



# Project SMS Codebook

*University of Washington*

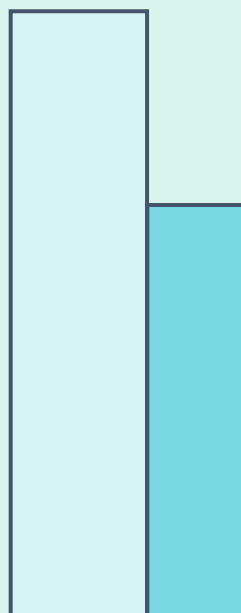
*Regulation, Affect and Development Lab*

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## Study Description

Project SMS is an IRB approved study which collected self-report and passive-sensing smartphone data from a sample of young adults in the greater Seattle, Washington Area. Project SMS investigates topics of emotions, behavior, and patterns of alcohol and marijuana use (See Study Objectives). Participants were recruited via various online and in-person sources (See Study Scope for more). This project is funded by the National Institutes of Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism. And the study began recruiting participants in August 2020, finished onboarding procedures on December 2022, and the final participants are expected to complete the final follow up survey around December 2024.

## Study Objectives

Negative urgency, a tendency to rash action in the face of negative emotions, is one of the strongest personality predictors of alcohol and marijuana misuse (heavy use, intoxication, and the experience of consequences). In the face of strong negative emotions, people high on negative urgency are theorized to engage in impulsive behavior that is hyper-focused on relieving negative affect despite the long-term consequences, negatively reinforcing impulsive behavior. However, no research has tested whether individuals high on urgency actually behave more impulsively in the face of negative emotions, what situations might enhance or buffer this effect, or what role affect-driven impulsivity plays in the development of alcohol and marijuana misuse during young adulthood. The goal of the current study is to (Aim 1) characterize the within-person process of negative urgency (Aim 2) identify between and within person moderators of that process, such as alcohol-promoting situations and emotion regulation, and (Aim 3) test the role of EMA-assessed urgency in the development of alcohol and marijuana misuse over two years of young adulthood. Using a large ( $n = 500$ ) sample of young adults (age 18 – 22) who regularly use alcohol or marijuana recruited from the community, the proposed study will critically test this theory of urgency using an ecological momentary assessment design matched with longitudinal follow-ups, allowing us to characterize between individual differences in the within-person process of impulsive responses to negative emotions, and the situations and behaviors that may exacerbate or attenuate this link. Understanding the mechanisms by which personality may lead to substance misuse will provide novel targets of research as well as spur the development of more focused personality targeted interventions.\*

Ambulatory assessment (AA) techniques (e.g., ecological momentary assessment, daily diaries, experiencing sampling) have provided critical tests of theories about the development of alcohol use disorder (AUD) by identifying within-person processes (such as negative or reinforcement, stress exposure, or social context) that can raise the risk for problem drinking and in turn AUD. AA methods are the leading methodological approach in the push towards

personalized medicine because it provides a compelling platform for assessment, diagnosis, real-time monitoring, and just-in-time interventions. However, the current utility of AA for personalized models of AUD risk is limited because risky drinking and the risk factors for it (such as changes in moods, stress, or social contexts) change at different scales of time. In other words, even heavy drinkers may only drink a few times a week, but their emotions, stressors and social contexts change multiple times a day. Current AA methods that rely on self-report data have to sample frequently enough to be sensitive to change, long enough to observe sufficient drinking episodes, and to do so while avoiding participant burnout. Passive mobile sensing, which uses sensors (such as GPS, accelerometer, light meter, etc.) available on most smartphones, has been shown in preliminary studies to predict the probability of drinking episodes, but those studies have used relatively small samples. The present study aims to develop knowledge in passive mobile sensing and the machine learning methods used to analyze passive mobile sensing data. The research proposal will analyze passive mobile sensing data collected in a large sample of regular drinking and marijuana using young adults (age 18 – 22, n = 500; 95.2% who drink), who will be followed using AA over 8 successive weekends as part of a parent R01 (DA 047247). The research goal is to identify passive mobile sensing models of risk factors for drinking (stress, social contexts, sleep, mood, and impulsive states), as well as the drinking episodes themselves. The candidate will develop expertise in these methods and models that will further the development of a research program aimed at developing person specific models of risk for AUD.\*\*

\* *From the EMA grant*

\*\* *From the Passive Sensing Grant*

## Grant/Funding Information

Data collection for Project SMS was supported by funding from:

*NIDA grant R01 DA047247 to Kevin M. King*

Data collection for AWARE data was supported by funding from:

*NIAAA grant K02 AA028832 to Kevin M. King*

## Organizational Affiliations

The PI and CO-Is listed as the recipients of award and management of this project belong to the below organizations:

- *University of Washington*
- *University of Kentucky*
- *University of Michigan*



## IRB Approval and Modifications

The study was initially approved for data collection on 1/15/2019 by the University of Washington's research ethics board (IRB). The study was given the ID by the University of Washington IRB STUDY00006424. Since Initial approval, the study has gone through a few notable IRB modifications. Initially, the study was approved to collect ambulatory assessments (i.e. ecological momentary assessments, or EMAs), however, on 7/24/2020 the study was approved to collect passive sensing data in the form of participant smartphones sensors. Protocol for virtual participation were included as well to account for the social distancing guidelines during the COVID-19 pandemic.

The study has since required several updates to the IRB approval during the data collection period. On 12/16/21 the IRB gave approval to use participant's current GPS location during onboarding in order to confirm their eligibility of residency (see Ineligibility Protocol below).

On 8/3/22 the IRB gave approval to add an extra survey to the weekly battery. This survey would be sent on Tuesday mornings and participants would be compensated for the completed weekly survey. This survey was added to study the expectancy effects on a small subsample of the participants.

On 9/26/23 the IRB gave approval to send out an extra survey to collect personal participant identifiers. This was necessary to abide by the NIH Data Sharing Agreement – which we had joined after being funded for the passive sensing protocol alluded to above – so we had not previously collected this information.

## Study Scope

The current study collected self-report and passive-sensing smartphone data from a sample of young adults in the greater Seattle, Washington Area. Participants were recruited via various online and in-person sources. Participants completed several study procedures throughout their participation. They began with a virtual (i.e. via Zoom) onboarding appointment with a research assistant to acquaint them to the study procedures, then completed a 45-minute baseline survey. Participants were then tasked with completing up to 5 surveys a day, from Thursday-Sunday, with an extra survey on Mondays and Tuesdays (i.e. 22\* surveys a week) for 8 weeks. Participants then were scheduled to complete four 45-minute follow-up surveys over the span of two years, with one survey every six months starting from their onboarding date.

