

March 2023

## Planning to Behave Impulsively to Feel Better: An EMA Study of College Students' Nonsuicidal Self-Injury, Binge Eating, and Exercise Behaviors

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Planning to Behave Impulsively to Feel Better: An EMA Study of College Students' Nonsuicidal  
Self-Injury, Binge Eating, and Exercise Behaviors

by

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A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
Department of Psychology  
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Date of Approval:  
May 31, 2022

Keywords: Impulsivity, deliberate self-harm, ambulatory assessment, affect, disordered eating

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## **DEDICATION**

To Frankie, who always makes me feel better, and who I may never have known but for my own impulsive behavior

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## ABSTRACT

Extensive research has demonstrated associations between impulsivity and maladaptive behaviors such as nonsuicidal self-injury and binge eating. Little attention has been paid to the planning that may occur prior to engagement in these behaviors, or to the role the planning might play in allowing individuals to regulate their emotions when they are not immediately able to engage in their chosen behaviors. Including another behavior that is typically considered to be non-impulsive (i.e., physical exercise) as a comparison, we sought to test the hypothesis that planning may serve an affect regulatory role for individuals who engage in so-called “impulsive” behaviors. We also sought to compare trait measures of impulsivity to indices of planning and impulsive behavior engagement. In a sample of undergraduate students, we conducted a two-phase study that included a baseline self-report measure and one week of repeated assessments (EMA) sent to participants’ cellphones inquiring about planning, behavior, and negative and positive affect. Results supported the hypothesis that planning exists in the context of these behaviors, and that it may reduce negative affect in cases of self-harm and binge-eating, and increase positive affect in the case of physical activity. Implications and directions for future investigations are discussed.

Keywords: *Impulsivity, affect, deliberate self-harm, ambulatory assessment, disordered eating*



## CHAPTER ONE: INTRODUCTION

Impulsivity is a multi-faceted construct that encompasses behaviors and traits related to difficulty inhibiting or delaying certain automatic responses, and/or acting without adequate forethought (Hollander & Rosen, 2000; Hollander & Evers, 2001; Stahl et al., 2014). Many scholars regard impulsivity as trait underlying several sensation-seeking and risk-taking behaviors, as well as extreme difficulty in the arenas of planning, follow-through, and focus on relevant tasks (Berg, Latzman, Bliwise, & Lilienfeld, 2015; Whiteside & Lynam, 2001). Impulsivity is often implicated as a maintenance factor underlying common psychiatric disorders, including alcohol- and substance-use disorders, borderline personality disorder, narcissistic personality disorder, bulimia nervosa, and binge eating disorder (Beauchikie & Nehuas, 2008; Carver & Johnson, 2018; Coskunpinar, Dir, & Cyders, 2013; Nigg, 2017; Vazire & Funder, 2008). While NSSI and binge eating are often associated with high levels of impulsivity, premeditation, or planning (e.g., procurement of highly palatable food for binges, locating private spaces in which to use illegal drugs, access to tools necessary for self-harm, etc.) may also be required to carry out such behaviors. Despite the potential relevance of deliberation to self-destructive behaviors, to our knowledge, planning mechanisms have not been studied.

Difficulty regulating emotions is a core feature associated with many of the psychological diagnoses in which impulsivity is also implicated, such as Cluster B personality disorders, alcohol and substance-use disorders, posttraumatic stress disorder, and various feeding and eating disorders (Chapman, Leung, & Lynch, 2008; Garofalo et al., 2018; Glenn & Klonsky, 2009; Velotti et al., 2016). Evidence suggests that emotion dysregulation and impulsivity are

closely linked both because they frequently co-occur, and because “failing” to choose more adaptive emotion regulation strategies might be more common among individuals who react impulsively, perhaps because of a lack of time spent choosing a behavioral response (i.e., inhibitory control) or because of a tendency to seek out more extreme experiences (i.e., sensation seeking; Kopetz, Woerner, & Briskin, 2018; Schreiber, Grant, & Odlaug, 2012; Weiss, Tull, Viana, Anestis, & Gratz, 2012).

Given the link between impulsivity and a tendency to feel emotionally dysregulated, might people who plan their behaviors (i.e., are less impulsive), in turn, demonstrate more sophisticated emotion regulations skills? Might the act of planning itself help people to regulate their emotions? One relevant example of potential linkage may be found in the planning of suicidal acts. For instance, research has demonstrated that planning to die by suicide may serve as a kind of mental “escape hatch” to help certain individuals cope ahead during times of distress or discomfort (Chapman, Gratz, & Brown, 2006; Klonsky & May, 2014). Negative reinforcement of unpleasant emotions and cognitions likely plays a role in this “escape” impact of planning suicidal acts (Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Victor, Glenn, & Klonsky, 2012). In other words, considering behaviors that cause harm to the self, for individuals who regularly feel relief when doing so, may alleviate some of the pressure of an individuals’ aversive mental state, thereby helping them to downregulate unpleasant emotions. In this vein, this study sought to test whether similar patterns were seen across other, related behaviors.

In the case of planning, substantial literature has examined the intricacies of behavior planning, and specifically the “intention-behavior gap” which occurs when individuals plan, and subsequently fail to carry out a behavior (Allan, Sniechotta, & Johnston, 2013; Sheeran & Webb,

2016). Among the varied definitions of planning, much of the literature points to two components: intentions (i.e., wanting to do something), action planning (i.e., drawing out the steps to do something). Here, we propose that planning is primarily comprised of both the cognitive anticipation (i.e., prolonged thinking about of an event), and the behavioral facilitation (i.e., taking action to prepare for engagement in an event) of any given outcome. We use this definition of planning when inquiring about college students' intentions to engage in three specific kinds of coping behaviors, one considered more adaptive (exercise) and the other two less-so (nonsuicidal self-injury and binge eating).

### **Nonsuicidal Self-Injury**

*Nonsuicidal self-injury* (NSSI) involves deliberately engaging in physical self-harm behaviors without the express intent of committing suicide (Nock, 2009; Prinstein, 2008). Commonly enacted by individuals with emotion regulation difficulties, NSSI is increasingly prevalent within both clinical and non-clinical populations, particularly among adolescents and young adults (Bentley, Cassiello-Robbins, Vittorio, Sauer-Zavala, & Barlow, 2015; Jacobsen & Gould, 2007; McManus et al., 2019; Muehlenkamp, Claes, Havertape, & Plener, 2012). By some estimates, between 7 and 10 percent of young adults engage in NSSI during the first two years of college, and estimates suggest the prevalence of NSSI among college students has risen in the past decade (Kiekens et al., 2019, Kiekens et al., 2021). Even in the absence of expressed suicidal intent, self-harming behaviors are dangerous. In addition to increasing the risk of serious injury, repeated engagement in NSSI may result in the increased capability for suicide over time (Asarnow et al., 2011; Van Orden, Witte, Gordon, Bender, & Joiner, 2008). Indeed, around five percent of self-harmers will die by suicide 9 years after first engaging in NSSI (Klonsky, 2009; Owens, Horrocks, & House, 2002).

Given the rising rates of NSSI and its relevance to the health of college students and young adults, understanding factors that serve to maintain engagement in these behaviors is of the utmost importance. Indeed, there have been efforts within the field to codify NSSI more robustly, including recent suggestions to include NSSI as its own disorder within the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). It is notable that the conditions identified within the DSM as closely associated with NSSI are those marked by high levels of impulsivity (BPD).

