Integrating EMA, Clinical Assessment and Wearable Sensors to examine the Association Between Major Depressive Disorders and Alcohol Use

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Background

- Major Depressive Disorder (MDD), is the leading cause of disability worldwide. Heavy drinking often co-occurs with MDD, increasing disability and preventing the amelioration of symptoms.
- New tools such as ecological momentary assessment (EMA) and wearable sensors allow a more granular examination of the association between MDD and alcohol use.
- Objective: To examine the association between depressive symptoms and alcohol consumption and moderators of the association through active and passive data recording.

Methods

Procedure: Individuals with MDD and healthy control subjects completed an 8-week protocol involving answering daily surveys on their mobile and wearing an Empatica E4 wristband sensors that tracks electrodermal activity (EDA) and accelerometer data 23 hours/day. Surveys included 10 questions from the Positive and Negative Affect Scale (PANAS) and questions about number and type of drinks consumed daily. The mobile app also captures location data passively.

Dependent variables:

Low Mood: log total NA/PA.

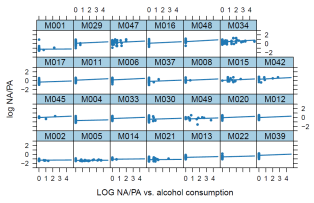
EDA asymmetry: difference in skin conductance level between right and left wrists over the course of the day.

Home stay: percentage of time spent at home over the course of 24 hours.

Alcohol use: daily number of drinks (SD).

Results

Hypothesis 1: Low mood and alcohol consumption are positively associated.



We used Linear Mixed Effects models with random intercept and slope to model the association between mood and alcohol consumption. Results showed a positive relationship between low mood and alcohol use (p=0.003).

Figure 1: Association between mood and alcohol use by sbj

Hypothesis 2: Time spent at home moderates the association between mood and alcohol use.

A Linear Mixed Effects model with random intercept showed that the interaction between alcohol consumption and time at home was not significant (p=0.46). However, the percentage of time spent at home was directly associated with low mood (p=0.05).

Hypothesis 3: EDA asymmetry moderates the association between mood and alcohol use.

A Linear Mixed Effects model with random intercept and slope showed a significant interaction between alcohol consumption and EDA asymmetry (p<0.0001): the greater EDA asymmetry, the stronger the influence of alcohol consumption on mood.

Participants

Participants=21 (21 with MDD; 4 healthy)

Demographic Characteristics	N (%)
Female	17 (68%)
Race: Caucasian/White	16 (64%)
MDD diagnosis	21(84%)

Treatment	N(%)
In Treatment	20 (80%)
On psychotropic medications	4 (16%)
In Therapy	4 (16%)
On both medications and therapy	9 (36%)
Number of lifetime episodes	2.67 (3.10)

Conclusions

- Findings are consistent with previous studies showing an association between mood and alcohol use.
- As expected, time spent at home and mood were associated. However, alcohol use did not affect this relationship.
- Higher arousal was associated with stronger association between alcohol consumption and mood.
- Integrating different technologies to assess alcohol use and mood is feasible. Daily passive and active recording will facilitate the development of complex models explaining the association of mood and alcohol use and moderating and mediating factors.

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