# Metadata

### Title\*

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| Situation-specific effects of stress and emotion on the decision to drink alcohol in daily life |

### Description\*

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| This is our preregistration for an EMA study on value-based decisions between alcoholic and non-alcoholic drinks |

### Contributors\*

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# Study Information

### Hypotheses\*

List specific, concise, and testable hypotheses. Please state if the hypotheses are directional or non-directional. If directional, state the direction. A predicted effect is also appropriate here. If a specific interaction or moderation is important to your research, you can list that as a separate hypothesis.

**Example**: If taste affects preference, then mean preference indices will be higher with higher concentrations of sugar.

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| Behavioral data:  RQ1: What are the magnitudes and directions of associations between momentary affective states (stress, negative emotion, positive emotion) and alcohol choice behavior, and which physiological states, cognitive states, and situational circumstances most robustly moderate these associations?  Drift diffusion modeling:  RQ2: Which decision-making parameters (decision carefulness, evidence sensitivity, alcohol bias) show the strongest associations with affective states, and what are the effect sizes of physiological, cognitive, and situational moderators of these associations? |

# Design Plan

In this section, you will be asked to describe the overall design of your study. Remember that this research plan is designed to register a single study, so if you have multiple experimental designs, please complete a separate preregistration.

### Study type\*

Please select one of the following statements.

* ~~Experiment - A researcher randomly assigns treatments to study subjects, this includes field or lab experiments. This is also known as an intervention experiment and includes randomized controlled trials.~~
* **Observational Study - Data is collected from study subjects that are not randomly assigned to a treatment. This includes surveys, “natural experiments,” and regression discontinuity designs.**
* ~~Meta-Analysis - A systematic review of published studies.~~
* ~~Other~~

### Blinding\*

Blinding describes who is aware of the experimental manipulations within a study. Mark all that apply.

* **No blinding is involved in this study.**
* ~~For studies that involve human subjects, they will not know the treatment group to which they have been assigned.~~
* ~~Personnel who interact directly with the study subjects (either human or non-human subjects) will not be aware of the assigned treatments. (Commonly known as “double blind”)~~
* ~~Personnel who analyze the data collected from the study are not aware of the treatment applied to any given group.~~

### Is there any additional blinding in this study?

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| N/A |

### Study design\*

Describe your study design. The key is to be as detailed as is necessary given the specific parameters of the design. There may be some overlap between this question and the following questions. That is OK, as long as sufficient detail is given in one of the areas to provide all of the requested information. Examples include two-group, factorial, randomized block, and repeated measures. Is it a between (unpaired), within-subject (paired), or mixed design? Describe any counterbalancing required.

**Example**: We have a between subjects design with 1 factor (sugar by mass) with 4 levels.

**More info**: This question has a variety of possible answers. The key is for a researcher to be as detailed as is necessary given the specifics of their design. Be careful to determine if every parameter has been specified in the description of the study design. There may be some overlap between this question and the following questions. That is OK, as long as sufficient detail is given in one of the areas to provide all of the requested information. For example, if the study design describes a complete factorial, 2 X 3 design and the treatments and levels are specified previously, you do not have to repeat that information.

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| Participants will complete a baseline survey followed by 14 consecutive days of EMA assessments. Participants will receive 2 scheduled EMA prompts per day via text message. The first scheduled EMA assessment will be sent in the afternoon (randomly between 3pm and 4pm) and the second one will be sent in the evening (randomly between 8pm and 9pm). Participants will always have two hours to complete the EMA assessment and receive a reminder after one hour. Participants will also be able to self-initiate one event-contingent EMA assessment per day (following the experience of a stressful event in their daily life). |

### Randomization

If you are doing a randomized study, state how you will randomize, and at what level. Typical randomization techniques include: simple, block, stratified, and adaptive covariate randomization. If randomization is required for the study, the method should be specified here, not simply the source of random numbers.

**Example**: We will use block randomization, where each participant will be randomly assigned to one of the four equally sized, predetermined blocks. The random number list used to create these four blocks will be created using the web applications available at http://random.org.