Planning is also regarded as an important feature of suicidal behaviors (Han, Compton, Gfroerer, & McKeon, 2015; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). Substantial research has implicated planning to commit suicide as a major predictor of both the lethality and the frequency of actual suicide attempts. Ample evidence suggests that a major risk factor for successful suicide attempts is the accessibility and specificity of a plan (Kessler, Borges, & Walters, 1999; Ren et al., 2019). Planning has been shown to impact these factors above and beyond the effects of suicidal desire or hopelessness (Chaudhury et al., 2016; Joiner, Rudd, & Rajab, 1997). Indeed, the development of specific plans plays a key role in determining the severity of suicide attempts, possibly by increasing fearlessness of death and acquired capability of individuals to carry out death by suicide (Joiner et al., 2003; May & Victor, 2018; Pérez, Ros, Folgado, & Marco, 2019). Given the plethora of research into suicide planning, the neglect of planning in the study of NSSI is striking.

### **Binge Eating**

Apart from suicide, researchers have begun to examine planning with regards to other maladaptive behaviors that share key characteristics with NSSI. For instance, early evidence supports a planning process for the bingeing and purging behaviors seen in eating disorders.

(Lydecker et al., 2019; Pearson et al., 2016). Evidence indicates that planning within these disorders might serve an emotion regulatory role, in helping to function as a kind of mental “escape hatch” to help individuals cope ahead during times of distress or discomfort (Manasse et al., 2019). For instance, research has demonstrated a link between negative urgency and binge eating, such that individuals who binge eat are more likely to demonstrate difficulties with inhibiting behaviors in times of acute distress (Fischer, Wonderlich, Breithaupt, Byrne, & Engel, 2018). A recent study examining planning among individuals with binge eating disorder, bulimia nervosa, and related eating disorders found that 33.7% of individuals had planned a binge episode in the month prior to the study (Parker et al., 2022). The authors also found that individuals who planned binges were more likely to believe that binge eating (i.e., binge “expectancies”) would reduce feelings of negative affect and boredom than their non-planning counterparts.

Manassee and colleagues (2019) examined the extent to which individuals with binge-related EDs planned their food binges in advance. Results indicated that over a quarter of participants (N = 111) reported planning their binges in advance, such that they endorsed both cognitively anticipating and behaviorally facilitating the behavior beforehand. Additionally, over half of participants reported that they either anticipated or facilitated the behavior at least some of the time, suggesting that bingeing behaviors, usually regarded as impulsive, were more likely to be planned.

The idea that planning might precede NSSI, eating binges, or other so-called “impulsive” behaviors is relatively new. Historically, the conventional wisdom regarding many of these behaviors is that impulsivity, along with a general tendency towards emotion dysregulation and inability to effectively manage one’s own mood and behavioral states underlie engagement in

maladaptive behaviors (Anestis, Selby, & Joiner, 2007; Claes et al., 2013; Hamza, Willoughby, & Heffer, 2015; Lockwood, Daley, Townsend, & Sayal, 2007).

### **Physical Activity**

Much research has demonstrated the emotion regulation functions of self-directed physical activity among non-clinical populations (Bernstein & McNally, 2017; Giles et al., 2018; Goldin, Ziv, Jazaieri, Hahn, & Gross, 2013). Research has also demonstrated the importance of planning to exercise on people's eventual completion of exercise behaviors (Conner, Sandberg, & Norman, 2010; Martin Ginis & 2010). A recent study of addictive behavior patterns found that impulsivity was associated with behaviors like binge eating and substance use, but not with compulsive exercise patterns (Forsén Mantilla, Clinton, Monell Levallius, & Birgegård, 2022). Given the high frequency of exercise among college-aged individuals, the evidence that exercise can help with emotion regulation, and that it is generally not correlated with impulsivity, we chose physical activity as a comparison behavior against which to measure the emotion regulatory effects of BE and NSSI.

To our knowledge, no research has been done on the mood-enhancing effects of planning to exercise. Since this study aimed to highlight the ability of planning of maladaptive behaviors to alleviate negative affect, we chose to include a more psychologically adaptive behavior for use as a comparison. Since exercise is generally regarded as a non-impulsive activity, we decided it would make the most sense to hypothesize that the affect regulation impact of exercise would be divorced from the planning of exercise. As such, physical activity was included in the study design to facilitate testing of the hypothesis that planning may serve an emotion regulatory function for so-called "impulsive" emotion regulation behaviors, like binge eating and NSSI, but not for non-impulsive behaviors like exercise.

## **Ecological Momentary Assessment**

Ecological momentary assessment (EMA) is a measurement strategy used in research to collect frequent, repeated measurements of data from participants across time in various naturalistic contexts (Shiffman, Stone, & Hufford, 2008). EMA allows for measurement of granular data, such as short-lived emotions, behaviors that might otherwise be lost in retrospective measurements that relies on memory recall. In recent years, researchers have begun to investigate a range of self-harming behaviors using EMA. Arney and colleagues (2015) outlined several of the benefits of using EMA to study depression-related phenomenon. In addition to allowing researchers to track the transient affect states that often comprise depressive disorders, EMA also allows researchers to gain insight into behavioral patterns in which individuals with depression might engage. A 2018 systematic review of 23 studies by Rodriguez-Blanco and colleagues detailed the utility of EMA in researching NSSI specifically. The authors asserted that EMA methods are useful for elucidating the unique emotional antecedents and consequences of NSSI episodes, as well as the contexts within which NSSI most frequently occurs. Given that the present study aims to understand the affective patterns of individuals in the time proceeding planned and unplanned behaviors, EMA was selected as the most appropriate data collection method to gain insight into the changes in affect that may occur before, in between, and after the planning and execution of certain behaviors.

## CHAPTER TWO: CURRENT STUDY

The primary goal of the current study is to test the hypothesis that certain coping behaviors may exist in two distinct forms: *planned* and *unplanned*, and that planning itself may serve an emotion regulatory function above and beyond the impact of the actual coping behavior. In addition to the aim of classifying different types of NSSI and binge eating behaviors (i.e., planned vs. unplanned) this study also sought to identify the emotional, behavioral, and environmental antecedents of these behaviors, both those related to personality dimensions and those related to real-time emotional processing. We used EMA to investigate everyday fluctuations in affect, cognitions and behaviors of college students report who a recent (prior 2-week) history of self-harm, binge eating, or physical exercise.

Therefore, as indicated in hypotheses 2 and 3, we predicted that affect regulation patterns that occurred for BE and NSSI groups would look different among individuals whose primary behavior was exercise, such that planning of exercise would not serve to help individuals regulate their emotions in the same way that planning of maladaptive behaviors would. We suggest that comparing the two maladaptive behaviors to the more adaptive behavior of exercise would allow for investigation into the different roles that planning might play for individuals who engage in impulsive versus “non-impulsive” behavior. Finally, the study attempted provide ecologically valid assessments of individuals’ real-time rationale for planning or engaging in any one of these behaviors, in addition to procuring information about what impact, if any, such activities have on individuals’ mood states. To our knowledge, this is the first study of its kind to make such an inquiry.



### **Aim 1: Identify Planned and Unplanned Behavioral Episodes**

To determine whether planning might play a role in helping people to regulate their affect states, this study first aimed to establish that maladaptive behaviors can be planned. In other words, we hypothesized that maladaptive behaviors, particularly binge-eating and NSSI, may not always be impulsive. Drawing on preliminary research by Manasse and colleagues (2019), we employ a measure of planning that focuses on two key psychological components of the planning process: preparatory thoughts and preparatory actions.

