseline survey and at least 85 % (38 out of 45) of daily surveys earned participants 3 research credits. Completing the baseline survey and 51–84 % (23–37) of daily surveys earned 2 credits, while completing the baseline survey and less than 51 % (fewer than 23) of daily surveys earned 1.5 credits. Additionally, participants who completed the baseline survey and at least 85 % of the daily surveys received a $50 Amazon gift card at the end of the semester in which they participated.

### 2.2. Measures

#### 2.2.1. FAD

If participants reported drinking alcohol the prior night then they were asked, "Did you eat less than normal (e.g., eat a smaller meal, skip a meal) prior to, or during drinking to get drunker/get drunk faster?" (FAD-intoxication - 1 = *yes*, 0 = *no*) and "Did you eat less than normal (e.g., eat a smaller meal, skip a meal) prior to, or during drinking to offset calories consumed from alcoholl?" (FAD-calories - 1 = *yes*, 0 = *no*).

#### 2.2.2. Subjective alcohol intoxication

Participants who drank the previous day responded to a single item asking them to estimate their peak intoxication level. Response options included (1 – *completely sober*, 2 – *mostly sober*, 3 – *a little drunk*, 4 – *moderately drunk*, 5 – *very drunk*, 6 – *totally wasted*). Response options were chosen based on prior research evaluating subjective alcohol intoxication as well as work highlighting the language college students use to describe various levels of intoxication (Linden-Carmichael et al., 2020, 2021).

#### 2.2.3. Negative alcohol-related consequences

To assess negative consequences from drinking, participants were prompted to recall whether any of the following 10 things happened to them as a result of drinking the previous day: I have/had a hangover, I became aggressive, I hurt or injured myself by accident, I couldn't remember what I did while drinking, I was rude or obnoxious, I did something that embarrassed me, I had a sexual experience I wish I hadn't, I felt nauseated or vomited, I passed out, and I drank more than I planned to. These items were obtained from the Daily Alcohol-Related Consequences and Evaluations (DACE) Measure for Young Adults (Lee et al., 2017) and 3 additional items were adapted for daily use from the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005). Negative consequences were coded as the sum of the 10 consequences.

#### 2.2.4. Alcohol use

If participants indicated that they drank the prior night then they were asked to report how many standard drinks they consumed. This estimate was used as a covariate in all models.

#### 2.2.5. Affect

For use as a covariate, participants responded to 8 items assessing their affective experience in the present moment: Negative affect - Sad, Anxious, Angry, Nervous (within ω =.74, between ω =.92), Positive affect - Cheerful, Relaxed, Content, Happy (within ω =.82, between ω =.94). Previous research supports the use of these and similar items to assess momentary affect (Dvorak et al., 2014; Simons et al., 2010). Responses ranged from 1 (*very slightly or not at all*) to 5 (*extremely*). We averaged responses to create total scores for both positive and negative affect.

## 3. Data analysis plan

We used multilevel linear modeling for primary analyses, with day (Level 1) nested within person (Level 2). Level 1 reflects the within-person level while Level 2 reflects between-person effects on outcomes. We person-centered all continuous Level 1 variables and utilized restricted maximum likelihood estimation to handle missing data. We conducted all multilevel linear modeling in SAS (version 9.4) using the PROC MIXED procedure. To gain insight regarding the percentage of variability of each construct which can be attributed to the between- and within-person levels, we ran models without predictors to determine intraclass coefficients (ICCs) for each Level 1 variable. We then ran our substantive models. To strengthen inference, we included alcohol use, affect (positive and negative), and sex assigned at birth as these variables have been shown to predict our variables of interest (Carpenter et al., 2019; Herchenroeder et al., 2022; Waddell et al., 2024). We included study day (1−20) as well as Level 2 aggregates of study variables in all substantive models. Lastly, we included random intercepts and slopes in all substantive models.

For the mediation analyses, we tested whether subjective alcohol intoxication mediated the effects of FAD engagement on negative consequences. Following procedures for testing multilevel mediation (Krull and MacKinnon, 2001), we first examined the effects of FAD on subjective alcohol intoxication (Level 1 mediator). In the second step, we tested the effect of subjective alcohol intoxication on negative

consequences, above and beyond the effects of FAD and aforementioned covariates. Finally, in the third step we determined the significance of the mediated effect using a Sobel test (Preacher and Leonardelli, 2010–2025) as well as by 95 % confidence intervals that did not contain zero using RMediation (Tofighi and MacKinnon, 2011).