**More info**: Typical randomization techniques include: simple, block, stratified, and adaptive covariate randomization. If randomization is required for the study, the method should be specified here, not simply the source of random numbers.

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| N/A |

# Sampling Plan

In this section we’ll ask you to describe how you plan to collect samples, as well as the number of samples you plan to collect and your rationale for this decision. Please keep in mind that the data described in this section should be the actual data used for analysis, so if you are using a subset of a larger dataset, please describe the subset that will actually be used in your study.

### Existing data\*

Preregistration is designed to make clear the distinction between confirmatory tests, specified prior to seeing the data, and exploratory analyses conducted after observing the data. Therefore, creating a research plan in which existing data will be used presents unique challenges. Please select the description that best describes your situation. See https://cos.io/prereg for more information.

* **Registration prior to creation of data: As of the date of submission of this research plan for preregistration, the data have not yet been collected, created, or realized.**
* ~~Registration prior to any human observation of the data: As of the date of submission, the data exist but have not yet been quantified, constructed, observed, or reported by anyone - including individuals that are not associated with the proposed study. Examples include museum specimens that have not been measured and data that have been collected by non-human collectors and are inaccessible.~~
* ~~Registration prior to accessing the data: As of the date of submission, the data exist, but have not been accessed by you or your collaborators. Commonly, this includes data that has been collected by another researcher or institution.~~
* ~~Registration prior to analysis of the data: As of the date of submission, the data exist and you have accessed it, though no analysis has been conducted related to the research plan (including calculation of summary statistics). A common situation for this scenario when a large dataset exists that is used for many different studies over time, or when a data set is randomly split into a sample for exploratory analyses, and the other section of data is reserved for later confirmatory data analysis.~~
* ~~Registration following analysis of the data: As of the date of submission, you have accessed and analyzed some of the data relevant to the research plan. This includes preliminary analysis of variables, calculation of descriptive statistics, and observation of data distributions. Please see cos.io/prereg for more information.~~

### Explanation of existing data

If you indicate that you will be using some data that already exist in this study, please describe the steps you have taken to assure that you are unaware of any patterns or summary statistics in the data. This may include an explanation of how access to the data has been limited, who has observed the data, or how you have avoided observing any analysis of the specific data you will use in your study.

**Example**: An appropriate instance of using existing data would be collecting a sample size much larger than is required for the study, using a small portion of it to conduct exploratory analysis, and then registering one particular analysis that showed promising results. After registration, conduct the specified analysis on that part of the dataset that had not been investigated by the researcher up to that point.

**More info**: An appropriate instance of using existing data would be collecting a sample size much larger than is required for the study, using a small portion of it to conduct exploratory analysis, and then registering one particular analysis that showed promising results. After registration, conduct the specified analysis on that part of the dataset that had not been investigated by the researcher up to that point.

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| N/A |

### Data collection procedures\*

Please describe the process by which you will collect your data and your inclusion and exclusion criteria. If you are using human subjects, this should include the population from which you obtain subjects, recruitment efforts, payment for participation, how subjects will be selected for eligibility from the initial pool, and your study timeline. For studies that don't include human subjects, include information about how you will collect samples, duration of data gathering efforts, source or location of samples, or batch numbers you will use.

**Example**: Participants will be recruited through advertisements at local pastry shops. Participants will be paid $10 for agreeing to participate (raised to $30 if our sample size is not reached within 15 days of beginning recruitment). Participants must be at least 18 years old and be able to eat the ingredients of the pastries.

**More information**: The answer to this question requires a specific set of instructions so that another person could repeat the data collection procedures and recreate the study population. Alternatively, if the study population would be unable to be reproduced because it relies on a specific set of circumstances unlikely to be recreated (e.g., a community of people from a specific time and location), the criteria and methods for creating the group and the rationale for this unique set of subjects should be clear.