Hypothesis 1. Individuals will vary in their endorsement of planning. Some instances of behavior will occur after the participant had endorsed “yes” to planning of their behavior in the preceding EMA prompt. Other instances of the behaviors will occur with individuals having responded “no” to planning in the preceding EMA prompt. Using the findings from the previous studies of binge planning as guides, (Manasse et al., 2019; Paker et al., 2022), we hypothesized that at least one-third of individuals would endorse planning prior to NSSI or BE behaviors.

### **Aim 2: Examine the Impact of Planning on Affect**

This study seeks to add to the literature that has measured the affective states of individual both before and after engagement in these coping behaviors (Klonsky, 2009; Nock, 2009; Nock & Prinstein, 2004). We expect to find similar patterns of fluctuations of negative and positive affect to previous studies, for instance that negative affect peaks prior to NSSI and binge-eating, and decreases following NSSI (the evidence regarding NA and binge eating is mixed; (Berg et al., 2015; Berg et al., 2017; Bodell et al., 2019; Selby, Franklin, Carson-Wong, & Rizvi, 2013). However, because this study will include the added measurement of planning, we expect a more complex pattern of affect fluctuations to emerge. For instance, we propose that planning itself, and not only the presence of NSSI or BE, will serve an emotion regulatory role,

primarily because it will help individuals to negatively reinforce their unpleasant mood states. As such, we expect to see a shallower drop in NA after either NSSI or BE for individuals who also report planning. Similarly, we expect a steeper decline in NA following NSSI or BE for when individuals do not endorse having planned these episodes. Using EMA to gather multiple data points of both positive and negative affect will help to bolster our findings regarding planned and unplanned episodes and will allow us to draw more informed conclusions about the emotional contexts within in which individuals engage in planned versus unplanned coping behaviors.

Hypothesis 2. Instances of NSSI or BE that were not preceded by planning will co-occur with a greater decrease in negative affect and a greater increase in positive affect than instances of NSSI or BE that were immediately preceded by planning. The latter instances, since they were planned, will co-occur with a decrease in negative affect and an increase in positive affect of lesser magnitude than the unplanned instances. In essence, we hypothesized that planning provides faster relief from negative affect than would be provided by the behaviors in the absence of planning. Concurrently, we hypothesized that affect patterns will not differ between planned and unplanned episodes of physical activity. Figure 1 provides an illustration of the expected affective differences between planned and unplanned BE and NSSI behaviors.

### Aim 3: Assess Trait Impulsivity and Unplanned Behaviors

Finally, this study also measured the more stable, global aspects of psychopathology that might present in college students who rely on maladaptive emotion regulation behaviors. We aim to provide a more robust psychological profile of individuals who engage in unplanned behaviors by comparing indices of these events to more stable, trait-based measures of impulsivity.

Hypothesis 3. Individuals within any of the three subgroups who reported planning prior to engagement in the target behavior will have lower impulsivity scores (as measured by the *UPPS-P--P*) and lower difficulty with emotion regulation scores (as measured by the *DEERS*)

Figure 1: Expected Variations in Affect for BE and NSSI

than individuals who did not report any instances of planning.

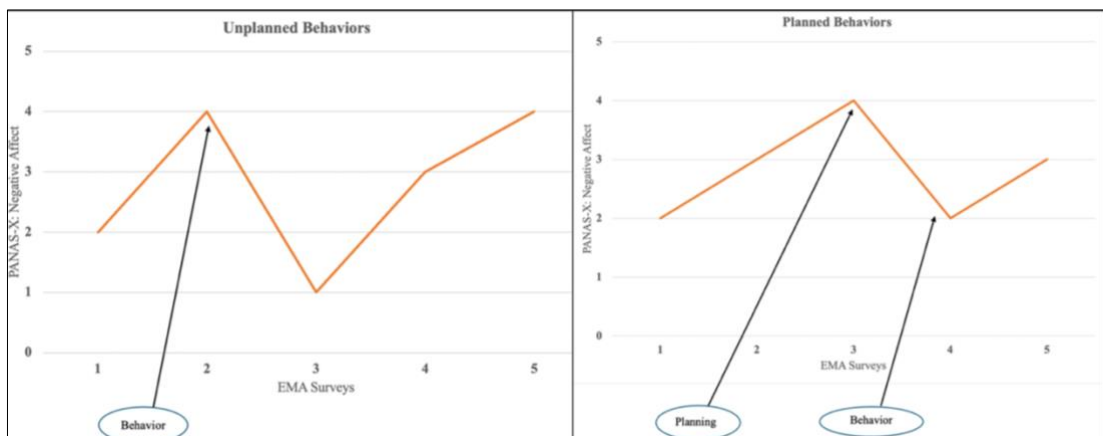


Figure 1: Expected Variations in Affect for BE and NSSI

## CHAPTER THREE: METHODS

### Participants

Participants were recruited using flyers, social media advertisements (Reddit, Facebook Groups) and the University of South Florida psychology research pool. The first round of screening was based on participants' answers to the first 3 questions in the survey: "During the past two weeks, you have engaged in any [deliberate self-harm behaviors without the intention to die/binge eating behaviors/voluntary physical exercise behaviors?]" For each of these three behaviors, additional language was included after the question to ensure a shared definition of the behavior was being referenced. See Appendix B for the specific language used.

If participants responded "no" to all three of these questions, they were subsequently exited from the survey and thanked for their time. If participants responded to "yes" to one or more of these questions, they were provided the consent agreement and were then directed to complete the rest of the baseline surveys.

Immediately following successful completion of the baseline measures, participants were directed to a sign-up link where they were encouraged to schedule a meeting with the study investigator to onboard them for the second part of the study. Participants who did not schedule this meeting were followed up with via email twice, and later removed from the study if they declined to schedule a follow-up call.

Fifty-one participants ages 18-29 completed an onboarding call with the principal investigator. Of these, 11 participants had responded "yes" to more than one of the behavioral screening questions (1 to both BE and NSSI, 10 to both BE and PA). During the onboarding call,

these participants were encouraged to identify which one of these behaviors was most salient to them (i.e., “which one would you be more likely to think about over the course of a given day?”) and they were placed into that group. In the cases where participants were unable to identify a primary behavior (5 of the participants who identified both BE and PA), participants were compensated for their participation in part 1 of the study, thanked for their time, and removed from the study.

At the end of recruitment, 48 participants had been onboarded to the study, with 15 in the PA group, 17 in the BE group, and 16 in the NSSI group. Using Kleinman’s (2018) power curves for multilevel studies, we estimated that 7 days of data collection, with a total of 10 surveys per day would optimize study power without placing an undue burden on participants. Although the minimum number of within group participants ( $n = 15$ ) revealed a power estimation suggesting a modestly powered study ( $\beta = .5$ , Cohen’s  $d = .8$ ), calculations that considered the overall sample size across groups suggested a sufficiently powered ( $\beta = .9$ , Cohen’s  $d = .8$ ) study design. Prior research on the use of various estimation techniques to model multi-level data suggested that an  $n$  as low as 10 would be sufficient to test the effects seen in this data using restricted maximum likelihood estimation such as those used in the present analyses (Austin, 2010; Hoyle & Gottfredson, 2015; Maas & Hox, 2005). See the data analytic strategy for further explanation.

## **Materials**

**Impulsivity.** Impulsivity was assessed using the *UPPS-P Impulsive Behavior Scale*, a 45-item self-report questionnaire that loads onto four distinct factors: urgency, sensation seeking, (lack of) premeditation, and (lack of) perseverance (Whiteside & Lynam, 2001). Reliability analyses in the current study yielded good internal consistency for the negative urgency ( $\alpha =$

.82), positive urgency ( $\alpha = .86$ ), sensation seeking ( $\alpha = .89$ ) and lack of perseverance ( $\alpha = .84$ ) scales. The lack of premeditation scale had acceptable internal consistency ( $\alpha = .79$ ).