*\*22 surveys was the weekly number after 8/3/22, before this date it was 21 surveys*

## Recruitment/Data Collection

Participants were recruited through various sources; prospective participants would visit webpage with link to the Qualtrics screener. After taking the screener, eligible participants would be redirected to a self-scheduling page to schedule remote onboarding appointment with RA on zoom. During onboarding, participants are introduced to EMAs, connected to the AWARE app for gathering passive data from smartphone sensors, and registered in our survey distribution partner's (SurveySignal) system to receive SMS messages for surveys. Onboarding ended with the completion of a 45-minute baseline survey. Once completed participants would take 5 EMAs daily from Thursday to Sunday with a single morning survey on Mondays and Tuesdays, \* for 8 consecutive weeks. Participants were scheduled for four follow-up surveys at 6 months, 12 months, 18 months, and 24 months following the date of their onboarding appointment.

### Sources of Recruitment

Participants were recruited from various locations digitally and otherwise. Social media sources included Instagram, Facebook, reddit, twitter, reddit, TikTok, and YouTube. Participants were also recruited via local Newspaper, School web-boards, in-person recruitment events, virtual and real-world flyers at public forums, and at local college campuses. A significant proportion of our sample was recruited from craigslist. Many of our participants had also heard about the study via word of mouth. Consistently, the study had four main recruitment sources that made up the vast majority of the final sample: Instagram, Craigslist, Facebook, and word of mouth, respectively. For diagnostic

purposes, reports on recruitment diagnostics over time were developed and are available upon request.

### **Participant Compensation**

Participants had the possibility of earning a maximum of \$451 for completing all study tasks. Compensation was provided in the form of prepaid Amazon gift card codes equaling \$50 for the baseline battery and the 3<sup>rd</sup> and 4<sup>th</sup> follow-up surveys, and \$40 for the 1<sup>st</sup> and 2<sup>nd</sup> follow-up surveys. Participants were also awarded Amazon digital gift cards on a weekly basis for the prior week's participation, with compensation amount varying depending on the number of EMA surveys completed. The completion of a single EMA survey was equivalent to \$1 worth of compensation, plus participants could receive a \$5 bonus for completing 80% of weekly surveys. This equated to a total of \$27 possible weekly compensation following the inclusion of Tuesday surveys (See IRB approval section above).

## **SMS Delivery Protocol**

We used the service SurveySignal (<https://www.surveysignal.com/>) to send participants daily SMS messages containing the links for their surveys. Participants were registered within the service during onboarding. SMS messages were scheduled to be sent out 5 times a day, within 1.5 hours of 10:30am, 12:30pm, 3:30pm, 6:30pm, and 9:30pm. The exact time that participants received each SMS was randomized within the above ranges to improve ecological validity. Each initial SMS message was followed by 3 reminder texts. One 20 minutes after the initial SMS, then one 40 minutes after, and finally one 55 minutes after. As mentioned before, participants were scheduled to receive 5 surveys from Thursday to Sunday, plus an extra survey on the mornings of Monday and Tuesday, for a total of 8 weeks.

### **SurveySignal Errors**

SurveySignal had not delivered all SMS messages as expected. On 7/25/22 SurveySignal had a server outage and was unable to send a weekend's worth of SMS messages to participants. On 8/3/22 the study had added Tuesday morning surveys to the study protocol. For this, several participants needed to have their SMS messages paused for a week while the new protocol was implemented into SurveySignal's backend. This meant that the below list of PIDs were given one extra week of surveys and had a break of one week of SMS messages

SurveySignal had also failed to deliver approximately 60% of SMS messages. Given the available data, it is difficult to estimate how much of retention loss was due to this failure. As we had three reminder texts, we expect that at least one of the reminders

allowed participants to complete their survey, but participants would occasionally reach out to study staff saying they had missed SMS messages for entire days, or rarely, entire weeks. Despite this, our weekly retention rates were not well below expectation (see Sample Demographics for more).

## Sample Information

Participants were young adults at baseline ( $n = 497$ , age 18 – 22,  $M_{age} = 20.3$ ,  $SD = 1.3$ , 45% cisgender female, 42% cisgender male), with the remaining participants identifying as nonbinary/gender queer/gender nonconforming (8.5%), transgender male or female (4.0%), or nongendered (0.2%). Participants were recruited from King, Pierce, and Snohomish Counties in Washington State from both college and non-college sources to ensure a representative sample of young adults in Washington State. We recruited using internet (Facebook, Instagram, TikTok, YouTube, Twitter, Craigslist, and Reddit) and non-internet (newspaper advertisements, flyers, and university registrar lists) sources (see breakdown in the recruitment sources section above). Participants were required to be between the ages of 18 and 22 at study screening, own a smartphone, be fluent in English, and report drinking or using cannabis “about once per week” or more over the past three months. Participants were excluded if they were not fluent in English or if they moved to the United States after age 12.

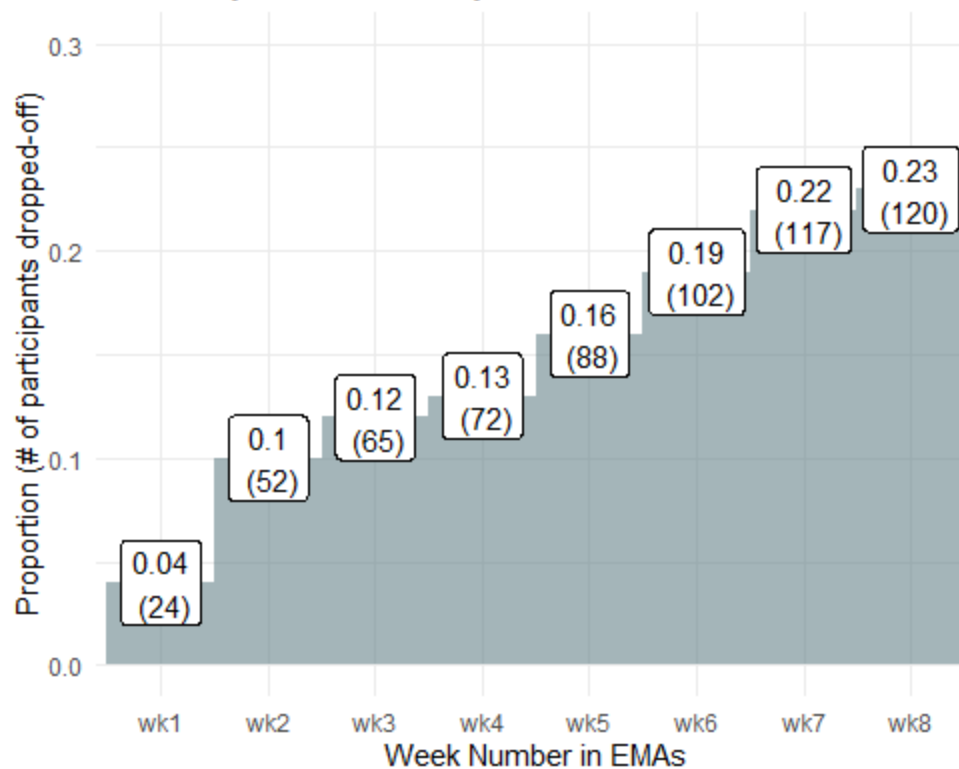
Participants endorsed a variety of race/ethnicities: 54% solely non-Hispanic White, 28.5% Asian, 6.6% African American, 8.37% Hispanic/Latino, and 22.7% who endorsed more than one ethnicity. Most participants identified as heterosexual (52%), with the remaining participants either identifying as LGBTQ+ (47.6%) or declining to respond ( $n = 2$ ).