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| Participants will be recruited from Prolific.co and stratified by sex assigned at birth (50% female, 50% male). They will be paid up to $160 depending on the number of EMA assessments they complete.  These are our inclusion criteria:   * Located in the USA * 21 years of age or older * Consume at least 10 units of alcohol (~6 standard alcoholic drinks) per week * Having an approval rate of at least 98% on Prolific * Having participated in at least 10 prior Prolific studies * Own an Apple or Android smartphone compatible with study app   These are our exclusion criteria:   * Past or current treatment for alcohol use |

### Sample size\*

Describe the sample size of your study. How many units will be analyzed in the study? This could be the number of people, birds, classrooms, plots, or countries included. If the units are not individuals, then describe the size requirements for each unit. If you are using a clustered or multilevel design, describe how many units are you collecting at each level of the analysis. This might be the number of samples or a range, minimum, or maximum.

**Example**: Our target sample size is 280 participants. We will attempt to recruit up to 320, assuming that not all will complete the total task.

**More information**: For some studies, this will simply be the number of samples or the number of clusters. For others, this could be an expected range, minimum, or maximum number.

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| We will collect data from 250 participants. The maximum number of completed EMA assessments per participant would be 42 (28 scheduled assessments + 14 self-initiated assessments), which would result in a total of 10,500 observations. Assuming a response rate of ~70% for both scheduled and self-initiated assessments would result in ~30 observations per participant (~7,500 total observations). |

### Sample size rationale

This could include a power analysis or an arbitrary constraint such as time, money, or personnel.

**Example**: We used the software program G\*Power to conduct a power analysis. Our goal was to obtain .95 power to detect a medium effect size of .25 at the standard .05 alpha error probability.

**More information**: This gives you an opportunity to specifically state how the sample size will be determined. A wide range of possible answers is acceptable; remember that transparency is more important than principled justifications. If you state any reason for a sample size upfront, it is better than stating no reason and leaving the reader to “fill in the blanks.” Acceptable rationales include: a power analysis, an arbitrary number of subjects, or a number based on time or monetary constraints.

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| The sample size was determined by the funding available for this study. We explored whether we have adequate power to detect a medium-sized interaction effect on the proportion of choices in favor of alcohol with 250 participants. We performed a power simulation with the Shiny app provided by Lafit and colleagues (DOI: 10.1177/[251524592097873](https://doi.org/10.1177/2515245920978738)8). For this analysis, we assumed 30 observations per participant, a fixed intercept of 0.5, a fixed slope of 0.03, an interaction effect of 0.02, standard deviations of errors, random intercept, and random slope of 0.08, autocorrelation of errors of 0.5, and a random correlation of 0.2. This analysis indicated that under the given assumptions we have > 90% power to detect the simulated interaction effect with N = 250. |

### Stopping rule

If your data collection procedures do not give you full control over your exact sample size, specify how you will decide when to terminate your data collection. If you are using sequential analysis, include your pre-specified thresholds.

**Example**: We will post participant sign-up slots by week on the preceding Friday night, with 20 spots posted per week. We will post 20 new slots each week if, on that Friday night, we are below 320 participants.

**More information**: You may specify a stopping rule based on p-values only in the specific case of sequential analyses with pre-specified checkpoints, alphas levels, and stopping rules. Unacceptable rationales include stopping based on p-values if checkpoints and stopping rules are not specified. If you have control over your sample size, then including a stopping rule is not necessary, though it must be clear in this question or a previous question how an exact sample size is attained.

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| N/A |

# Variables

In this section you can describe all variables (both manipulated and measured variables) that will later be used in your confirmatory analysis plan. In your analysis plan, you will have the opportunity to describe how each variable will be used. If you have variables which you are measuring for exploratory analyses, you are not required to list them, though you are permitted to do so.

### Manipulated variables

Precisely define all variables you plan to manipulate and the levels or treatment arms of each variable. This is not applicable to any observational study.

**Example:** We manipulated the percentage of sugar by mass added to brownies. The four levels of this categorical variable are: 15%, 20%, 25%, or 40% cane sugar by mass.