**Emotion Regulation.** The *Difficulties in Emotion Regulation Scale (DERS*, Gratz & Roemer, 2004) is a 36-item measure used to assess challenges related to emotion regulation. The DERS is comprised of 6 factors: non-acceptance of emotions, difficulty engaging in goal-directed behavior, impulse control difficulties, limited access to emotion regulation strategies, and lack of emotional clarity. Reliability analyses demonstrated that the emotion regulation goals subscale had high internal consistency ( $\alpha = .92$ ). Analyses found good internal consistency for the nonacceptance of emotions ( $\alpha = .88$ ), lack of emotional awareness ( $\alpha = .88$ ), and lack of emotional regulation skills ( $\alpha = .88$ ) scales. Internal consistency for the impulse control difficulties scale was in the acceptable range ( $\alpha = .77$ ). The lack of emotional clarity scale, in contrast, demonstrated poor internal consistency ( $\alpha = .47$ ) in the present sample.

**Functions of Nonsuicidal self-injury.** NSSI was assessed using the *Inventory of Statements About Self-Injury (ISAS*; Klonsky & Glenn, 2009). The *ISAS* is a well-validated self-report measure that assesses the frequency, duration, methods, and functions of specific NSSI behaviors. The *ISAS* is comprised of two subscales: the first gathers information regarding types and duration (both lifetime and episodic) of NSSI behaviors (e.g., “Please indicate if you have a main form of self-harm”, “at what age did you first harm yourself,” etc.). The second subscale asks respondents to respond to a series of statements about the functions of their behaviors using the prompt “When I self-harm, I am...” Response statements include sentiments such as “calming myself down,” and “punishing myself.” Reliability analyses for the present study indicated good internal consistency for the *ISAS* scale ( $\alpha = .84$ ).

**Functions of Binge Eating.** Binge eating was assessed using an adapted version of the *Inventory of Statements About Self-Injury (ISAS)*; Klonsky & Glenn, 2009) with item wording altered to pertain to binge eating rather than self-harming behaviors. For the first section of the ISAS, this included changing response options from specific self-harm behaviors such as “cutting” and “burning” to specific binge-eating behaviors such as “eating until I feel sick” and “eating so much food that I feel physically sick”. For the second portion of this scale, the response options were the same, but the prompting statement was changed to “When I binge eat, I am...” Reliability analyses for the present study indicated acceptable internal consistency for the *functions of binge eating* scale ( $\alpha = .77$ ).

**Functions of Physical Activity.** Physical activity was assessed using an adapted version of the *Inventory of Statements About Self-Injury (ISAS)*; Klonsky & Glenn, 2009) with the wording altered to pertain to exercise behaviors rather than self-harm. For the first section of the ISAS, this included changing response options from specific self-harm behaviors such as “cutting” and “burning” to specific physical activities such as “going to the gym” and “following a workout video”. For the second portion of this scale, the response options were the same, but the prompting statement was changed to “When I exercise, I am...” Reliability analyses for the present study indicated very good internal consistency for the *functions of physical activity* scale ( $\alpha = .94$ ).

**Planning.** An adapted version of Manasse and colleagues (2019) questionnaire was used to examine two key aspects of planning: anticipation and facilitation. Item wording did not require modification for the BE group, but language was altered to use examples that were relevant for the NSSI and PA groups. This survey assessed the degree to which respondents endorse cognitive anticipation of behaviors (e.g., daydreaming about foods they would eat;

thinking about where on their body they might inflict harm, considering what kind of fitness activity they might perform) and the extent to which respondents reported behaviorally facilitating future episodes of their indicated coping behavior (e.g., obtaining weapons or materials, buying food, selecting clothes to wear when exercising).

**NSSI /Binge Eating/ Physical Activity in Everyday Life.** At each EMA prompt, respondents were presented between 1 and 4 brief questions regarding their behavior, depending on their previous answers. For instance, if respondents indicated “no” to the question about actual behavioral engagement, “Since the last prompt, did you [self-harm/binge eat/ exercise]?” they were skipped to the next relevant question. If the participant responded, ‘yes’ to the behavior question, they were asked to identify which specific types of behavior they engaged in used in a ‘check all that apply’ (e.g., *cutting, severe scratching, eating so much I felt sick or uncomfortable, yoga*). Next, respondents were asked, “Since the most recent prompt, have you planned to engage in any [self-harm/binge eating/ exercise] behaviors?” If respondents answered “yes” to the planning question, they were asked to identify which specific types of planning they had used in a ‘check all that apply’ format (e.g., “*choosing where on my body I would self-harm, deciding what foods I would eat, signing up for an exercise class*”). For both behavior and planning questions, participants were asked to indicate details the length of time they spent doing said activity (e.g., “*less than 5 seconds*” “*less than one minute*” “*between 1 and 5 minutes, more than 2 hours*”). See Appendix B for the exact surveys used.

**Affect in everyday life.** *PANAS-X. The Positive and Negative Affect Schedule- Expanded Form (PANAS-X; Watson, Clark, & Tellegen, 1998)* was used to assess participants’ affect states in the EMA assessment. This form included two 5-item scales (measuring positive and negative



affect, respectively) Reliability analyses indicated good internal consistency for both the positive ( $\alpha = .84$ ) and negative affect ( $\alpha = .89$ ) subscales.

## **Procedure**

Immediately following completion of the baseline survey, participants were directed to an online scheduler (i.e., the Calend.ly web application) where they were prompted to sign up for a 15-minute virtual meeting with the primary investigator. This meeting served as an onboarding process to familiarize participants with the EMA portion of the study, gather relevant information (e.g., cell-phone number or email address, preferred window of time for survey prompts) and to re-establish consent for participation in the EMA part of the study. This meeting was also used to guide participants through a practice EMA prompt, to ensure their understanding of and comfort with the questions. The experimenter took care to review the terminology used in the surveys with participants to ensure mutual understanding. For the purposes of this study, “planning” included any deliberate thought process such as daydreaming or fantasizing about a behavior, in addition to behavioral actions such as clearing one’s schedule or purchasing or setting aside supplies for a given behavior. Examples of planning were reviewed by way of brief talking points expressed verbally to all participants.

Signal-contingent sampling was used to collect real-time responses from participants over 7 consecutive days. Signal-contingent sampling denotes those assessments were provided to respondents at varied times throughout the day, delivered randomly within roughly-equally spaced time intervals (Wheeler & Reis, 1991). Assessments were recorded on participants’ personal smartphones using the text-alert or email function of the online survey software *Qualtrics*. Whether respondents received text or email surveys was dependent both on participant

preference and compatibility of their wireless service provider. The automatized email function of *Qualtrics* was used for participants whose cell-phone providers did not allow for automated mms-messaging. When this was the case, extra care was taken to ensure participants had push notifications turned “on” so that surveys would not be missed. Participants were prompted 10 times daily within a 12-hour period of their choosing, with assessments starting no more than one hour after participants’ self-reported wake time. During the EMA portion of the study, participants were compensated \$.60 for each survey completed, for a possible total of \$42 for 7 days of participation, in addition to \$3 for the baseline survey, and a possible \$5 bonus for completing 63 or more EMA surveys (90% or more), for a maximum possible total of up to \$50. Participants who completed the study through the university’s research pool were compensated 2 research points for the baseline survey, and up to 6 points for the EMA surveys (14 EMA surveys = 1 point), plus a bonus point for completion above 90 percent, for a maximum possible total of up to 8 research credits.

