

Mood Induction in the Wild: Validation of a Brief and Mobile Negative Affect Induction for use in Acute Drug Effects Research



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Background

Current methods of measuring negative affect include surveys, clinical diagnoses, imaging and heart rate studies using functional magnetic resonance imaging or electrocardiograms. These methods require lengthy training and combined with surveys can be a burden to use in remote environments with cannabis users. The novel Rumination Induction Task (RIT) induces a rumination or a careful thought in the subject¹ with a focused breathing exercise, with focus on one primary sensation², to recover the subject to baseline levels. The task combines both subjective and objective measures to capture multiple aspects of a rumination induced negative affect.

Methods

This study is focused on the subject's 1st visit to the lab as part of a larger IRB approved study and future work will assess acute effects of cannabis.

- **Recruitment:** Flyers & Online ads
- **Eligibility:** Phone/online screening determined eligibility: Used cannabis at least once, Experience anxiety, No psychiatric diagnoses, Lives in Boulder-Denver area
- **Outcomes:**
 - Demographics (N=158, Age: 31.79±12.27, 61% F, 75% White)
 - Rumination Induction Task (RIT)
 - Self-Reported Feeling (SRF) scores (Current feeling, Visual analog scale (Figure 1))
 - Heart rate (HR) measurement (Pulse oximeter)
 - 3 Phases of assessment (Figure 1b)
 - Questionnaires
 - Depression, Anxiety and Stress Scales-21; Depression scores (D-DASS); Summation multiplied by 2
 - Cannabis Use History (Smoking frequency per month)
- **Statistics:** SPSS v25; Pearson's Correlations, Repeated Measures General Linear Models)

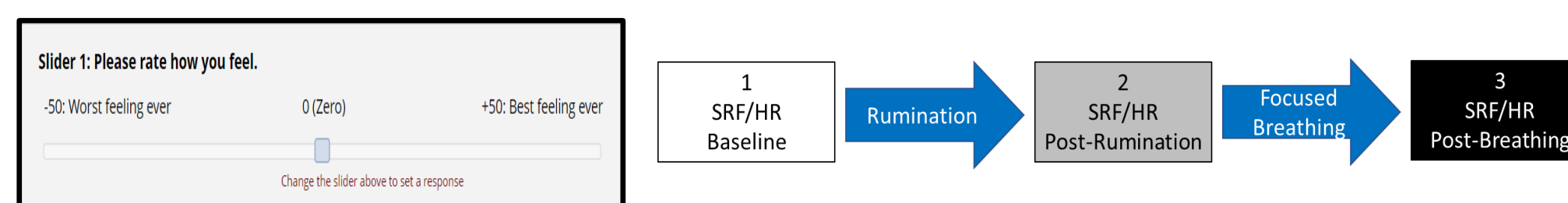


Fig.1a. Visual analog scale. **Fig. 1b.** Phases of RIT Task. Baseline (SRF1/HR1) completed prior to any knowledge of the RIT. Post-Rumination followed (researcher induced rumination), ended at peak of rumination or 3 minutes (SRF2/HR2). Post-Breathing was last (researcher guided focused breathing exercise), lasted 3 minutes (SRF3/HR3).