Finally, 9.8% of the sample was born outside the U.S. Racial/ethnic proportions broadly reflected Washington census data from counties in which participants were recruited. Approximately 67% of the sample attended a 4-year college at recruitment.

Participants had completed an average of 77.7% ( $std = 28.2$ ) of weekly surveys. Weekly survey completion had dropped iteratively each week. About 3-6% of the sample dropped off from future EMA completion each week. By week eight, 23% of the sample had not completed a daily EMA.



### Cumulative Proportions of Participants Dropping off of EMAs by Week in Study



Note: Proportions are gathered from beginning of week (i.e. 12% of participants stopped taking survey by the beginning of week 3).

Roughly 80-85% of Follow-up surveys were completed, and we see a decrease in completion over time with these surveys as well. The four follow-up surveys had completion rates of 88.5%, 84.3%, 83.3%, and 78% respectively.

## Screening and Eligibility Protocols

Project SMS participants are determined eligible if they are casual alcohol or cannabis young adult users (at least once a week for the past 3 months) from the greater Seattle area between the ages of 18-22. These individuals need to be proficient enough in English, own a smart device, and have a good enough internet connectivity to complete all aspects of the study. Before registering as a participant, each prospective participant would need to complete a screening survey to determine eligibility.

At subsequent stages in the study, after being determined eligible, some participants had provided information which countered their screener responses. This includes (among other things) residing in a location outside of the greater Seattle area for the majority of the study period, or having a different age or name than is presented on the driver's license or passport presented during onboarding. Thus, we had implemented extra protocol to catch ineligible participants who had made it through the screener process. As an aside, this influx of falsely eligible participants likely come from a combination of the study's large compensation (> \$500 in total) and remote procedures, which could motivate and allow professional scammers and others to provide false information for eligibility.\* On 12/16/21, new protocols were implemented in several aspects of the study, including: the advertising protocol, the screener protocol, the registration/onboarding protocol, and the EMA period protocol. Incongruent participant information that would clearly disqualify a participant could be withdrawn by any study staff (such as names/ages on screener differing from ID presented at onboarding), but if participant eligibility could be argued otherwise, the research coordinator inspected participant data holistically to uncover red flags suggesting false eligibility and would make a final determination of participant withdrawal. Participants' information was evaluated holistically, meaning that if all of a participant's flagged data, when looked at together, would lead a reasonable person to believe the participant (more likely than not) provided false information or was initially ineligible for the study, the participant was involuntarily withdrawn from the study. The below sections detail the information inspected at each step that was used to determine false eligibility.

### Ineligibility Determination for each Study Phase:

#### **Advertisement/Screening Protocols:**

In order to account for individuals who are lying on the screener, we did not make our eligibility criteria known in our advertisement materials or in the screener (the screener included multiple other questions that do not pertain to the eligibility criteria such as nicotine usage, exercise, and diet). As one of our eligibility requirements were that

participants needed to reside in the greater Seattle area, our screeners had gathered IP address information to determine the general location of the survey taker. It should be noted that we had used the platform Qualtrics for survey development, and their IP data is not accurate 100% of the time (CITE), and/or some individuals may use a VPN to hide or misdirect their IP location. Additionally, the current location of the survey taker may not represent their location of residence. Thus, we had split our screener into two surveys and inspected the convergence of the location, but we did not rely on this information for a sole determination in ineligibility. As with much of the information monitored for false eligibility, multiple red flags of ineligibility were needed before reasonably assuming false eligibility and withdrawing a participant.

### **Registration/Onboarding Protocols:**

Participants who were determined to be eligible via the screener were automatically sent to a scheduling page to schedule a time with one of our research assistants. At this stage, the research coordinator would inspect the name, phone number and email address of the individual to see if any information matches previous individuals flagged as falsely eligible. Before the onboarding date, the screener responses were inspected. If an individual had completed more than one screener, and especially if they were determined to be ineligible in a previous screener attempt within a month span of taking a previous screener, the individual was flagged. Participant IP addresses were inspected to determine if the participant's location at the time of taking the screener assessments was outside of the Greater Seattle area. This information provided weak evidence of residence as participant's could be in a different location than their residence or were using a VPN, however the location was taken in conjunction with other information for holistic assessment (and to evaluate convergence with IP locations provided in the EMA surveys as well). The names and emails of ineligible participants often followed certain patterns, such as an individual having a first name for both a first name and a last name (e.g. Ryan Jake) or having a very stereotypically American name (e.g. John Smith or Joe Dane), or a famous person's name (e.g. John Lennon). Regarding emails, we noticed a common pattern of [firstname]\_[lastname][random numbers]@gmail.com. Of course, it is entirely possible these are real people, so this evidence was weak and needed to be used in conjunction with stronger evidence to determine false eligibility.