**More information**: For any experimental manipulation, you should give a precise definition of each manipulated variable. This must include a precise description of the levels at which each variable will be set, or a specific definition for each categorical treatment. For example, “loud or quiet,” should instead give either a precise decibel level or a means of recreating each level. 'Presence/absence' or 'positive/negative' is an acceptable description if the variable is precisely described.

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| N/A |

### Measured variables \*

Precisely define each variable that you will measure. This will include outcome measures, as well as any measured predictors or covariates.

**Example**: The single outcome variable will be the perceived tastiness of the single brownie each participant will eat. We will measure this by asking participants ‘How much did you enjoy eating the brownie’ (on a scale of 1-7, 1 being ‘not at all’, 7 being ‘a great deal’) and ‘How good did the brownie taste’ (on a scale of 1-7, 1 being ‘very bad’, 7 being ‘very good’).

**More information**: Observational studies and meta-analyses will include only measured variables. As with the previous questions, the answers here must be precise. For example, 'intelligence,' 'accuracy,' 'aggression,' and 'color' are too vague. Acceptable alternatives could be 'IQ as measured by Wechsler Adult Intelligence Scale' 'percent correct,' 'number of threat displays,' and 'percent reflectance at 400 nm.'

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| **Baseline:**  The following will be assessed once at baseline.  Image rating task: Participants will view 30 images of alcoholic drinks and 30 images of non-alcoholic drinks and will indicate for each item how much they like to consume them (1 = not at all, 2 = not really, 3 = a little bit, 4 = a lot). These ratings will be used to create the personalized 2AFC trials during EMA.  Demographics: Participants will report age, race, sex assigned at birth, gender identity, sexual identity, student status, highest completed education, and employment status.  Participants will complete the following validated scales:  AUDIT DMQ-R UPPS-P (negative urgency and positive urgency sub-scale)  CERQ  ERS  **EMA:**  The EMA battery consists of 33 self-reports and one cognitive task.  Stressful event:   1. stress\_binary: Did anything upsetting or stressful happen in the last 30 minutes? An upsetting or stressful event is any event, even a minor one, which negatively affected you.    1. Yes    2. No 2. stress\_event\_type: Which of these options best describes the event (check all that apply)?    1. Argument, disagreement, or conflict    2. Social disappointment/let down    3. Difficulties involving work or school    4. Difficulties at home    5. Health issue or accident    6. Negative event that happened to others    7. Other stressful event 3. stress\_event\_intensity: How stressful was the event?    1. 0 (not at all) – 4 (extremely)   Affective states:   1. stress\_state: How stressed do you feel right now?    1. 0 (not at all) – 4 (extremely) 2. PA\_state: To what extent are you experiencing positive emotions right now?    1. 0 (neutral) – 4 (extremely) 3. NA\_state: To what extent are you experiencing negative emotions right now?    1. 0 (neutral) – 4 (extremely) 4. stress\_change\_alc: If you were to consume alcoholic drinks later today, how stressed would you feel after?    1. -2 (much less stressed) – 2 (much more stressed) 5. stress\_change\_soft: If you were to consume non-alcoholic soft drinks later today, how stressed would you feel after?    1. -2 (much less stressed) – 2 (much more stressed) 6. PA\_change\_alc: If you were to consume alcoholic drinks later today, to what extent would you experience positive emotions after?    1. -2 (much less positive) – 2 (much more positive) 7. PA\_change\_soft: If you were to consume non-alcoholic soft drinks later today, to what extent would you experience positive emotions after?    1. -2 (much less positive) – 2 (much more positive) 8. NA\_change\_alc: If you were to consume alcoholic drinks later today, to what extent would you experience negative emotions after?    1. -2 (much less negative) – 2 (much more negative) 9. NA\_change\_soft: If you were to consume non-alcoholic soft drinks later today, to what extent would you experience negative emotions after?    1. -2 (much less negative) – 2 (much more negative) 10. stress\_change: Compared to the last time you completed one of these assessments (whether earlier today or yesterday), how has your stress changed?     