Results

Feeling scores decrease after rumination and increase after breathing

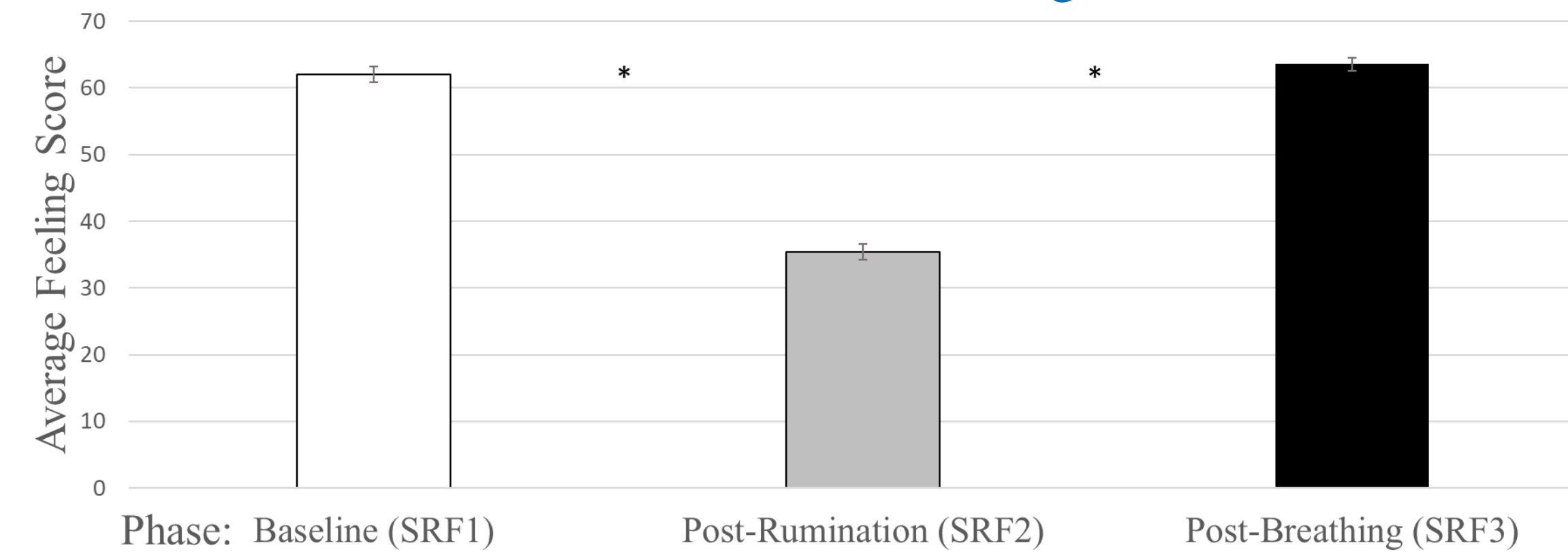


Figure 2. Average (± SEM) Self-Reported Feeling Scores of subjects' at Baseline, Post-Rumination, and Post-Breathing. SRF scores were translated from -50 to 50 to 0 to 100. *Denotes significant ($p < 0.05$) main effect of phase and post-hoc differences confirmed between phases.