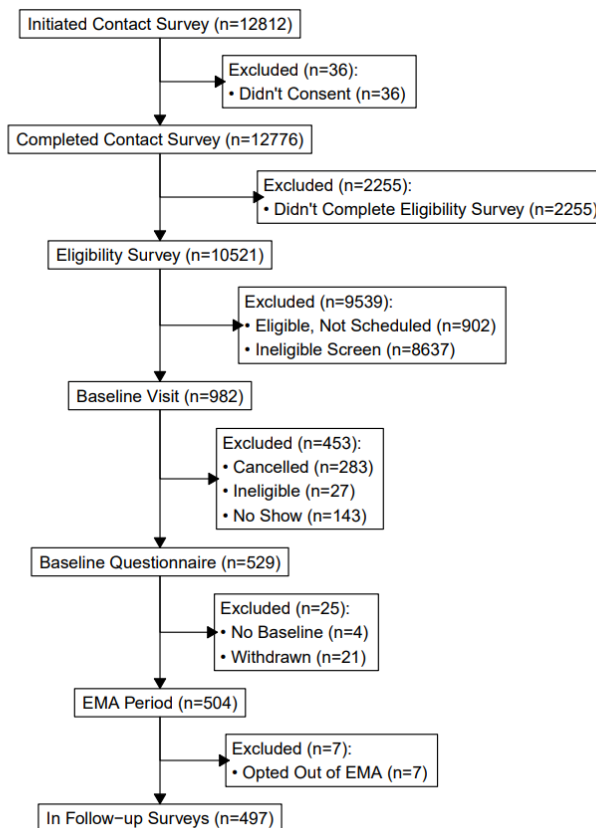
During the live Zoom onboarding session with a research assistant, participants needed to have their video on the entire time and provide a legal ID, which show their current permanent residence, date of birth, and first and last name, as well a photo identification. In the case where the address on their ID was from a previous residence, participants were also asked to provide a valid current mailing address in the greater Seattle area to receive study paperwork. As a final check for Seattle residency, Participants were required to share their current GPS location with the lab's digital phone, so research assistant could see in real time that an individual was not calling in from a location outside of the state or the country. Once all checks were completed, individuals were registered into the AWARE app and completed a test survey to see if their internet connectivity was adequate.

### EMA protocols:

We expected that not many participants that made it through the previous checks would be in the EMA portion of the study, however, checks were still conducted at this stage as well. As alluded to above, participants IP locations were gathered to see if participants had spent the majority of the study period outside of the Seattle area. Additionally, the combination of near perfect weekly participation with completing surveys more quickly than most participants, and/or the prevalence of ceiling/floor/center responding during the EMA led to participants being flagged. This pattern of behavior suggests that participants were simply completing every survey as quickly as possible in order to receive compensation for little effort. While this may not directly suggest false ineligibility, this information was taken in conjunction with other flagged information.

### Participant Recruitment Consort Diagram:

Below represents the number of participants at each stage of recruitment in the study. Prospective participants would begin the first contact survey then consent to initial screening procedures. Then eligibility would be determined through the eligibility survey. Those eligible would be invited to an onboarding visit in which they complete their baseline battery. Following onboarding is the EMA and Follow-up survey periods.



## Data and Materials Access/Data Use Statement

Data and materials access will be project specific. That is to say, you may access data from a shared forum (i.e. OSF – the Open Science Framework), or through collaboration with the PI, Kevin King. Alongside our data and materials accessible on OSF, this Codebook is given the copyright usage CC-By Attribution 4.0 International ([see here for more info](#)). Please reach out to Kevin King at [kmking@uw.edu](mailto:kmking@uw.edu) for more information or to request materials

## DATA DICTIONARY

The project SMS dataset is a nested data with 2,130 columns and 35,145 rows. The data is structured so that each row represents a single ema survey (“timepoint”) and is nested within the study day (“study\_day”) for the participant. Each participant is uniquely identified by an ID number (PID). Each participant should have a max of about 5 EMA’s per day with about 40 days in the study. Baseline variables will be at the PID level and EMA variables will be at the EMA level. Several variables in the dataset may be at the daily level, and these variables will be noted as such within their respective sections. The dictionary below is organized by Meta-data, Demographics, and then a section for baseline variables and finally EMA variables.

**\*\*Note:** For each measure, we have included a narrative, psychometrics (both from the literature and in our own sample), citations, and a data dictionary along with calculated variables. We have reported the omega values in our own sample with the polycorrelations option turned off, since estimates did not substantially differ when we compared them with and without that option.

**\*\*\*\*Note:** Items that are reverse coded will be indicated by a bolded variable name

## META-SURVEY DATA

Meta-Data about the participant’s survey completions or context relating to survey completion was collected. This includes variables manually collected via self-report, calculated variables (such as survey completion rates), some variables were collected automatically by Qualtrics.

Variable Name	Description	Response Values
PID	Unique Identifier per participant	12 numeric digits
StartDate.ema	The date and time values indicating when the respondents first clicked the survey link.	date-time format = [YYYY-MM-DD HH:MM:SS]
EndDate.y	The date and time values indicating when the	date-time format = [YYYY-MM-DD HH:MM:SS]

	respondents submitted the survey.	
timepoint	Momentary Assessment number	1 = morning survey 2= midmorning survey 3= Afternoon 4= Evening 5= Night
study_day	Day in the study	Positive integer
Progress.y	indication of how much of the survey they finished in percentage decimal	Numeric value between [0,1]
Finished.y	True or False indicating whether the response was submitted or closed. Respondent clicked final "Next" or "submit" button	[TRUE, FALSE]

## DEMOGRAPHICS

Variable Name	Item Description	Response Options
DOB.month	Please select your month of birth.	Drop-down: January-December (sequentially coded 1-12)
DOB.year	Please select your year of birth.	Drop-down: 1900-2049 (sequentially coded 1-150)
sex	What is your biological sex?	1 – Male 2 – Female 3 – Intersex 4 – No response
student.status	Are you currently a student	1 = Yes; 0 = No
gender.female	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Female]	1 or blank
gender.male	Understanding that gender identity can be complex, what term(s) best describes	1 or blank

	your gender identity? (Check all that apply) [Male]	
gender.genderqueer	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Genderqueer]	1 or blank
gender.transgender	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Transgender]	1 or blank
gender.nongendered	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Non-gendered]	1 or blank
gender.intersex	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Intersex]	1 or blank
gender.nonbinary	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Non-binary]	1 or blank
gender.nonconform	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Gender non-conforming]	1 or blank
gender.twospirit	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Two-spirit]	1 or blank
gender.ftm	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Transgender (female-to-male or FTM)]	1 or blank



gender.mtf	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Transgender (male-to-female or MTF)]	1 or blank
gender.other	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Other]	1 or blank
gender.noresponse	Understanding that gender identity can be complex, what term(s) best describes your gender identity? (Check all that apply) [Other Response]	1 or blank
gender.TEXT	[Text entry for “Other” response]	Text entry

# EMA QUESTIONNAIRES

## Affect Circumplex

### Narrative

The first two items (pleasant and energetic) correspond to the affect circumplex model, which suggests that emotions are interrelated such that they may be represented by a circular spatial model with two axes - activation/deactivation and unpleasant/pleasant (Russel, 1980). Anchors for these two items are extremely pleasant (0), neutral, and extremely unpleasant (100), and extremely low-energy (0), neutral, and extremely high-energy (100), respectively. These two items are presented to participants at every assessment throughout the day. They are asked to what extent they have felt pleasant and energetic within the past hour.