### **Data Handling and Manipulation**

*IBM SPSS Statistics*, version 28.0.1, was used for data cleaning and descriptive analyses of baseline data. *SAS OnDemand* software, version 9.4, was used for all other data manipulation and analyses. Several EMA studies on related topics were used as points of comparison to assess what time frame would be appropriate for these analyses. In the present study, timepoints were roughly spaced between 1.5 and 2 hours apart, meaning that t2 represents about 90-120 minutes after t1, and t3 represents roughly 180 – 240 minutes (3 – 4 hours) after t1. Research by Kleiman and colleagues (2017) assessing suicidality via EMA assessed participants’ suicidal ideation and related phenomena using a 4-hour time window, which is comparable to between t2 and t3 of the

present study. Other research also used a 4-hour window of time to identify behavioral episodes (Armev et al., 2011, Fox et al., 2019).

As such, to both maximize the ability of the present analyses to identify meaningful behavioral episodes among participants and to detect important associations between planning, affect, and subsequent behaviors, the decision was made to compare behavioral indices at t1, t1 and t3 to prior planning and affect data points. This framing of the data structure allows for a sufficiently robust interpretation of the impact planning and affect may have on downstream behavioral outcomes. Nested data were tested for random intercepts and slopes (where appropriate).

Aim 1. Consistent with previous literature examining binary variables within EMA data for both within- and between-subjects effects, the presence of planning prior to behavioral episodes was assessed with mixed-effects logistic regression (with maximum likelihood estimation methods) modeling using the online SAS PROC NLMIXED software package (Hedeker, Demirtas, & Mermelstein, 2009; Maher, Rebar, & Dunton, 2018). Using the PROC print function, instances of planning were examined within subjects, providing in descriptive results for how many planning occurrences each participant reported, in addition to how many of these planning incidents were later followed by behavior (up to the t+3 cut point). Planning was also assessed between subjects and stratified by group, allowing for assessment of planning that varied by group. See table 1 for a breakdown of planning and behavioral instances by subject.

PROC Print was also used to examine data about participants self-reported types of planning, from cognitive experiences like daydreaming about the behavior to actions like setting aside time during the day for the behavior to occur. Visualization and considering specific types of behavior were the two most frequently selected types of planning for all three groups. For a

more detailed breakdown of the kinds of planning endorsed by participants across groups, and about the length of time participants spend planning see Tables 4 and 5, respectively.

To test whether planning at a given timepoint was correlated with behavior at a later timepoint (lagged, at  $t+1$ ,  $t+2$ , and  $t+3$ ), we first set parameters within the dataset to instruct SAS to identify behavior as a lagged variable, where it would be compared to the planning variable in the corresponding timepoint preceding it. To ensure the analyses were in line with our proposed model, we did not compare variables across days of the data collection period. Therefore, any lagged variable was only compared to the appropriate timepoint preceding it if it occurred on the same calendar day. Since our predictions were related to affect regulation in the short term (i.e., within the time it might take to plan and then carry out a behavior), this method of data constraint simplified the analyses in a way that did not impede on our ability to test the study hypotheses.

To test predictions in a multilevel model with more than two levels of a categorical variable of interest (i.e., NSSI vs. BE vs. PA groups), we used the PROC GLMSELECT function in SAS to create binary variables representing the presence or absence of behavior categories to allow for examination of results across groups. This recoding allowed us to run three models that provided interpretable interaction terms showing directionality, despite having more than two categorical variables in the dataset. For example, in the model where we used the parameter that  $PA = 0$  (absent), we were able to test for the significance of planning on affect between NSSI and PA. The same was done for models  $BE = 0$  and  $NSSI = 0$ , to compare the impact of planning on affect between NSSI and PA, and BE and PA, respectively.

Aim 2. In concordance with recommended approaches for analyzing time-varying changes in affect, the trajectories of positive and negative affect were modeled using mean-

centering on the time at which the planning occurred, so that both pre-planning (t-1, t-2, t-3) and post-planning (t+1, t+2, t+3) affect scores were included in the analysis (Berg et al., 2017, Schaefer et al., 2020).

Multilevel models in which momentary observations (Level 1) were nested within subjects (Level 2) estimated linear, quadratic, and cubic effects. Models specified a random intercept for participant and a common intercept for pre-and post-planning affect trajectories. For pre-planning trajectories, analyses examined whether the linear, cubic, and quadratic effects differed significantly from zero. For trajectories of affect following a planning incident, analyses examined whether the linear, cubic, and quadratic effects of the post-planning affect trajectory were significantly different from the pre-planning affect trajectory. This allowed for assessment of whether the affect was changed following the planning episode.

Secondary analyses were used to help determine whether the post-planning affect trajectories significantly differed from zero (i.e., were planning episodes followed by significant increases or decreases in either positive or negative affect).

Testing hypothesis 2 involved producing the unconditional means model, with no predictors, to test for statistically significant variability in the dependent measure (i.e., significant variability in intercepts). In the second step, time was added to the model, with its corresponding random effect, to test for statistically significant variability in slopes in an unconditional growth curve model. In the third and final step, predictors were added to the model to account for variability in intercepts and slopes. In this case, predictors included all subscales of each of the relevant “functions” measures, the UPPS-P, and the DERS. As indicated by the figures provided, each of these scales were first combined to test for overall model cohesion. We also assessed for the presence of multicollinearity by computing a correlation matrix containing each of the

variables. Although some variables demonstrated high correlations with other variables (suggested by  $r > .5$ ), few of these exceeded the  $r = .75$  threshold that has previously been reported as a cut-point in multilevel models (Shieh & Foulad2003; see Appendix E for the correlation matrix).

Aim 3. For Aim 3, with between-person outcomes, t-tests were used to examine associations. Within the EMA data, overall positive affect and negative affect scores for each time point were calculated by taking the mean of all positive and negative affect items, respectively. Cronbach's alpha statistics were calculated to examine internal consistency for each subscale as well as item-total correlations. Analyses of affect surrounding behavioral episodes were conducted using two-level linear mixed models, with ratings of affect, planning, and behavior represented at level 1 and participants represented at level 2. This approach accounts for the non-independence of repeated observations made by the same participant and allows for the consideration of participants that contributed unequal numbers of observations to the dataset.

## CHAPTER FOUR: RESULTS

### Demographics

Fifty-one participants completed the study. Due to survey non-compliance and participant errors in data collection (i.e., < 50% of EMA prompts completed (n =3), incorrectly entered ID numbers resulting in lost data (n=1), four of the original participants were not included in the analyses, resulting in a total N of 47. Of the participants whose data was not included in the analyses, 3 were in the PA group, and 1 was from the NSSI group. Table 1 provides demographic information for the included participants.

Table 1. Summary of Participant Demographics (N=47)	
Variable	Frequency (Percent)
Group	
NSSI	16 (34.0)
BE	18 (38.3)
PA	13 (27.7)
Gender	
Female	35 (74.5)
Male	10(21.3)
Non-binary	2 (4.3)
Age, Mean (SD)	20.6 (2.3)

Table 1 (Continued)	
White (non-Hispanic)	22 (46.8)
Hispanic	5 (10.6)
Black/African American	5 (10.6)
Asian or Asian/American	4 (8.5)
Multiracial	7 (14.9)

The average age was 20.61, with a standard deviation of 2.32 years. Participants were 76.1% female and 4.3% nonbinary. Slightly less than half (47.8%) of participants were White (non-Hispanic), 10.9% were Black, 8.7% were Hispanic, 8.7% were Asian or Asian American, and 15.2 % were multiracial. Except for one student enrolled at a nearby university, all were currently enrolled as undergraduates at the principal investigator’s university. Chi-square tests of homogeneity found no significant differences on demographic characteristics such as age ( $\chi^2 = 18.9, p = .4$ ) gender ( $\chi^2 = 1.54, p = .82$ ), and race ( $\chi^2 = 14.14, p = .17$ ) between any of the three behavior groups.