Heart rate increases and stays elevated after rumination and breathing

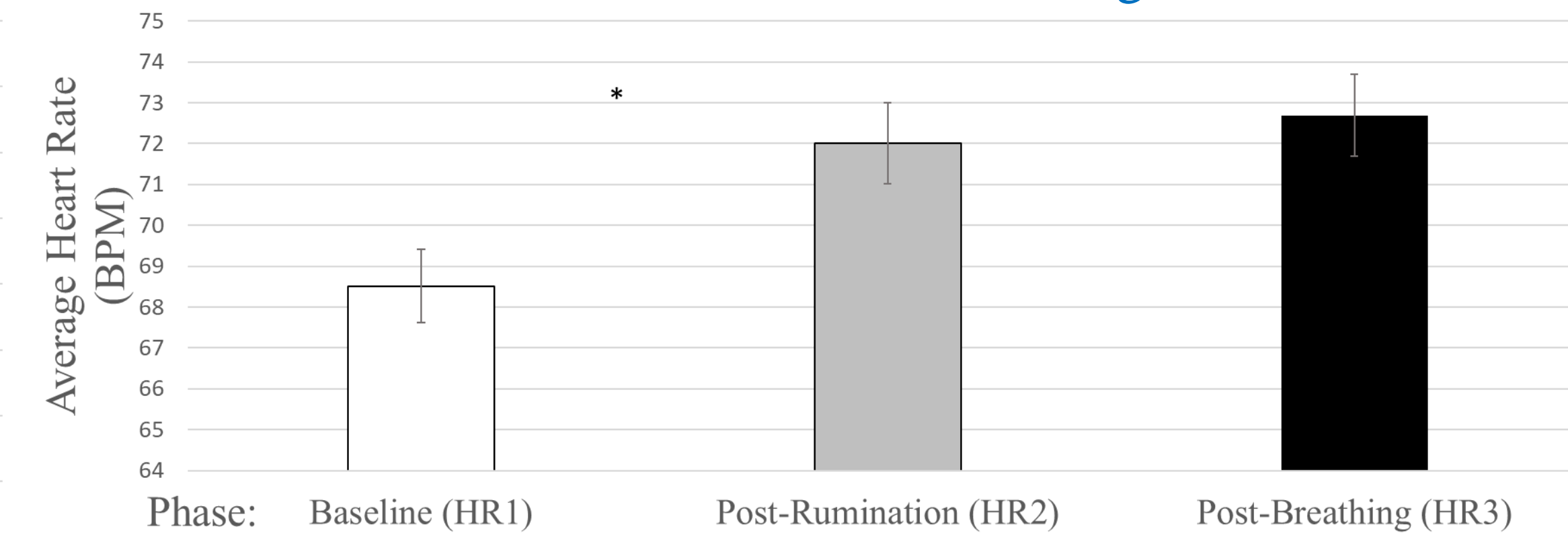


Figure 3. Average (±SEM) Heart rates at Baseline, Post-Rumination, and Post-Breathing. *Denotes significant ($p < 0.05$) main effect between phases and differences confirmed by post-hoc test.

Feelings change according to D-DASS group scores after rumination

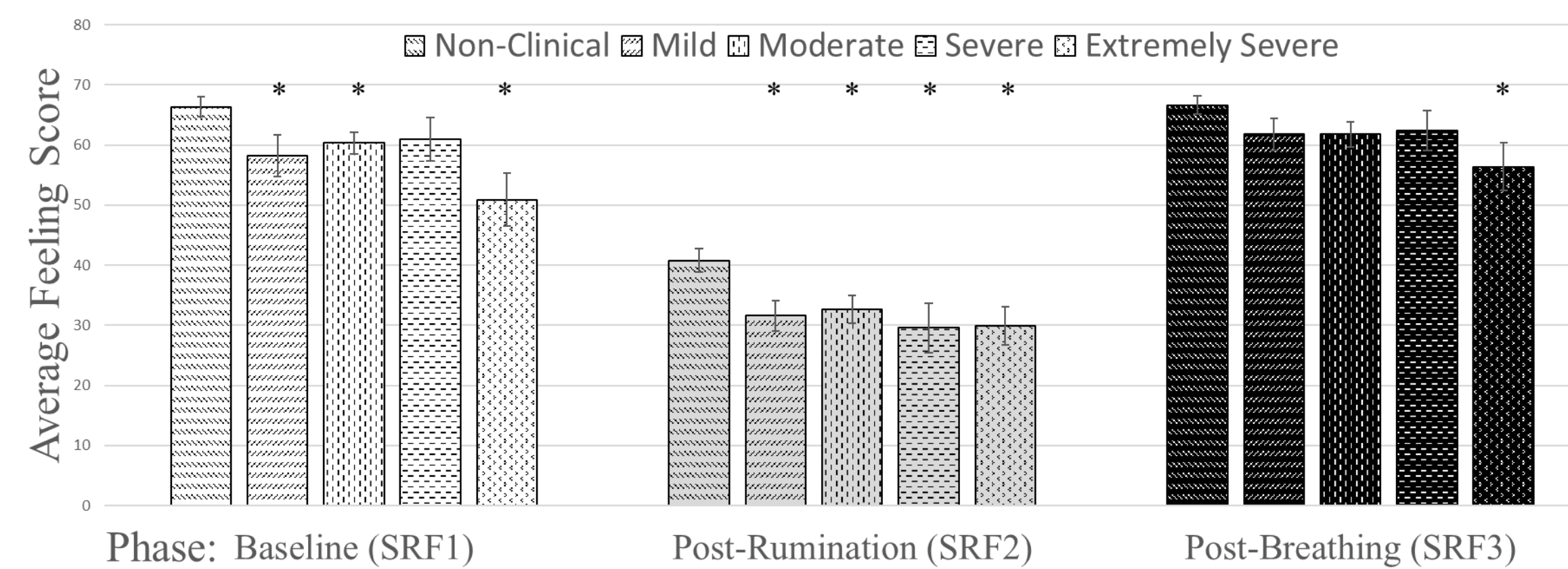


Figure 4. Average (± SEM) Self-Reported Feeling Scores at Baseline, Post-Rumination, and Post-Breathing by D-DASS groups. D-DASS groups: Non-Clinical (0-9), Mild (10-13), Moderate (14-20), Severe (21-27), Extremely Severe (28+). *Denotes significant ($p < 0.05$) main effect between groups and differences compared to Non-Clinical confirmed with post-hoc tests.