## 4. Results

### 4.1. Descriptive statistics

Participants completed a total of 3053 out of 3240 daily surveys (94.2 %). Participants ranged in completion rate from 61 % to 100 %, with the median completion rate at 98 %. All participants reported consuming alcohol during the study protocol, totaling 545 drinking days ($M_{person}$=7.57, *SD*=3.71, Range=1–17) across the sample. Additionally, 48 (66.7 %) participants reported engaging in FAD during the study protocol, with a total of 192 FAD engagement days. Of these, participants reported FAD-intoxication motives on 118 days ($M_{person}$=1.64, *SD*=2.69, Range=0–16) and FAD-calories motives on 134 days ($M_{person}$=1.86, *SD*=2.82, Range=0–16).[1] Students engaged in FAD for both alcohol enhancement and caloric compensation motives on 31.3 % ($n$ = 60) of FAD engagement days. On drinking days, participants reported an average subjective intoxication level of 3.11 (*SD*=0.81), which falls between "a little drunk" and "moderately drunk." Participants consumed an average of 3.53 (*SD*=1.14) drinks and experienced an average of 0.94 (*SD*=0.86) negative consequences on drinking days.

### 4.2. Multilevel linear models

While we initially included random slopes in all substantive models, the models did not converge, likely due to insufficient variability in the slopes. Therefore, we removed random slopes for the final analyses. All reported estimates are unstandardized.

#### 4.2.1. FAD-intoxication mediation model

All parameter estimates are displayed in Table 1. Analyses revealed that above and beyond the effects of alcohol use, affect, sex assigned at birth, and study day, participants reported higher levels of subjective alcohol intoxication on days when they engaged in FAD-intoxication compared to when they consumed alcohol but did not participate in FAD-intoxication (B = 0.35, SE = 0.13, $p$ = .01). Further, after accounting for the above covariates, as well as FAD-intoxication, subjective alcohol intoxication positively associated with negative consequences (B = 0.71, SE = 0.06, $p$ = <.01) such that on days when participants reported higher levels of intoxication, they also reported more negative consequences. Finally, we found evidence for a significant mediation effect such that subjective alcohol intoxication mediated the effect of FAD-intoxication on negative alcohol-related consequences (see Table 1).

#### 4.2.2. FAD-calories mediation model

All parameter estimates are displayed in Table 2. In contrast to the FAD-intoxication model, FAD-calories did not significantly associate with subjective alcohol intoxication above and beyond the covariates (B = 0.23, SE = 0.13, $p$ = .08). However, in line with the FAD-intoxication results, subjective alcohol intoxication positively associated with negative consequences (B = 0.71, SE = 0.06, $p$ = <.01), such that on days when participants reported higher levels of subjective alcohol intoxication, they also reported more negative consequences. Overall, the test of the indirect effect of FAD-calories on negative consequences through subjective alcohol intoxication was not significant (see Table 2).

[1] FAD and alcohol use person-level means were computed by averaging the total number of instances reported by each participant, with equal weighting applied to all individual count scores.

**Table 1**
FAD-intoxication to negative consequences via subjective intoxication pathways.

| Outcome: | | | Subjective Intoxication (a-path) | | |
|---|---|---|---|---|---|
| Predictor Variables: | B | SE | *p* | | |
| Intercept | 1.37 | 0.70 | 0.05 | | |
| Level 1 | | | | | |
| **FAD-Intoxication** | **0.35** | **0.13** | 0.01 | | |
| **Alcohol Use** | **0.37** | **0.02** | **< 0.01** | | |
| Negative Affect | 0.00 | 0.07 | 0.96 | | |
| Positive Affect | -0.01 | 0.07 | 0.88 | | |
| Level 2 | | | | | |
| **FAD-Intoxication** | **0.68** | **0.30** | **0.03** | | |
| **Alcohol Use** | **0.36** | **0.08** | **< 0.01** | | |
| Negative Affect | 0.10 | 0.14 | 0.5 | | |
| Positive Affect | 0.01 | 0.14 | 0.93 | | |
| Sex | 0.04 | 0.19 | 0.84 | | |
| Study Day | 0.00 | 0.01 | 0.56 | | |
| Outcome | | | Negative Consequences (b-path) | | |
| Predictor Variables: | B | SE | *p* | | |
| Intercept | -1.03 | 0.90 | 0.26 | | |
| Level 1 | | | | | |
| **Subjective Intoxication** | **0.71** | **0.06** | **< 0.01** | | |
| FAD-Intoxication | -0.07 | 0.17 | **0.69** | | |
| Alcohol Use | 0.01 | 0.04 | **0.72** | | |
| Negative Affect | 0.05 | 0.09 | 0.62 | | |
| Positive Affect | 0.06 | 0.09 | 0.51 | | |
| Level 2 | | | | | |
| **Subjective Intoxication** | **0.49** | **0.15** | **< 0.01** | | |
| FAD-Intoxication | 0.53 | 0.39 | 0.17 | | |
| Alcohol Use | 0.03 | 0.11 | 0.8 | | |
| Negative Affect | 0.06 | 0.18 | 0.72 | | |
| Positive Affect | 0.04 | 0.17 | 0.83 | | |
| Sex | 0.12 | 0.24 | 0.63 | | |
| Study Day | -0.02 | 0.01 | 0.11 | | |
| Independent Variable → Mediator → Outcome | | | | | |
| Indirect Effect | *t* | | *p* | *a*b* | *95 % CI* |
| **FAD-Intoxication → Subjective Intoxication → Negative Consequences** | **2.63** | | **< 0.01** | **0.25** | **0.07, 0.44** |