1. -2 (much less stressed) – 2 (much more stressed) 11. PA\_change: Compared to the last time you completed one of these assessments (whether earlier today or yesterday), how has your experience positive emotions changed?     1. -2 (much less positive) – 2 (much more positive) 12. NA\_change: Compared to the last time you completed one of these assessments (whether earlier today or yesterday), how has your experience of negative emotions changed?     1. -2 (much less negative) – 2 (much more negative)   Physiological states:   1. alc\_yday: How many alcoholic drinks did you have yesterday?    1. 0 – 10+ 2. soft\_yday: How many non-alcoholic soft drinks did you have yesterday?    1. 0 – 10+ 3. alc\_today: How many alcoholic drinks did you have today up until now?    1. 0 – 10+ 4. soft\_today: How many non-alcoholic soft drinks did you have today up until now?    1. 0 – 10+ 5. alc\_intend: How many alcoholic drinks do you intend to have for the remainder of today?    1. 0 – 10+ 6. soft\_intend: How many non-alcoholic soft drinks do you intend to have for the remainder of today?    1. 0 – 10+ 7. thirst\_state: How thirsty are you right now?    1. 0 (not at all) – 4 (extremely) 8. hunger\_state: How hungry are you right now?    1. 0 (not at all) – 4 (extremely) 9. tired\_state: How tired are you right now?    1. 0 (not at all) – 4 (extremely) 10. bored\_state: How bored are you right now?     1. 0 (not at all) – 4 (extremely)   Cognitive states:   1. Alcohol expectancies: If you were to drink alcohol later today, which of the following things do you think you would likely feel or do (check all that apply)?    1. alc\_exp\_relaxed: Feel more relaxed    2. alc\_exp\_sociable: Be more sociable    3. alc\_exp\_buzz: Get a buzz    4. alc\_exp\_mood: Be in a better mood    5. alc\_exp\_energetic: Feel more energetic    6. alc\_exp\_hangover: Have a hangover    7. alc\_exp\_embar: Do something that embarrasses you    8. alc\_exp\_rude: Be rude or obnoxious    9. alc\_exp\_vomit: Feel nauseous or vomit    10. alc\_exp\_injure: Hurt or injure yourself by accident 2. Drinking motives: If you were to drink alcohol later today, which of these statements would you agree with (check all that apply)?    1. alc\_mot\_coping: You would drink to forget your worries or problems.    2. alc\_mot\_social: You would drink to celebrate a special occasion with friends.    3. alc\_mot\_enhance: You would drink because you like the feeling. 3. alc\_craving: How much are you craving an alcoholic drink right now?    1. 0 (not at all) – 4 (extremely) 4. soft\_craving: How much are you craving a non-alcoholic soft drink right now?    1. 0 (not at all) – 4 (extremely)   Context:   1. location: Where are you right now?    1. Home    2. Someone else’s home    3. School/work    4. Outdoors    5. Restaurant/café    6. Bar/club    7. Other location 2. social: Who are you with right now (check all that apply)?    1. No one (I am alone)    2. Friend(s)/roommate(s)    3. Romantic partner(s)    4. Family member(s)    5. Coworker(s)/classmate(s)    6. Stranger(s)    7. Other people 3. alc\_cue: If you look around, do you see any alcohol in your immediate environment right now?    1. No alcohol is visible    2. Alcohol is visible indirectly (TV, magazine, etc.)    3. Alcohol is visible directly (bottle, glass, etc.) 4. responsibility: Do you have any responsibilities (e.g., work, school, a meeting or other important activity, taking care of your kids or a family member) right now, later today, or early tomorrow morning?    1. Yes    2. No   **2AFC task:**   1. choice\_prop: In each trial, participants choose between an alcoholic and a non-alcoholic drink they rated at baseline. Participants have four seconds to decide which drink they would rather consume in the present moment by pressing it on their smartphone screen. We construct choice pairs based on participants' baseline ratings, creating all possible rating combinations (16 unique combinations), with 10 trials per combination (160 total trials). This ensures that alcoholic options are higher rated in exactly half the trials. Trials are separated by a 0.25s fixation cross.   **Passively collected:**   1. time\_of\_day    1. Afternoon    2. Evening 2. day\_of\_week    1. Sunday    2. Monday    3. Tuesday    4. Wednesday    5. Thursday    6. Friday    7. Saturday |

### Indices

If applicable, please define how measures will be combined into an index (or even a mean) and what measures will be used. Include either a formula or a precise description of the method. If you are using a more complicated statistical method to combine measures (e.g. a factor analysis), please note that here but describe the exact method in the analysis plan section.