*Note: These items refer to “the past 10 minutes” in the pilot data instead of the past hour.*

### Validity and Reliability

In the original study, reliabilities were not directly calculated due to the single-item nature of the data, however, maximum correlations for each item with the remaining 27 were used as an indication of reliability. For the original study the correlations ranged from 0.28 to 0.65 (Russell, 1980). The circumplex model has shown consistency with other fields' conceptualizations of affect (Posner, Russell & Peterson, 2005). In the pilot data, the ICCs for within-person variance are \*\*\*. For between-person variance, the ICCs are \*\*\*\*.

## Citations

Posner, J., Russell, J. A., & Peterson, B. S. (2005). The circumplex model of affect: An integrative approach to affective neuroscience, cognitive development, and psychopathology. *Development and psychopathology*, 17(3), 715.

Russell, J. A. (1980). A circumplex model of affect. *Journal of personality and social psychology*, 39J(6), 1161.

## Data Dictionary

Response options for the following questions are presented as sliding scales ranging from 0-100. Anchors are indicated next to each item.

*Note: These items refer to “the past 10 minutes” in the pilot data instead of the past hour.*

Variable Name	Description	Response options
mood.pleasant	In the past hour, how pleasant have you felt?	Labeled from left to right: “extremely pleasant,” “neutral,” and “extremely unpleasant”
mood.energetic	In the past hour, how energetic have you felt?	Labeled from left to right: “extremely low-energy,” “neutral,” and “extremely high-energy”

## Calculated Variables

N/A

# Daily Positive and Negative Affect

## Narrative

A total of 14 emotion words were randomly presented to participants

from a word bank reflecting 7 positive and negative affect dimensions based on the PANAS-X (Watson & Clark, 1994) and other prior work (e.g., Jacobson et al., 2020; Larson & Lampman-Petratis, 1989). The specific emotion words used in the present study were selected with the intention of providing coverage of each emotion dimension in terms of semantic interpretation, intensity, and specificity. Project staff also added two additional emotion words, “anxious” and “annoyed,” to include colloquial terms often used to describe the negative affect dimensions of anxiety and anger, respectively.

Participants indicated how much they’ve experienced each emotion in the past hour. Anchors were “not at all” (0), “very much” (100), and a central anchor of “somewhat”. Participants received two words each from seven sets of items reflecting four negative affect dimensions, which are anger (7 items), sadness (6 items), anxiety (7 items), and general negative affect (4 items), and three positive affect dimensions, which are joviality (8 items), attentiveness (4 items), and serenity (3 items). Below is the full list of emotion words within each category:

Negative Affect				Positive Affect		
Anger	Sadness	Anxiety	General Negative Affect	Joviality	Attentiveness	Serenity
<i>Angry</i>	<i>Unhappy</i>	<i>Anxious</i>	<i>Upset</i>	<i>Happy</i>	<i>Alert</i>	<i>Calm</i>
<i>Irritated</i>	<i>Sad</i>	<i>Afraid</i>	<i>Distressed</i>	<i>Cheerful</i>	<i>Attentive</i>	<i>Relaxed</i>
<i>Hostile</i>	<i>Blue</i>	<i>Nervous</i>	<i>Guilty</i>	<i>Delighted</i>	<i>Determined</i>	<i>At ease</i>
<i>Annoyed</i>	<i>Alone</i>	<i>Jittery</i>	<i>Ashamed</i>	<i>Joyful</i>	<i>Concentrating</i>	
<i>Scornful</i>	<i>Lonely</i>	<i>Shaky</i>		<i>Enthusiastic</i>		
<i>Disgusted</i>	<i>Downhearted</i>	<i>Frightened</i>		<i>Energetic</i>		
<i>Loathing</i>		<i>Scared</i>		<i>Lively</i>		
				<i>Excited</i>		

*Note: Emotions included in Project SMS vary slightly from those included in the pilot data. The time frame queried also varies between Pilot 1, Pilot 2, and Project SMS.*

### Validity and Reliability

The PANAS, which the vast majority of the emotion words were drawn from, is a well- established and widely used measure of positive and negative affect. It demonstrated good validity and reliability in the original validation

study with an alpha of 0.89 for momentary positive affect and 0.85 for momentary negative affect (Watson et al., 1988). It has also been demonstrated to predict anxiety and depression (Crawford & Henry, 2004; Petrie, Chapman & Vines, 2012). Previous literature has also provided support for differentiating among positive and negative emotions on the within-person level using similar emotion dimensions (Jacobson et al., 2020).

In our pilot study, which used slightly different discrete emotion words, negative/positive affect had high reliability within-person (\*\*\*\*).

## Citations

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non- clinical sample. *British journal of clinical psychology*, 43(3), 245-265.

Jacobson, N. C., Evey, K. J., Wright, A. G., & Newman, M. G. (2020). Integration of discrete and global building blocks of affect: Specific affect within-persons and global affect between-persons.

Larson, R. W., & Lampman-Petratis, C. (1989). Daily emotional states as reported by children and adolescents. *Child Development*, 60(5), 1250–1260.

Petrie, J. M., Chapman, L. K., & Vines, L. M. (2013). Utility of the PANAS-X in predicting social phobia in African American females. *Journal of Black Psychology*, 39(2), 131-155.

Watson, D., & Clark, L. A. (1994). The Panas-X. Manual for the positive and negative affect schedule-expanded form. The University of Iowa.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of personality and social psychology*, 54(6), 1063.

## Data Dictionary

Participants indicate to what extent they've felt several emotions within the past hour. The scales for all items are on slider bars ranging from 0-100, with 0 = Not at all, 50 = Somewhat, 100 = Very much.

*Note: The time frame queried varies between Pilot 1, Pilot 2, and Project SMS.*

Variable Name	Description	
mood.angry	In the past hour, how much have you felt: Angry	Anger
mood.irritated	In the past hour, how much have you felt: Irritated	Anger
mood.hostile	In the past hour, how much have you felt: Hostile	Anger
mood.annoyed	In the past hour, how much have you: felt Annoyed	Anger
mood.scornful	In the past hour, how much have you felt: Scornful	Anger
mood.disgusted	In the past hour, how much have you felt: Disgusted	Anger
mood.loathing	In the past hour, how much have you felt: Loathing	Anger
mood.unhappy	In the past hour, how much have you felt: Unhappy	Sadness
mood.sad	In the past hour, how much have you felt: Sad	Sadness
mood.blue	In the past hour, how much have you felt: Blue	Sadness
mood.alone	In the past hour, how much have you felt: Alone	Sadness
mood.lonely	In the past hour, how much have you felt: Lonely	Sadness
mood.down	In the past hour, how much have you felt: Downhearted	Sadness
mood.anxious	In the past hour, how much have you felt: Anxious	Anxiety
mood.afraid	In the past hour, how much have you felt: Afraid	Anxiety
mood.nervous	In the past hour, how much have you felt: Nervous	Anxiety