#### 4.2.3. Sensitivity analyses

Given prior cross-sectional research suggesting that endorsing both motives for FAD may confer additional risks (Looby et al., 2025), and considering that a notable proportion (31.3 %) of FAD endorsement days involved both motives, we conducted sensitivity analyses categorizing FAD days into: (1) FAD–Intoxication only, (2) FAD–Calories only, and (3) FAD for both motives. A full depiction of findings can be found in Supplementary Tables 1–3. Overall, findings closely mirrored our original analyses. Specifically, the significant mediation effect remained for the FAD-intoxication only model, whereas there was not a significant mediation effect for the FAD-calories model. Of note, the FAD-both mediation model did not reach statistical significance.

## 5. Discussion

The present study is the first, to our knowledge, to assess whether college students report higher levels of subjective alcohol intoxication, and in turn experience more negative consequences, on days when they engage in FAD compared to when they consume alcohol absent of FAD. Analyses revealed motive-specific associations between FAD and subjective alcohol intoxication. Specifically, for FAD-intoxication, we found a significant mediation effect such that on days when students engaged in FAD-intoxication they reported higher subjective alcohol intoxication than on days when they consumed alcohol absent of FAD-intoxication. In turn, on days when students reported higher subjective alcohol intoxication they also reported more negative alcohol-related consequences. In contrast, the mediation effect for the FAD-calories model was not significant due to the fact that reports of subjective alcohol

**Table 2**
FAD-calories to negative consequences via subjective intoxication pathways.

| Outcome: | | | Subjective Intoxication (a-path) | | |
|---|---|---|---|---|---|
| Predictor Variables: | B | SE | *p* | | |
| Intercept | 1.33 | 0.73 | 0.07 | | |
| Level 1 | | | | | |
| FAD-Calories | 0.23 | 0.13 | 0.08 | | |
| **Alcohol Use** | **0.38** | **0.02** | **< 0.01** | | |
| Negative Affect | -0.00 | 0.07 | 0.96 | | |
| Positive Affect | -0.01 | 0.07 | 0.87 | | |
| Level 2 | | | | | |
| FAD-Calories | 0.35 | 0.29 | **0.23** | | |
| **Alcohol Use** | **0.36** | **0.08** | **< 0.01** | | |
| Negative Affect | 0.11 | 0.15 | 0.44 | | |
| Positive Affect | 0.03 | 0.15 | 0.84 | | |
| Sex | 0.04 | 0.20 | 0.83 | | |
| Study Day | 0.00 | 0.01 | 0.52 | | |
| Outcome | | | Negative Consequences (b-path) | | |
| Predictor Variables: | B | SE | *p* | | |
| Intercept | -1.09 | 0.92 | 0.24 | | |
| Level 1 | | | | | |
| **Subjective Intoxication** | **0.71** | **0.06** | **< 0.01** | | |
| FAD-Calories | -0.06 | 0.17 | **0.72** | | |
| Alcohol Use | 0.01 | 0.04 | **0.73** | | |
| Negative Affect | 0.05 | 0.09 | 0.56 | | |
| Positive Affect | 0.06 | 0.09 | 0.46 | | |
| Level 2 | | | | | |
| **Subjective Intoxication** | **0.53** | **0.15** | **< 0.01** | | |
| FAD-Calories | 0.24 | 0.36 | 0.51 | | |
| Alcohol Use | 0.01 | 0.11 | 0.9 | | |
| Negative Affect | 0.07 | 0.18 | 0.69 | | |
| Positive Affect | 0.04 | 0.18 | 0.82 | | |
| Sex | 0.11 | 0.24 | 0.65 | | |
| Study Day | -0.02 | 0.01 | 0.12 | | |
| Independent Variable → Mediator → Outcome | | | | | |
| Indirect Effect | *t* | | *p* | *a*b* | *95 % CI* |
| FAD-Calories → Subjective Intoxication → Negative Consequences | 1.75 | | 0.08 | 0.16 | -0.02, 0.35 |