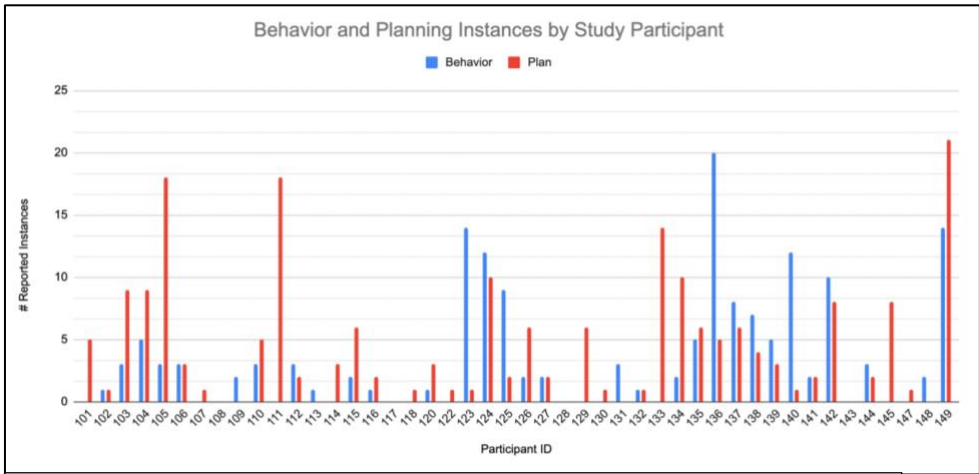


Figure 2: Behavior and Planning Instances by Study Participant



## Results of Aim 1

Of the 47 participants who completed the EMA portion of the study, 40 (85%) reported at least one instance of planning, including 14 (78%) of those in the BE group, 14 (88%) of those in the NSSI group, and 11 (85%) of those in the PA group. Notably, reports of planning compared to behavioral engagement were higher in the BE and NSSI groups compared to the PA group. Figure 2 provides a visual representation of the number of behavior and planning instances for each participant.

**Binge Eating.** Out of 912 recorded observations, there were 27 recorded binge episodes. Of these, 85.2% (23) were planned and 14.8 % (4) were unplanned. There were 50 instances in which individuals endorsed planned but later did not subsequently endorse a binge episode within the next 6 hours (t+1, t+2, t+3). The mean number of behaviors recorded in the BE group was 1.5, with a range of 0-5, and a median of 1. The mean number of planning instances was 4.6, with a range of 0-18 and a median of 3.

**Nonsuicidal Self-Injury.** Out of 830 recorded observations, a total of 46 self-harm episodes were recorded across all participants. Of these 67.4% (31) of episodes were planned, and 32.6% (15) were unplanned. There were 26 instances in which individuals endorsed planning but did not report an NSSI episode within the next 6 hours (t+1, t+2, t+3). Across all NSSI participants, the mean number of behaviors was 6.1, the range was 0-14, and the median was 3. The mean number of planning instances was 4.1, with a range of 0-14 and a median of 2.

**Physical Activity.** Out of 751 recorded observations, a total of 86 physical activity episodes were recorded across all participants. Of these, 58.1% (50) were planned, and 41.9% (36) were unplanned. There were 17 instances in which individuals endorsed planning but did not subsequently engage in physical activity within the next 6 hours (t+1, t+2, t+3). Across all

PA participants, the mean number of behaviors was 6.3, the range was 0-20, and the median was 5. The mean number of planning instances was 4.8, with a range of 0-21 and a median of 3.5. See figure 3 for a graphical representation of planned and unplanned behaviors, and plans that were reported without a subsequent behavior.

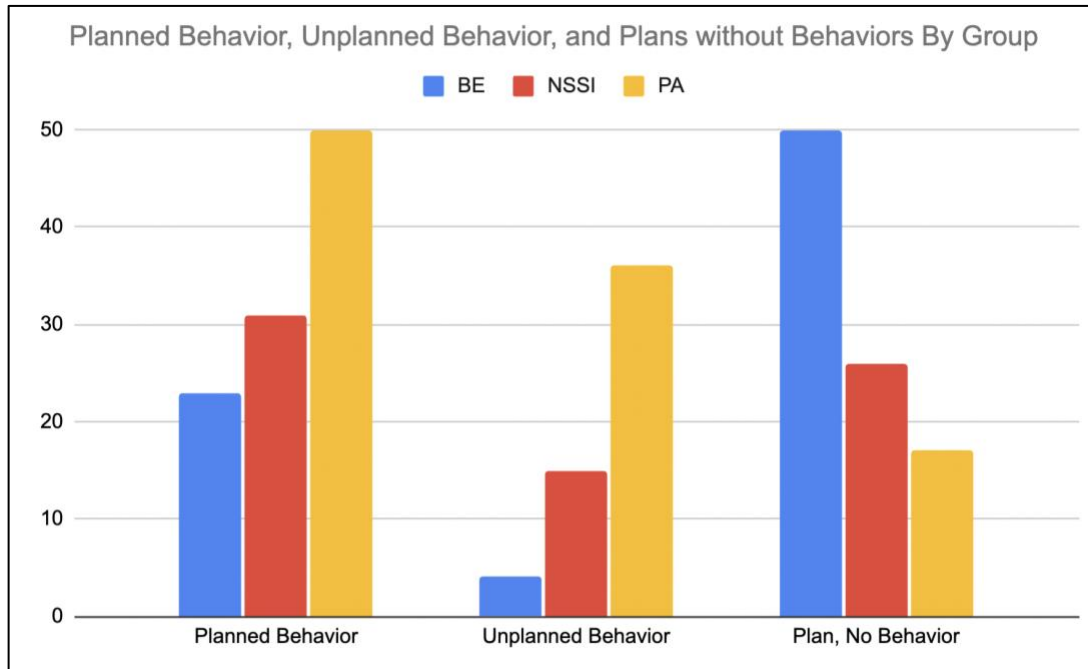


Figure 2: Planned Behavior, Unplanned Behavior, Plans w/o Behaviors By Group

Two one-way ANOVAs were conducted to test the differences in both planning and behaviors between the groups. Results suggested that individuals in the PA group were significantly more likely both to engage in the behavior than those in the BE group ( $F(2, 45) = 8.86, p < .001$ ), and the NSSI group ( $F(2, 45) = 6.63, p < .001$ ). Tukey's HSD Test for multiple comparisons found that behavior frequency was higher in PA group relative to the BE group ( $p = .001, 95\% \text{ C.I.} = -9.08, -2.41$ ), and to relative to the NSSI group ( $p = .028, 95\% \text{ C.I.} = -7.21, -.35$ ). There was no significant difference in behavioral engagement between the NSSI group and the BE group ( $p = .32, 95\% \text{ CI} = -5.24, 1.31$ ). A one-way ANOVA testing differences in

planning frequency between the three groups revealed no statistically significant differences ( $F(2,45) = .76, p = .473$ ).