**Example**: We will take the mean of the two questions above to create a single measure of ‘brownie enjoyment.’

**More information**: If you are using multiple pieces of data to construct a single variable, how will this occur? Both the data that are included and the formula or weights for each measure must be specified. Standard summary statistics, such as “means” do not require a formula, though more complicated indices require either the exact formula or, if it is an established index in the field, the index must be unambiguously defined. For example, “biodiversity index” is too broad, whereas “Shannon’s biodiversity index” is appropriate.

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| choice\_prop: We will compute the proportion of choices for alcohol from the 2AFC trials at each EMA: Nalcohol choice/Nalcohol choice + softdrink choice |

# Analysis Plan

In this section, you will describe one or more confirmatory analysis. Please remember that all analyses specified below must be reported in the final article, and any additional analyses must be noted as exploratory or hypothesis-generating. A confirmatory analysis plan must state up front which variables are predictors (independent) and which are the outcomes (dependent).

### Statistical models \*

What statistical model will you use to test each hypothesis? Please include the type of model (e.g. ANOVA, RMANOVA, MANOVA, multiple regression, SEM, etc) and the specification of the model. This includes each variable that will be included, all interactions, subgroup analyses, pairwise or complex contrasts, and any follow-up tests from omnibus tests. If you plan on using any positive controls, negative controls, or manipulation checks you may mention that here. Provide enough detail so that another person could run the same analysis with the information provided. Remember that in your final article any test not included here must be noted as exploratory and that you must report the results of all tests.

**Example**: We will use a 2 X 3 repeated measures ANOVA (RMANOVA) with both factors within subjects to analyze our results. This is perhaps the most important and most complicated question within the preregistration. Ask yourself: is enough detail provided to run the same analysis again with the information provided by the user? Be aware for instances where the statistical models appear specific, but actually leave openings for the precise test.

**More information**: This is perhaps the most important and most complicated question within the preregistration. As with all of the other questions, the key is to provide a specific recipe for analyzing the collected data. Ask yourself: is enough detail provided to run the same analysis again with the information provided by the user? Be aware for instances where the statistical models appear specific, but actually leave openings for the precise test. See the following examples:

* If someone specifies a 2x3 ANOVA with both factors within subjects, there is still flexibility with the various types of ANOVAs that could be run. Either a repeated measures ANOVA (RMANOVA) or a multivariate ANOVA (MANOVA) could be used for that design, which are two different tests.
* If you are going to perform a sequential analysis and check after 50, 100, and 150 samples, you must also specify the p-values you’ll test against at those three points.