mood.jittery	In the past hour, how much have you felt: Jittery	Anxiety
mood.shaky	In the past hour, how much have you felt: Shaky	Anxiety
mood.fright	In the past hour, how much have you felt: Frightened	Anxiety
mood.scared	In the past hour, how much have you felt: Scared	Anxiety
mood.upset	In the past hour, how much have you felt: Upset	General Negative Affect
mood.distressed	In the past hour, how much have you felt: Distressed	General Negative Affect
mood.guilty	In the past hour, how much have you felt: Guilty	General Negative Affect
mood.ashamed	In the past hour, how much have you felt: Ashamed	General Negative Affect
mood.happy	In the past hour, how much have you felt: Happy	Joviality
mood.cheerful	In the past hour, how much have you felt: Cheerful	Joviality
mood.delight	In the past hour, how much have you felt: Delighted	Joviality
mood.joyful	In the past hour, how much have you felt: Joyful	Joviality
mood.enthuse	In the past hour, how much have you felt: Enthusiastic	Joviality
mood.energy	In the past hour, how much have you felt: Energetic	Joviality
mood.lively	In the past hour, how much have you felt: Lively	Joviality
mood.excited	In the past hour, how much have you felt: Excited	Joviality
mood.alert	In the past hour, how much have you felt: Alert	Attentiveness

mood.attentive	In the past hour, how much have you felt: Attentive	Attentiveness
mood.determined	In the past hour, how much have you felt: Determined	Attentiveness
mood.concentrate	In the past hour, how much have you felt: Concentrated	Attentiveness
mood.calm	In the past hour, how much have you felt: Calm	Serenity
mood.relaxed	In the past hour, how much have you felt: Relaxed	Serenity
mood.ease	In the past hour, how much have you felt: At ease	Serenity

### Calculated Variables

Each dimension of affect (except general negative affect) will be scored as the mean of items within that dimension. Overall negative affect will be scored as the mean of all negative affect items across all four dimensions, and overall positive affect will be scored as the mean of all positive affect items across all three dimensions. This strategy increases the reliability of our within person measures of emotions, broadens the construct representation, and balances survey length against participant burden.

*Note: New emotions were added to Project SMS surveys, so calculated variables will differ from those in the pilot.*

Variable name	Variable description	Items
NA.obs.grant	Overall negative affect	mood.angry, mood.irritated, mood.hostile, mood.annoyed, mood.scorn, mood.disgust, mood.loathing, mood.unhappy, mood.sad, mood.blue, mood.alone, mood.lonely, mood.down, mood.anxious, mood.afraid, mood.nervous, mood.jittery, mood.shaky, mood.fright, mood.scared, mood.upset, mood.distress, mood.guilty, mood.ashamed

PA.obs.grant	Overall positive affect	mood.happy, mood.cheerful, mood.delight, mood.joyful, mood.enthusiasm, mood.energy, mood.lively, mood.excited, mood.alert, mood.attentive, mood.determined, mood.concentrate, mood.calm, mood.relaxed, mood.ease
anger.obs	Anger subscale	mood.angry, mood.irritated, mood.hostile, mood.annoyed, mood.scorn, mood.disgust, mood.loathing
sad.obs	Sadness subscale	mood.unhappy, mood.sad, mood.blue, mood.alone, mood.lonely, mood.down
anx.obs	Anxiety subscale	mood.anxious, mood.afraid, mood.nervous, mood.jittery, mood.shaky, mood.fright, mood.scared
jov.obs	Joviality subscale	mood.happy, mood.cheerful, mood.delight, mood.joyful, mood.enthusiasm, mood.energy, mood.lively, mood.excited
attentive.obs	Attentiveness subscale	mood.alert, mood.attentive, mood.determined, mood.concentrate
serenity.obs	Serenity subscale	mood.calm, mood.relaxed, mood.ease

## Transformed Calculated Variables

Variable name	Variable description	Response Values
NA.day	Daily level average Negative Affect	Numeric value between 0 and 100
PA.day	Daily level average Positive Affect	Numeric value between 0 and 100
NA.person	Participant's average Negative Affect across all study days	Numeric value between 0 and 100
PA.person	Participant's average Positive Affect across all study days	Numeric value between 0 and 100



# Daily Emotion Regulation

## Narrative

Participants indicate which of the following emotion regulation and coping strategies they employed in the past hour from a “check all that apply” style of question. This question includes 12 statements. Six items for this construct were taken from a similar protocol designed by Tan et al. (2012) for a cell-phone EMA study of adolescents. These items were designed to assess six emotion regulation strategies commonly defined in the literature (acceptance, problem- solving, rumination, reframing, avoidance, and distraction). For the current study, an item was added in the same style which assessed the use of suppression, given a growing body of literature indicating that expressive suppression is linked to some aspects of mental health (Hu, Zhang, Wang, Mistry, Ran, & Wang, 2014).

The next 4 items on the checklist were adapted from the Brief COPE, a 28-item self- report measure of frequency of use of 14 different coping strategies (Carver, 1997). There are 7 subscales, each with two items measuring use of one specific type of coping strategy. Rating for the original measure is on a 1-4 Likert scale where 1 = I haven't been doing this at all and 4 = I've been doing this a lot. These items are adapted from the following subscales: use of emotional support, venting, self-blame, religion. Scores on the brief COPE range from 28-112. These 4 items were adapted from the Brief COPE.

Lastly, a ‘none of the above’ option was added.

*Notes: Pilot items differ slightly from Project SMS items. The time frame also varies between the pilot and Project SMS data.*

## Validity and Reliability

Validation has not been published for the Emotion Regulation Strategies measure from Tan et al. (2012).

Different subscales of the brief COPE show varying internal consistency. Internal consistency for each subscale from which items were adapted is as follows: use of emotional support ( $\alpha = .71$ ), venting ( $\alpha = .50$ ), self-blame ( $\alpha = .69$ ), religion ( $\alpha = .82$ ). The measure has useful criterion-related validity in that use of adaptive and maladaptive coping strategies differentially predicts positive and negative outcomes.

A study from this lab showed that negative urgency was correlated with disengagement/reflective emotion regulation strategies relative to engagement strategies assessed via the CERQ. This finding was replicated in

EMA data that utilized an abbreviated version of the COPE measure (King et al., 2018). These findings lend some support to the validity of the COPE in EMA studies.

## Citations

Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the Brief COPE. *International journal of behavioral medicine*, 4(1), 92.