## **Results of Aim 2**

EMA data were organized by behavior group (NSSI, BE, PA), and dummy-coded variables were created to allow for a test of the likelihood that planning impacted affect across groups. To assess what impact planning had on affect, a hierarchical logistic regression (SAS Proc Glimmix) was run with the binary dependent variable “behavior” (lagged, at  $t+1$ ,  $t+2$ , and  $t+3$ , yes or no), the binary predictor variable “plan” (yes or no), and the continuous predictor variables (negative affect, positive affect) included in the model.

We assessed variables across a total of four timepoints meaning that planning at a hypothetical “timepoint 1” was compared to changes in affect at the three following timepoints, or within an approximate window of 6 hours.

For the NSSI group, among instances where respondents reported a planned self-harm episode, there was a significant effect of planning on negative affect ( $t=4.56, p=.001$ ), but no significant effect on positive affect. Planning to self-harm at one timepoint was associated with decreased negative affect at the following 3 timepoints, regardless of whether the behavior was committed. When the model was run using the dummy-coded variables to compare the effects across groups, participants in the NSSI group demonstrated significantly greater decreases in NA following planning compared to participants in the PA group ( $t = -3.23, p = .01$ ), but not the BE group ( $t = 1.09, p=.32$ ).

For the BE group, among instances where respondents reported planning a binge eating episode, there was a significant effect of planning on negative affect ( $t=1.04, p=.001$ ), but not positive affect. Like NSSI, planning to binge eat at one timepoint was associated with decreased

negative affect at the following 3 timepoints, regardless of whether the behavior was eventually committed.

For the PA group, among instances where respondents indicated an episode of physical activity, there was a significant effect of planning on positive affect ( $t=2.02$ ,  $p=.001$ ), but not on negative affect. Individuals who planned to exercise exhibited greater increases in positive affect at the later timepoints than individuals who had not planned to exercise, regardless of actual exercise behavior. In the model where planning was not included as a predictor, results expectedly yielded a statically significant effect of behavior on positive affect ( $t=8.30$ ,  $p<.0001$ ), but no effect on negative affect was observed. Compared to the NSSI and BE groups, PA participants were significantly more likely to report increased positive affect following planning ( $t = 3.01$ ,  $p = .002$ , and  $t = 3.03$ ,  $p = .01$ , respectively).

### **Results of Aim 3**

A relationship between unplanned behavior and negative urgency was observed ( $t(23, 1273) = -3.23$ ,  $p = .0012$ ), such that individuals who were higher in negative urgency were more likely to report unplanned behavioral episodes. All other subscales of the UPPS-P were not significantly related to unplanned behaviors. See Table 3 for the means and standard deviations of the impulsivity subscales by group.

Alternatively, results indicated a significant main effect of group such that participants who planned but did *not* perform the behavior scored lower on the *UPPS-P* subscales of positive urgency ( $F(2, 24) = 5.16$ ,  $p = .02$ ), and lack of premeditation ( $F(2, 24) = 3.32$ ,  $p = .056$ ), relative to individuals who planned and subsequently performed the behavior. No other differences were observed between these groups on the *UPPS-P* or on any of the *DERS* subscales. Table 3

provides a breakdown of all study measures as they relate to the model predicting the likelihood of the behavior across all groups.

Table 2. UPPS-P Impulsivity Subscales: Means and Standard Deviations						
	<u>Nonsuicidal Self-Injury</u> (N = 16)		<u>Binge Eating</u> (N = 18)		<u>Physical Activity</u> (N = 13)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Negative Urgency	1.98	0.71	2.85*	0.60	1.86	0.47
Positive Urgency	1.59	0.39	1.95	0.53	1.69	0.60
Sensation Seeking	2.74	0.45	2.73	0.77	2.39	0.77
Lack of Premeditation	1.37	0.28	1.59	0.37	1.55	0.38
Lack of Perseverance	1.94	0.57	2.22*	0.49	1.80	0.35

\* Indicates statistically significant difference from other two groups at the alpha = .05 level.

## CHAPTER FIVE: DISCUSSION

This study found that most binge-eating episodes (85.2%) were planned, compared to about two-thirds (67.4%) of self-harm behaviors and slightly over half (58.1%) of physical activity behaviors. These results provide robust support for the existence of planning across all these behaviors, suggesting that the impulsive nature of behaviors like binge-eating and NSSI may have been previously over-emphasized. Although there exists no previous research on the planning of NSSI against which to compare these figures, it is notable that the few previous studies of planning in binge eating found that rates of planning hover at about 33% (Parker et al., 2021), which is demonstrably less than the rate found in the current study. One possible explanation for this discrepancy is the use of a more rigorous, and likely more valid, real-time data collection procedure in this study, compared to the retrospective questioning used in other assessments of binge planning. In previous studies, researchers asked participants to reflect on their own binge-planning “within the past 4 weeks,” which is a markedly different assessment procedure than the one used in the current study (Manasse et al., 2020; Parker et al., 2021). There are several possible explanations for why these results are incongruous. First, these results suggest that only brief amounts of time were devoted to planning. Across all study participants, 95% spent less than 1 hour planning, and 85% spent less than 30 minutes (see Appendix C, Table 5 for results). Results were similar for those in the BE group (92 and 76 percent, respectively). Despite the seeming importance of planning to the psychological impact of these behaviors, it seems reasonable that it would be easy to forget instances of planning that spanned less than 30 minutes or an hour over the course of a month. Additionally, results suggested that many instances of planning did not result in actual behaviors, which may have made plans more

difficult to recall over the long term. For the BE group, about 68 percent of planning instances were not followed up by behavior, and therefore may have been easily overlooked or forgotten when probed within a 4-week retrospective timeframe. These factors, combined with the wide time range used in the present data analysis (i.e., reports of planning matched to behaviors up to 6 hours later), may well be responsible for some of the discrepancy between this study's findings and those of previous researchers. Importantly, and despite these novel findings, there was no statistically significant difference in planning rates between any of the three behavioral groups.

Individuals in this study who were reporting on physical activity were more likely to engage in those behaviors during data collection than those in either the BE or NSSI groups, which is reasonable given what is known about the frequency of those behaviors in non-clinical samples. For example, the diagnostic threshold for Binge Eating Disorder (mild severity) requires between 1 and 3 binge eating episodes in a single week. Although the criteria for a moderate (4-7 x/ week), severe (8-13) and extreme (14+) notation allow for greater frequency of binge eating episodes, research suggests that, among college students, the majority who report binge-eating episodes report fewer than 4 episodes in a 28-day period, or about 1 episode per week (Nagata et al., 2021). For those who engage in NSSI, the frequency of these behaviors is estimated to be much lower for most individuals, with research suggesting that the majority of college students who engage in self-harm do so between 1 and 4 times a year (Kienkens, 2019). Notably, the present study required individuals to have engaged in the target behavior at least once in the previous two weeks during study enrollment, in part as an attempt to recruit individuals with higher frequency of self-harm behaviors. While the frequency of self-harm behaviors reported in this study was relatively high compared to previous research, it is

unsurprising that the frequency of physical activity was more than both binge eating and self-harm in the current sample.

Exercise behaviors are generally not classified as “impulsive,” presumably because of the effort and forethought assumed to be inherent in their execution. That the frequency of planning was similar between the NSSI, and PA groups provides support for our hypothesis that planning may occur prior to NSSI behaviors more often than has been otherwise understood. While a small sample size (i.e., 16 NSSI participants) limits the generalizability of this key finding, it is worth noting the novelty of this result, given the challenge it poses to traditional conceptualizations of impulsive, maladaptive behaviors.