Similar cannabis smoking frequency between all D-DASS groups

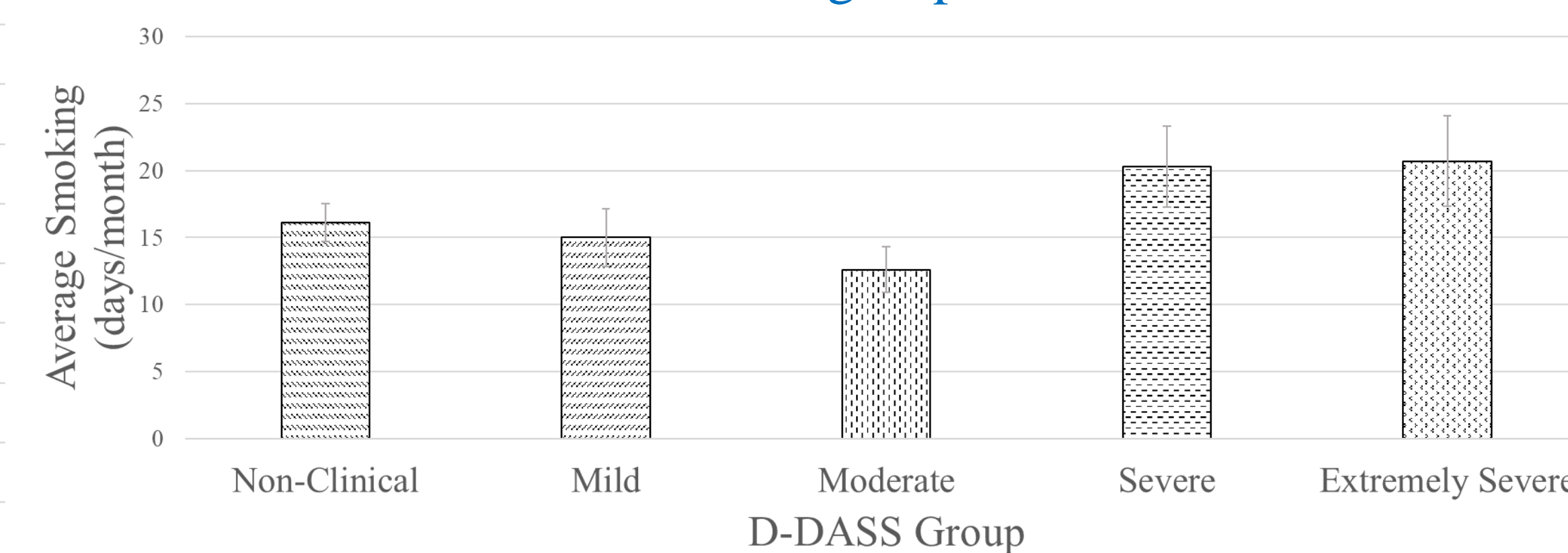


Figure 5. Average (± SEM) cannabis smoking frequency of subjects separated by D-DASS group. D-DASS groups based on D-DASS composite scores: Non-Clinical (0-9), Mild (10-13), Moderate (14-20), Severe (21-27), Extremely Severe (28+).

Conclusions

1. Self-Reported Feelings scores (objective measure) decrease from Baseline to Post-Rumination and increase from Post-Rumination to Post-Breathing, objectively indicating a successful subject rumination and then relaxation (back to Baseline levels) after the focused breathing exercise (Fig 2).
2. Heart rate (subjective measure) increased from Baseline to Post-Rumination and remained increased from Post-Rumination to Post-Breathing, again indicating successful rumination but no return to Baseline levels in the time allotted (Fig 3).
3. Self-Reported Feeling Scores in the D-DASS Non-Clinical group were higher than other D-DASS groups after rumination, appearing to have less of an effect on subject's classified with non-clinical amounts of depression compared to subjects classified with greater depression levels (Fig 4).
4. All D-DASS groups smoked similar amounts of cannabis, potentially self-medicating similarly by depression levels (Fig 5).
5. The rumination induction task appears to be a valid measure and will be analyzed in its efficiency in measuring negative affect in a mobile setting with cannabis use.