Tan, P. Z., Forbes, E. E., Dahl, R. E., Ryan, N. D., Siegle, G. J., Ladouceur, C. D., & Silk, J. S. (2012). Emotional reactivity and regulation in anxious and nonanxious youth: A cell-phone ecological momentary assessment study. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 53(2), 197–206.  
<https://doi.org/10.1111/j.1469-7610.2011.02469.x>

Hu, T., Zhang, D., Wang, J., Mistry, R., Ran, G., & Wang, X. (2014). Relation between emotion regulation and mental health: a meta-analysis review. *Psychological reports*, 114(2), 341-362.

## Data Dictionary

Participants are presented with a “check all that apply” style of question in which they indicate which of the following emotion regulation strategies they used. If an item is selected, 1 is populated. If the item is not selected, it remains blank.

*Note: New ER strategies were added to Project SMS surveys, so items differ from those in the pilot. The time frame also varies between the pilot and Project SMS data.*

Variable Name	Description	Subscale/Measure/ Source
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er.acceptance/ er.problemsolve/ er.rumination/ er.reframing/ er.distraction/ er.avoidance/ er.suppression/ er.support/ er.express/ er.criticize/ er.mindful/ er.none	<p>In the past hour, which of the following did you do? Check all that apply.</p> <p>[Options are the following variables that are labelled er.X and listed below. If a participant checks the box next to the item, a 1 is populated]</p>	
er.acceptance	You decided to accept a situation or problem the way it is	Acceptance (from Tan et al., 2012)
er.problemsolve	You did something to fix a problem or thought of a way to make things better	Problem-solving (from Tan et al., 2012)
er.rumination	You were unable to stop thinking about how you were feeling - thoughts kept popping up in your mind	Rumination (from Tan et al., 2012)
er.reframing	You tried to think of a problem in a different way so it didn't seem as bad	Reframing (from Tan et al., 2012)
er.distraction	You tried to keep your mind off a problem by doing something else	Distraction (from Tan et al., 2012)
er.avoidance	You tried not to think about a problem or tried to forget all about it	Avoidance (from Tan et al., 2012)
er.suppression	You tried not to control your emotions by not expressing them	Suppression (adapted from Tan et al., 2012 by project staff)
er.support	You reached out for emotional support from others	From Brief COPE
er.express	You tried expressing your negative emotion	From Brief COPE

er.criticize	You criticized yourself for how you were feeling	From Brief COPE
er.mindful	You used mindfulness or meditation to make yourself feel better	From Brief COPE
er.none	None of the above	

### Calculated Variables

*Note:* New ER strategies were added to Project SMS surveys, so calculated variables will differ from those in the pilot.

Calculated variable	Calculated variable name	Items
Maladaptive emotion reg (sum)	er.neg.grant	er.rumination er.avoidance er.suppression er.distraction er.criticize
Adaptive emotion reg (sum)	er.pos.grant	er.acceptance er.problemsolve er.reframing er.support er.express er.mindful
All emotion reg (sum)	er.all.grant	er.rumination er.avoidance er.suppression er.acceptance er.problemsolve er.reframing er.support er.express er.criticize er.mindful
Ratio of negative regulation strategies to positive and negative strategies	er.ratio.grant	$(er.neg) / (er.neg + er.pos)$

## Self-Control Demands

*Added by Madi Feil*

## Narrative

Two items were selected from a 4-item measure of daily self-control demands first used by Muraven et al. (2005). In the original measure, participants indicated on an 11-point scale to what extent they felt they had to regulate their moods, control their thoughts, deal with stress, or felt overwhelmed over the course of that day. In the current study, participants indicate on a scale of 0-100 (with 0 being “Not at all” and 100 being “Very much”) to what extent they have needed to control/fix their mood and control/fix their thoughts in the past hour.

*Notes: Items included in Project SMS vary slightly from those used in the pilot data. The time frame also varies between the pilot and Project SMS data.*

## Validity and Reliability

Cronbach’s alpha for the full 4 items as reported by Muraven et al. (2005) is 0.75. In the pilot data, cronbach’s alpha was \*\*\*\*\*.

## Citations

Muraven, M., Collins, R. L., Shiffman, S., & Paty, J. A. (2005). Daily Fluctuations in Self- Control Demands and Alcohol Intake. *Psychology of Addictive Behaviors*, 19(2), 140–147. <https://doi.org/10.1037/0893-164X.19.2.140>

## Data Dictionary

All questions are slide bars ranging from 0-100 and labeled from left to right: “Not at all,” “Somewhat,” “Very Much.” Participants are prompted: “Please rate your experiences in the past hour” and presented with the following items.

Variable Name	Description
control.fixmood	In the past hour, have you needed to control/fix your mood?
control.fixthought	In the past hour, have you needed to control/fix your thoughts?

## Calculated Variables

*Note: Items differ slightly in Project SMS surveys from what is included in the pilot data, so calculated variables will differ.*

Calculated variable	Calculated variable name	Items
Momentary self-control demands (mean)	control.grant	control.fixmood/ control.fixthought

## Emotion Appraisals

*Added by Madi Feil*

### Narrative

Two aspects of momentary emotional appraisal are included in the present study: perceived changeability of current emotional state (i.e. confidence in changing emotion) and perceived importance of changing the current emotion (i.e. importance of changing emotion). The former encompasses changeability beliefs and emotion-regulation self-efficacy, while the latter relates to distress tolerance, perceived desirability of the current emotion, and emotion-regulation motivation. There are two items total, with each corresponding to one of the two aspects.

Participants will indicate how well they think they could “control, fix, or change” their current mood on a scale from 0-100, with anchors being “not at all,” “somewhat,” and “completely.” They then indicate how important they believe it is to do so on the same scale, with anchors being “not at all important,” “somewhat important,” and “extremely important.” These items ask about participants' perceptions “right now.”

The creation of these items was informed by the appraisal literature (Ford & Gross, 2019; Kalokerinos, Tamir, & Kuppens, 2017; C. A. Smith & Lazarus, 1993; Tamir et al., 2007).

### Validity and Reliability

There is no validity or reliability information for this measure; it was developed by staff.

### Citations

Ford, B. Q., & Gross, J. J. (2019). Why Beliefs About Emotion Matter: An Emotion- Regulation Perspective. *Current Directions in Psychological Science*, 28(1), 74–81.

Kalokerinos, E. K., Tamir, M., & Kuppens, P. (2017). Instrumental motives in negative emotion regulation in daily life: Frequency, consistency, and predictors. *Emotion*, 17(4), 48–657. Smith, C. A., & Lazarus, R. S. (1993). Appraisal Components, Core Relational Themes, and the Emotions. *Cognition and Emotion*, 7(3–4), 233–269.

Tamir, M., John, O. P., Srivastava, S., & Gross, J. J. (2007). Implicit Theories of Emotion: Affective and Social Outcomes Across a Major Life Transition. *Journal of Personality and Social Psychology*, 92(4), 731–744.