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| **Behavioral data:**  **Primary Analysis**  We will conduct our primary analysis in R using the glmmLasso package. We will fit a separate model for each affective state (stress\_binary, stress\_state, NA\_state, PA\_state). The models will include fixed effects for the affective state, all moderator variables (physiological states, cognitive states, and circumstances), and their two-way interactions with the affective state. The main effect of the affective state will not be subject to LASSO penalization, as this represents our primary predictor of interest. The LASSO regularization will be applied to all other coefficients to identify the most robust relationships, while the mixed-effects structure (random intercepts and slopes for the affective state by participant) will account for individual differences in both baseline alcohol choice and stress/affective reactivity.  To determine the optimal level of LASSO regularization, we will use 5-fold cross-validation at the participant level. Specifically:   1. Participants will be randomly assigned to five groups. 2. For each fold, a model will be fit on data from 80% of participants and tested on the remaining 20%. 3. This process will be repeated across a sequence of lambda values ranging from 100 to 0 in decrements of 5. 4. For each lambda value, we will calculate the mean squared prediction error across all five folds. 5. We will select the largest lambda value whose mean squared error is within one standard error of the minimum mean squared error.   We will fit the final model using this lambda value on the full dataset.  **Sensitivity Analyses**  To assess the robustness of our findings and examine potential limitations of our modeling assumptions, we will conduct several sensitivity analyses:   1. Dimension Reduction Approaches: We will re-run the mixed-effects LASSO using two different dimension reduction techniques:  * Principal Component Analysis (PCA), retaining components jointly explaining 80% of variance (maximum 5) * Uniform Manifold Approximation and Projection (UMAP), a non-linear dimension reduction technique.   These analyses will help us understand whether dimension reduction impacts our findings and whether non-linear dimension reduction captures different patterns in our data.  1. Non-linear Relationships: To examine whether our assumption of linear relationships is appropriate, we will implement two additional modeling approaches that can capture non-linear patterns:  * Random Forests * Decision Trees   These models will be implemented with raw variables, PCA components, and UMAP components, using the same 5-fold cross-validation structure at the participant level as our primary analysis.   While these models do not separate between- from within-participant variance like the mixed-effects LASSO approach does, they will allow us to assess whether important non-linear relationships exist that our primary analysis might miss.   We will compare the predictive performance (using RMSE on held-out test data) across all nine modeling approaches:  Primary Analysis:   * Mixed-effects LASSO with raw variables   Sensitivity Analyses - Dimension Reduction:   * Mixed-effects LASSO with PCA components * Mixed-effects LASSO with UMAP components   Sensitivity Analyses - Non-linear Models:   * Random Forest with raw variables * Random Forest with PCA components * Random Forest with UMAP components * Decision Tree with raw variables * Decision Tree with PCA components * Decision Tree with UMAP components   If non-linear models show substantially better predictive performance than our primary analysis, this suggests that important non-linear relationships exist in the data. In this case, we will examine variable importance measures and decision rules from these models to understand the nature of these non-linear relationships.  **Drift diffusion modeling:**  We are going to fit a drift diffusion model to the choice (between alcohol and non-alcoholic drink) and RT data from the 2AFC task data from each EMA assessment with the pyDDM library in Python. The model will include two adjustments/extensions to the standard DDM. First, we will multiply the drift rate by the value function (i.e., the difference in value of the presented alcohol and non-alcoholic drink stimulus based on the data from the image rating task). Second, we will add a scalar bias parameter to the drift rate which reflects whether participants’ decisions are generally biased towards alcoholic or non-alcoholic drinks.  The model depends on the following parameters:  Vi = the difference in value between the two stimuli presented in trial i, as estimated by the image rating task  β indicates parameters fit to the data.  The DDM is simulated as:  dx = μ(Vi) dt + βnoise dW  where W is a Weiner process. The diffusion process x(t) is terminated at the first value of t where |x(t)| > B.  The model is determined by specifying the values of μ and B.  μ(Vi)=Viβdrift + βbias, B=βbound  We will apply the same analysis pipeline (mixed-effects LASSO as primary analysis, with sensitivity analyses using different dimension reduction techniques and non-linear models) to predict each of the three drift diffusion model parameters estimated from each EMA assessment. These analyses will help us understand how stress and its interactions with physiological, cognitive, and situational factors influence different aspects of the decision-making process, as captured by the DDM parameters. |

### Transformations

If you plan on transforming, centering, recoding the data, or will require a coding scheme for categorical variables, please describe that process.

**Example**: The “Effect of sugar on brownie tastiness” does not require any additional transformations. However, if it were using a regression analysis and each level of sweet had been categorically described (e.g. not sweet, somewhat sweet, sweet, and very sweet), ‘sweet’ could be dummy coded with ‘not sweet’ as the reference category. If any categorical predictors are included in a regression, indicate how those variables will be coded (e.g. dummy coding, summation coding, etc.) and what the reference category will be.

**More information**: If any categorical predictors are included in a regression, indicate how those variables will be coded (e.g. dummy coding, summation coding, etc.) and what the reference category will be.

