# An Ecological Investigation of Hangover Symptoms the Morning After Drinking Alcohol: Preliminary Results from MARC Project Six

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## Introduction

Hangover is probably the most common consequence of heavy drinking. Accumulating evidence suggests it may play a role in risk for alcohol use disorders. Despite this, little is known about the event-level experience of hangover in naturalistic contexts. MARC Project 6 is designed to study the acute and delayed motivational consequences of alcohol and tobacco use, including hangover effects, in users' natural environments.

## Research Questions

- What is the prevalence of hangover in the community? It is frequent enough to be assessed using EMA methods?
- What symptoms differentiate hangover mornings from post-drinking non-hangover mornings and mornings following abstention from alcohol?
- Does smoking status differentially affect self-report of physical and affective symptoms on hangover days, non-hangover and post-abstention days?

## Sample

- The current sample is comprised of participants in Project Six of the Midwest Alcoholism Research Center (Conjoint Alcohol and Tobacco Use: An Ecological Study). Data collection is ongoing.
- Participants were recruited from the community via fliers and advertisements placed in a local advertisement circular. Recruitment emails were also sent to faculty, staff and students at the University of Missouri-Columbia.
- The current data include 181 adult smokers and non-smokers who regularly consume alcohol.
- The mean age was 23.5 (SD=7.7, range=18-71).
- Most participants were smokers (n=106, 59%), and approximately half were female (n=89, 48%).

Figure 1.
Electronic diary main menu screen

## Methods

- Participants were issued Palm m500 palm –top computers equipped with software specifically designed for this study by invivodata (See Figure 1; Pittsburgh, PA).
- Participants carried the palm-top computers for 21 days, and entered data multiple times daily according to the schedule in Table 1.
- All questionnaires included a core battery of items assessing affect, physical symptoms, craving for alcohol, and among smokers, craving for cigarettes.

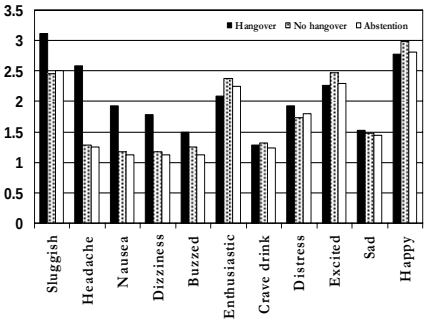
Table 1.
Daily diary entries

| Entry type | Frequency | Description |
|---|---|---|
| Morning report | Once daily upon waking | Contains core report items, and items assessing drinking the previous night and current hangover. |
| Random prompt | Five times daily at random times | Contains core report items, and assesses whether drinking or smoking have occurred in past 15 minutes. |
| Cigarette report | After smoking every cigarette | Up to four times daily triggers brief questionnaire about smoking episode that includes core assessment. Most entries only require confirmation of smoking to reduce burden. |
| Drinking report | After completing an alcoholic beverage, and at 30, 120, and 180 minute follow-ups | Includes core assessment and assesses characteristics of drinking episode as well as number of drinks and cigarettes consumed. |
| Bedtime report | Once daily upon retiring for bed | Places diary in sleep mode, and requires setting of alarm for next morning. |

## Results

- The current data include 3,611 days of recording.
- Participants completed 89% of the morning reports, and around 80% of the random prompts.
- Participants initiated 8,359 smoking reports and 987 drinking reports.
- During morning reports, participants reported prior-night drinking on 1215 occasions (33.6%).
- Participants reported hangover in the morning on 234 occasions, or 19.3% of post-drinking days.
- Ninety-nine participants (54.7%) reported at least one hangover, and 63(34.8%) reported two or more (mean=2.36, range=1-7).
- On mornings following drinking episodes, participants with hangover reported drinking significantly more (mean=9.5 drinks, SD=4.5) than participants without hangover (mean=4.7, SD=4.0).
- A series of multilevel models examined ratings of individual symptoms (rated on a 1-5 scale) in morning reports (See Figure 1). We compared mornings following abstention to mornings in which hangover was endorsed or drinking but not hangover was endorsed.

Figure 2.
Symptoms at morning report by morning type




- Hangover days were associated with significantly reduced ratings of enthusiasm as well as significantly elevated ratings of headache, nauseous, dizzy, sluggish, and buzzed compared to compared to non-hangover and post-abstention days (See Table 2).
- Non-hangover post-drinking days were associated with more excitement, enthusiasm and happiness than hangover days and post-abstention days.
- No differences in sadness or craving for alcohol were found.
- The same pattern of results was found when day of the week was included in the models.

Table 2.
Coefficients showing the association between physical and affective symptoms and morning type

| | b and 95% CI | | |
|---|---|---|---|
| | Hangover vs. abstention | Non-hangover vs. abstention | Hangover vs. non-hangover |
| Buzzed | **.37 (.30-.46)*** | **.13 (.09-.18)*** | **.22 (.13-.32)*** |
| Crave drink | -.04 (-.11-.04) | .04 (-.01-.09) | **-.10 (-.20-.01)*** |
| Distress | .04 (-.07-.16) | **-.11 (-.18- -.04)*** | **.14 (.01-.27)*** |
| Dizziness | **.63 (.56-.70)*** | **.05 (.01-.09)*** | **.59 (.50-.68)*** |
| Enthusiastic | **-.16 (-.28 - -.04)*** | **.15 (.08-.22)*** | **-.34 (-.45- -.20)*** |
| Excited | -.01 (-.13-.12) | **.21 (.13-.29)*** | **-.25 (-.39- -.11)*** |
| Happy | -.01 (-.13-.11) | **.20 (.13-.27)*** | **-.23 (-.37- -.09)*** |
| Headache | **1.32 (1.24-1.41)*** | .06 (.00-.11) | **1.26 (1.14-1.37)*** |
| Nausea | **.78 (.70-.85)*** | **.05 (.01-.09)*** | **.74 (.64-.83)*** |
| Sad | .02 (-.07-.11) | -.02 (-.08-.03) | .05 (-.05-.15) |
| Sluggish | **.56 (.40-.72)*** | .05 (-.18-.01) | **.69 (.51-.86)*** |

*Note.** p<.05; All analyses accounted for the nesting of diary days within participants.; All dependent variables were measured on a 1-5 scale such that 1 =absent and 5 =severe.

- Interactions between smoking status and day type were added to the multilevel models.
- Smokers reported significantly less dizziness and buzz during hangover than non-smokers. No other differences in symptom reports by smoking status were found.

## Conclusion

- Hangover is relatively common among regular drinkers. Nearly 6.5% of the study days to date included endorsement of hangover. This suggests that EMA is a viable method for the study of naturalistic hangover.
- Headache, sluggishness, nausea and dizziness are reported more often during hangover mornings than other mornings.
- Although mood effects have been considered to be important symptoms of hangover, the current data suggest that mood effects during hangover are weak.
- Interestingly, participants reported greater excitement, happiness and enthusiasm during non-hangover mornings following drinking than other morning types.
- Interactions showed smokers rated feelings of buzz and dizziness during hangover lower than non-smokers. Cross-tolerance between alcohol and tobacco may account for this finding.

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