intoxication were not predicted by FAD-calories engagement at the daily level.

Our finding that, at the daily level, FAD-intoxication engagement predicts negative consequences via subjective alcohol intoxication aligns with prior studies showing that college students who engage in FAD-intoxication more frequently also tend to report more negative alcohol-related consequences (see Berry et al., 2024 for a review). By leveraging a within-person design, the present study extends this previous work by illustrating that engaging in FAD-intoxication is associated with an increased risk of experiencing negative alcohol-related consequences at the daily level. In addition, our findings corroborate past testimonies from college students who reported that engaging in FAD-intoxication facilitates a greater level of subjective alcohol intoxication (Berry and Looby, 2024). Taken together, these results provide evidence that interventions aiming to reduce alcohol-related harms should consider implementing programming that directly targets FAD-intoxication engagement. However, simply providing education related to the effects of FAD-intoxication may be ineffective due to the behavior being goal-consistent and potentially reinforcing.

One intervention strategy that may prove effective is incorporating personalized normative feedback specific to FAD-intoxication into existing alcohol interventions. Indeed, prior work suggests that the majority of college students who consume alcohol overestimate the prevalence and peer approval of FAD-intoxication (Herchenroeder et al., 2024). These normative misperceptions are in turn associated with personal FAD-intoxication engagement such that students who believe FAD-intoxication is more common and socially acceptable are also more likely to engage in FAD-intoxication themselves (Herchenroeder et al., 2024). Providing accurate normative information may therefore reduce both FAD-intoxication engagement and related harms. In-person normative feedback could then be supplemented by Just-in-time messages containing accurate normative information related to FAD-intoxication on days when students intend to drink. Indeed, prior research suggests that daily messages communicating normative information to heavy drinking college students resulted in significant reductions in alcohol use and related negative consequences (Merrill et al., 2018).

The nonsignificant effect of FAD-calories on negative consequences via subjective alcohol intoxication is noteworthy as it indicates that the outcomes associated with the same behavior (restricting caloric intake) may differ based on the underlying motive. This finding highlights the importance of attending to FAD motives. Moreover, it aligns with prior FAD work at the within-person level suggesting that FAD-intoxication positively associates with future alcohol use (Herchenroeder and Yeung, 2024) whereas the association between FAD-calories and future alcohol use is not significant. The current finding that, holding alcohol use constant, the motive underlying FAD differentially associates with subjective alcohol intoxication is particularly interesting given the physiological nature of the outcome. Prior work by Wardell et al. (2016) indicates individual drinking motives show unique patterns of association with alcohol sensitivity among young adults. Specifically, those with higher enhancement motives showed heightened responses to alcohol's rewarding effects, which in turn predicted post-alcohol administration wanting and liking of alcohol. In contrast, higher coping motives were associated with post-alcohol sedation which was not associated with post-alcohol wanting and liking of alcohol. Based on Wardell et al. (2016) findings, it may be that those who partake in FAD to increase intoxication, compared to for caloric compensation, may be more sensitive to alcohol's rewarding effects which may in turn lead to a greater motivation to continue drinking, and a higher likelihood of experiencing negative consequences. It is also important to consider the potential role of FAD expectancies. Specifically, those who engage in FAD-intoxication may be more likely to expect to feel intoxicated compared to those who engage in FAD-calories. These expectancies may in turn affect participants' reports of subjective intoxication. Indeed, research suggests that on days when college students reported higher than average expectancies for specific subjective positive or negative consequences, they were more likely to report experiencing those same consequences as a result of their alcohol use that day, even after accounting for same-day alcohol use (Lee et al., 2020).