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| Prior to PCA/UMAP, categorical variables will be converted to dummy variables, and all variables will be standardized. |

### Inference criteria

What criteria will you use to make inferences? Please describe the information you’ll use (e.g. specify the p-values, Bayes factors, specific model fit indices), as well as cut-off criterion, where appropriate. Will you be using one or two tailed tests for each of your analyses? If you are comparing multiple conditions or testing multiple hypotheses, will you account for this?

**Example**: We will use the standard p<.05 criteria for determining if the ANOVA and the post hoc test suggest that the results are significantly different from those expected if the null hypothesis were correct. The post-hoc Tukey-Kramer test adjusts for multiple comparisons.

**More information:** P-values, confidence intervals, and effect sizes are standard means for making an inference, and any level is acceptable, though some criteria must be specified in this or previous fields. Bayesian analyses should specify a Bayes factor or a credible interval. If you are selecting models, then how will you determine the relative quality of each? In regards to multiple comparisons, this is a question with few “wrong” answers. In other words, transparency is more important than any specific method of controlling the false discovery rate or false error rate. One may state an intention to report all tests conducted or one may conduct a specific correction procedure; either strategy is acceptable.

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| To interpret the results in terms of practical significance, we define our smallest effect size of interest as a change in alcohol choice probability of +/- 2.5 percentage points. Effects who fall outside this region will be considered meaningfully different from zero. This criterion will be applied to both the main effect of affective states and interactions.  Given our theoretical interest in separating within- from between-participant variance, we prefer the mixed-effects LASSO as our primary model. However, we will consider alternative non-linear models to outperform our mixed-effects LASSO if they demonstrate superior predictive performance, defined as a reduction in out-of-sample RMSE of at least 10% compared to the mixed-effects LASSO. |

### Data exclusion

How will you determine what data or samples, if any, to exclude from your analyses? How will outliers be handled? Will you use any awareness check?

**Example**: We will verify that each subject answered each of the three tastiness indices. Outliers will be included in the analysis.

**More information**: Any rule for excluding a particular set of data is acceptable. One may describe rules for excluding a participant or for identifying outlier data.

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| We will exclude responses faster than 300ms from the 2AFC task.  We will fit the DDM to the raw 2AFC task data for each EMA assessment that has at least 120 valid trials. |

### Missing data

How will you deal with incomplete or missing data?

**Example**: If a subject does not complete any of the three indices of tastiness, that subject will not be included in the analysis.

**More information**: Any relevant explanation is acceptable. As a final reminder, remember that the final analysis must follow the specified plan, and deviations must be either strongly justified or included as a separate, exploratory analysis.

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| We will use missRanger to impute:  a) Missing survey responses from incomplete/missed EMAs  b) Missing DDM parameters from incomplete/missed EMAs  The imputation model will include all available variables (survey responses and successfully estimated DDM parameters).    Imputation will be performed once on the complete dataset before conducting any analyses.  This imputed dataset will then be used for all subsequent analyses including cross-validation. |

### Exploratory analysis

If you plan to explore your data to look for unspecified differences or relationships, you may include those plans here. If you list an exploratory test here, you are not obligated to report its results. But if you do report it you are obligated to describe it as an exploratory result.

**Example**: We expect that certain demographic traits may be related to taste preferences. Therefore, we will look for relationships between demographic variables (age, gender, income, and marital status) and the primary outcome measures of taste preferences.

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| We plan three sets of exploratory analyses, for which we will use a similar workflow as for the preregistered analyses:  1. We want to explore whether it is not the current affective state, but the *expected change in the affective state* that predicts alcohol choice behavior.  2. We want to explore whether it is not the current affective state, but the *perceived change in the affective state compared to the last EMA assessment* that predicts alcohol choice behavior.  3. We want to explore whether stable *individual differences* assessed at baseline instead of momentary states assessed at EMA moderate the relationships. |

# Other

### Other

If there is any additional information that you feel needs to be included in your preregistration, please enter it here. Literature cited, disclosures of any related work such as replications or work that uses the same data, or other context that will be helpful for future readers would be appropriate here.

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| N/A |

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