## Data Dictionary

Participants are asked to indicate their responses to the following items “right now.” Response options for both items are on a sliding scale of 0-100. Anchors for each item are presented below.

Variable Name	Description	Response options:
change.mood.comp	If you wanted to, how well do you think you could control, fix or change your mood <i>right now</i> ?	Labeled from left to right: “not at all,” “somewhat,” and “completely”
change.mood.imp	How important is it for you to control, change or fix your mood <i>right now</i> ?	Labeled from left to right: “not at all important,” “somewhat important,” and “extremely important”

## Calculated Variables

N/A

## Previous Night Alcohol Use

### Narrative

The following items were designed by project staff to assess the

participant's alcohol consumption and drinking behaviors from the previous night.

### Validity and Reliability

Not yet tested; measure is new and was designed by project staff.

### Citations

SMS Project staff.

### Data Dictionary

Note: If participant indicates that they did not drink yesterday in the 2nd question, the subsequent questions will not be shown and they will be redirected to the "Health Behavior Questions- Alcohol" items.

Variable Name	Description	Response Options
alc.quant	How many alcoholic drinks did you have yesterday? Please remember that a drink refers to a "standard" drink size: 12 oz. beer, 8-9 oz. malt liquor, 5 oz. wine, 1.5 oz. hard liquor. <i>Select 0 if you didn't drink yesterday.</i>	Slider bar: 0 to 30 drinks
alc.time	About what time did you begin drinking?	1= Morning (Before 11:00am) 2= Daytime (11:00am-1:59pm) 3= Afternoon (2:00pm-4:59pm) 4= Evening (5:00pm-7:59pm) 5= Late Evening (After 8:00pm) 6= I did not drink yesterday
alc.hours	Over how many hours did you drink?	Slider bar: 0 to 24 hours
alc.intox	How drunk or intoxicated did you get?	Slider bar: 0 = "Not at all/I didn't drink", 50 = "Somewhat Drunk", 100 = "Very Drunk"
alc.intoxhours	Over how many hours did you feel the effects of alcohol ('buzzed' or 'drunk')?	Slider bar: 0 to 24 hours



## Previous Night Marijuana Use

### Narrative

The following items were designed by project staff to assess the participant's marijuana consumption and behaviors from the previous night.

### Validity and Reliability

Not yet tested; measure is new and was designed by project staff.

### Citations

SMS Project staff.

### Data Dictionary

Note: If participants indicate in the first two questions that they did not use marijuana, the subsequent questions are not displayed and participants are redirected to the "Health Behavior Questions- Marijuana" questions.

Variable Name	Description	Response Options
mar.use	Did you use marijuana yesterday?	1= Yes 2= No
mar.intox	How 'stoned' or 'high' did you get?	Slider bar: 0 = "Not at all/I didn't use marijuana", 50 = "Somewhat High", 100 = "Very High"
mar.intoxhours	Over how many hours did you feel the effects of marijuana ('stoned' or 'high')?	Slider bar: 0 to 24 hours

## Previous Night Alcohol and Marijuana Consequences

### Narrative

The following items were designed by project staff to assess the participant's positive and negative life consequences of consuming alcohol and/or marijuana.

*Notes:* In the pilot data, alcohol and marijuana consequences are separated by substance.

In Project SMS, they are combined such that participants are asked whether they experienced consequences related to alcohol and/or marijuana use.

**Validity and Reliability**

Not yet tested; measure is new and was designed by project staff.

**Citations**

SMS Project staff.

**Data Dictionary**

Variable Name	Description
sub.use sub.hangover sub.agg sub.vomit sub.hurt sub.blackout sub.school sub.rude sub.embar sub.troub sub.regret sub.norm sub.fight sub.paranoid sub.express sub.energy sub.buzz sub.mood sub.sociable sub.relaxed sub.creative sub.sleep sub.sensory sub.none	<p>Which of the following did you experience related to your drinking and/or marijuana use? (This question refers to drinking or marijuana use you engaged in yesterday).</p> <p><i>Please select all that apply.</i></p> <p>[Options are the following variables that are labelled sub.X and listed below. If a participant checks the box next to the item, a 1 is populated]</p>
sub.use	None, I did not drink alcohol or use marijuana yesterday.
sub.hangover	I had a hangover
sub.agg	I became aggressive
sub.vomit	I felt nauseated or vomited
sub.hurt	I hurt or injured myself by accident

sub.blackout	I couldn't remember what I did
sub.school	I was unable to do work/schoolwork
sub.rude	I was rude or obnoxious
sub.embar	I did or said something that embarrassed me
sub.troub	I got in trouble
sub.regret	I did or said something I regret
sub.norm	I did something I wouldn't normally do when sober
sub.fight	I got into a fight/argument
sub.paranoid	I felt panicked or paranoid
sub.express	I was able to express my feelings more easily
sub.energy	I felt more energetic
sub.buzz	I got a buzz
sub.mood	I was in a better mood

sub.sociable	I was more sociable
sub.relaxed	I felt relaxed
sub.creative	I felt more creative
sub.sleep	I had better sleep
sub.sensory	I had an enhanced sensory experience
sub.none	I drank and/or used marijuana but didn't experience these outcomes

### Calculated Variables

Calculated variable	Calculated variable name	Items
Negative consequences (sum)	sub.neg.conseq	sub.hangover, sub.agg, sub.vomit, sub.hurt, sub.blackout, sub.school, sub.rude, sub.embar, sub.troub, sub.regret, sub.norm, sub.fight, sub.paranoid
Positive consequences (sum)	sub.pos.conseq	sub.express, sub.energy, sub.buzz, sub.mood, sub.sociable, sub.relaxed, sub.creative, sub.sleep, sub.sensory

## Current Intoxication

### Narrative

The four items used to assess current intoxication were developed by project staff and administered at every EMA signal.

### **Validity and Reliability**

Not yet tested; measure is new and was designed by project staff.

### **Citations**

SMS Project staff.

### **Data Dictionary**

Participants respond to questions asking about their use of alcohol or marijuana in the last hour; “Not at all” (0), “Moderately drunk/high” (50), and “Very drunk/high” (100).

<b>Variable Name</b>	<b>Item Description</b>	<b>Response Options</b>
drink.amt.current	In the past hour, how many drinks have you had? (If more than 15, select 15)	Slider bar from 0-15
drunk.current	How drunk do you feel right now?	Slider bar: “Not at all” (0), “Moderately drunk” (50), “Very drunk” (100)
mar.use.current	In the last hour, have you used any marijuana?	1= Yes 2= No
high.current	How high do you feel right now?	Slider bar: “Not at all” (0), “Moderately high” (50), “Very high” (100)

### **Calculated Variables**

To be determined by project staff.