Importantly, there may be other mechanisms linking FAD-calories and negative alcohol-related consequences not accounted for in the present study. For example, research suggests dieters may increase their alcohol use after an unsuccessful restraint attempt (Caton et al., 2015). For example, a person may eat less prior to/during drinking to reduce the number of drinks (and calories) needed to reach their desired level of intoxication. However, while under the influence of alcohol, they are unable to restrain themselves from consuming additional alcoholic beverages due to general impairment in executive functioning attributable to alcohol consumption (Day et al., 2015). This inability to restrain oneself might lead the individual to see their attempt to limit calories as a failure, causing them to abandon their goal (e.g., limiting alcohol consumption) for the remainder of the night and increasing the likelihood of them binge drinking (Caton et al., 2015).

Lastly, it is worth noting that our sensitivity analyses revealed that on days when participants reported both intoxication and caloric compensation motives, they did not report higher levels of subjective intoxication. However, those who *on average* reported more frequent FAD engagement for both motives did report greater subjective intoxication throughout the study duration. Past cross-sectional research has shown that individuals who endorse both FAD motives consume more alcohol and experience more negative consequences than peers who endorse only one FAD motive or do not engage in FAD at all (Looby et al., 2025). That said, Looby et al.'s (2025) analyses included additional FAD behaviors (e.g., purging, excessive exercise, laxative use) within their measure of the caloric compensation motive, which may

account for the discrepancy between their findings and our within-person results. Moreover, it is important to note the limited statistical power of our sensitivity analyses when interpreting these findings. Future work is needed to further investigate whether the within-person, between-person, or both are important to consider when examining the relative effect of endorsing both FAD motives on alcohol-related outcomes.

### 5.1. Limitations and future directions

The present study is one of the first to examine FAD and its association with alcohol-related outcomes at the daily level and as such represents an important addition to the FAD literature. However, it is not without limitations. First, the present study assessed FAD, subjective alcohol intoxication, and negative consequences during the same survey (on the morning following the drinking event). Therefore, despite research suggesting that FAD often occurs before a drinking event occurs (Berry et al., 2024), we are unable to make causal claims regarding the study variables. Future work would benefit from a more intensive ecological momentary assessment approach, involving several estimates of subjective alcohol intoxication collected throughout a drinking episode. Such an approach would allow for stronger inferences about temporal precedence between FAD and subjective alcohol intoxication. Moreover, this approach could clarify whether FAD influences the peak level of intoxication, the rate at which intoxication develops, or both. In addition, the present study consisted primarily of females and work is needed to replicate these findings in a more balanced sample of males and females. Similarly, the present sample was recruited from a single university and therefore the results cannot be generalized to all college students. Further, although all participants were trained on standard drink definitions, we did not provide reminders via the survey platform or through external documentation. The absence of consistent reminders about what constitutes a standard drink may have contributed to greater variability in reported alcohol consumption.

We also focused on a single FAD behavior (restricting caloric intake), despite the existence of several other FAD behaviors (e.g., purging, excessive exercise) that might meaningfully relate to our outcomes of interest. Future work ought to examine these additional behaviors to determine whether they show similar associations with subjective intoxication and negative alcohol-related consequences. Additionally, although single-item measures reduce participant burden, a multi-item measure capturing multiple facets of subjective intoxication (e.g., cognitive, motor, and affective) could provide a more precise and nuanced assessment and may yield different results. Lastly, given that our sample consisted of students who regularly engage in FAD, the present study was not suitable to investigate distinct differences between those who engage in FAD and those who do not. However, prior research utilizing multilevel modeling has found a strong between-person association between FAD and alcohol use and related harms (Herchenroeder and Yeung, 2024). This suggests that future research should aim to better understand acute mechanisms of risk between individuals who engage in FAD compared to those who abstain.

### 5.2. Conclusions

The present study is the first, to our knowledge, to assess whether college students report higher subjective alcohol intoxication on days when they engage in FAD and whether, in turn, increases in subjective alcohol intoxication predict negative alcohol-related consequences at the daily level. Results indicate that on days when college students engage in FAD-intoxication they also report higher subjective alcohol intoxication. Subjective alcohol intoxication, in turn, positively associates with negative alcohol-related consequences. These findings further highlight the risk associated with engaging in FAD-intoxication and provide preliminary evidence that FAD-intoxication should be considered in interventions aiming to reduce event-level alcohol-related harms among college students.

## CRediT authorship contribution statement

**Luke Herchenroeder:** Writing – original draft, Visualization, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Ellen W. Yeung:** Writing – review & editing, Supervision, Resources, Formal analysis.

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## Declaration of Competing Interest

none

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## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.drugalcdep.2025.112994.

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