Results demonstrated that planning is associated with a lowering of negative affect both for individuals who regularly self-harm, and for those who binge eat. Examining planning from this functionalist perspective (i.e., how choosing to plan maladaptive behaviors, or choosing to engage in the behavior may serve emotional “functions”) allows for a broader understanding of what Swerdlow and colleagues (2020) described as part of an affect regulation process focused on the hedonic rewards of either seeking relief from distress or pursuit of pleasure when engaging in NSSI. In fact, understanding the relief from negative affect gained by some who plan to binge eat or self-harm adds immense value to this functionalist perspective by suggesting that destructive behaviors themselves may be less singularly relevant to relief than previously imagined. In other words, if people don’t even need to engage in a self-destructive behavior to feel better, there lies a possibility then that, at the very least, motivated individuals may be able to reduce the harmful impact of their own behaviors by gaining relief from planning without behavioral follow-through.



Planning was related to increases in positive affect for individuals who engage in physical activity, suggesting that for some people, planning exercise served to increase pleasant feelings beyond the mood-boosting effects of exercise itself. The key takeaway from this finding may very well be that the reinforcement pathways operate differently for exercise than for NSSI or BE behaviors. Whether the relevance of positive affect (as opposed to NA) for the exercise group demonstrates different overall reward systems for these individuals, or whether this difference is behavior-specific (i.e., exercise is linked mainly to production of positive affect) is outside the scope of this study, but these findings do suggest some systematic group differences.

Several potential mechanisms may underlie the benefit that planning seems to serve for negative affect among individuals who self-harm and/or binge eat. As previously mentioned, negative reinforcement of unpleasant feelings may be at work, such that planning to engage in these behaviors could ease distress individuals feel either by serving as a distraction from unpleasant circumstances or by providing hope for a future time wherein one might feel relieved. In this study, planning was defined as involving either cognitive processes (e.g., daydreaming, considering options), physical actions (e.g., finding tools, locating a space to perform the behavior), or both. The cognitive anticipation and behavioral facilitation of planning both provide potential opportunities for individuals to either distract themselves from current situations, or to move towards a concrete goal, either way engendering relief from present circumstances and feelings.

Prior research had found that female college students who self-harm demonstrate less variability and expression of positive affect than their non-self-harming peers (Gratz, 2006). Compared with the present findings that planning was unrelated to positive affect among people who self-harm suggests the possibility that positive affect may not be a salient experience for

individuals who self-harm, which could help to explain the lack of impact. with other studies have also found similar results in terms of affect, such that individuals who engage in NSSI seem to be more prone to negative affect and less likely to experience positive affect overall (Hamza & Willoughby, 2015; Spangenberg, Forkmann, & Glaesmer, 2015). Indeed, if individuals who self-harm have a difficult time experiencing positive feelings in general, they may simply attend to changes in positive affect less than non-self-harming individuals. In this same vein, prior literature has suggested that experiences of unpleasant feelings are especially salient to people who self-harm, such that they may over-attend to negative affect (Bresin, Carter, & Gordon, 2013; Victor & Klonsky, 2014)

Interestingly, the inverse may also be true of individuals who exercise, as some research has demonstrated that regular exercisers experience positive affect more readily than others overall, and that they may also be less likely to experience heightened negative affect, or even to fluctuate in their negative affect (Garcia, Archer, Moradi, & Andersson-Artén, 2012; McIntyre, Watson, & Cunningham, 1990; Tuson, Sinyor, & Pelletier, 1995). This suggests two distinct patterns for individuals who plan to exercise and individuals who plan to self-harm. Individuals who plan to self-harm may reduce their negative affect, a state which they experience frequently, while individuals who plan to exercise may increase their positive affect, a state which they also experience with regularity

Positive urgency refers to the tendency of individuals to respond impulsively to positive affective states. Finally, individuals who planned but did not subsequently did not engage in their target behavior reported lower levels of positive urgency and higher tendencies towards premeditation than individuals who planned and carried out their behaviors, suggesting that these individuals who are more planful in general may also be less likely to act rashly in response to

positive emotions. It is possible that people who are more planful are also more likely to plan for positive experiences, thereby reducing feelings of positive urgency that result could result in impulsive behaviors.

That the positive urgency subscale of the *UPPS-P* was elevated among individuals who both planned and carried out a behavior compared to individuals who only planned behaviors suggests that there may be some relevance of the actual behaviors to positive affect that is unrelated to planning. Some research has found that higher positive urgency is related to lower response inhibition profiles, suggesting, perhaps, that people with high positive urgency may have more difficulty not engaging in a behavior once they have considered it (Johnson, Tharp, Peckham, Sanchez, & Carver, 2016). This conclusion would indicate, then, that a key difference between the individuals who planned and the individuals who both planned and carried out behaviors is response inhibition, such that those with higher positive urgency may be less likely to halt the follow-through of a behavior after already considering (i.e., planning) it. Perhaps the greater salience of positive emotions is an indication of the momentum with which individuals move towards an action urge, instead of away from it. In this way, higher positive urgency may be an indicator of someone who is less likely to feel relief from planning alone and may instead require action in order to satiate the urge to behave rashly.

One potentially important finding of the present study is the frequent occurrence of reported planning of a behavior that then did not occur at the following timepoint. Although it is not entirely clear what may have contributed to these results, a few potential causes come to mind. First, it is possible that planning occurred later (t+4, t+5, etc., or even on the next day), but the analyses of this study did not capture those data. It is also possible that planning did indeed serve to help people regulate their emotions, thereby precluding, in some instances, the need to

engage in the behavior. In this case, such an occurrence would lend support to our original suggestion that planning alone may serve an important and understudied role in the maintenance and proliferation of emotion regulation behaviors. Alternatively, it is possible that individuals could have planned to engage in a behavior but later decided against it for reasons unrelated to emotional functioning (e.g., circumstances changed that precluded engagement in the behavior, either because the behavior was no longer feasible or because an alternative behavioral opportunity arose), though this would have been captured and included with the data on instances of planning without subsequent behaviors. It is also possible that some individuals were actively trying to avoid engaging in the behavior. Although outside the scope of this study, we did collect data that indicated some individuals were actively hoping to stop engaging in binge eating or self-harming behaviors, and these individuals may have been the same individuals who sometimes planned but did not carry out behaviors. In this vein, it is possible that planning but later declining to engage in such a behavior could indicate a triumph on the part of an individual who would like to reduce their engagement in their behavior, such that they intentionally worked to avoid the behavior and, in those instances, were successful.

As alluded to in the discussion of the functionalist approach, this study's findings regarding the occurrence of planning without subsequent behavior imply some possible clinical opportunities. If future studies could clarify the reasons why individuals may sometimes plan but fail to later engage in certain behaviors, it stands to reason that these occurrences could maybe manufactured in treatment settings to help people stop unwanted behaviors. If individuals are sometimes capable of organically reducing their unpleasant feelings effectively enough to avoid engaging in potentially harmful behaviors, it stands to reason that this kind of effect might be replicable in a therapeutic setting. Treatment may focus, then, on allowing individuals to practice

planning of behaviors to experience emotional relief without having to engage in the behavior at all.

### **Limitations**

The above findings ought to be considered in the context of some of general methodological limitations. First, the sample size of the groups of interest were relatively small, even when considering the repeated observations gained via the EMA methodology, and this limitation is particularly applicable in the results that examined planners versus non-planners within the three different groups. Also, this study relied upon a college student sample. Since diagnostic interviews with the non-clinical participants were infeasible in this case, it is unclear to what extent the current findings are reflective of clinical or sub-clinical populations.

Relatedly, it is possible that college students who engage in self-harm or binge-eating are simply not representative of all individuals who engage in these behaviors, and therefore may have planning, affect, and/or behavioral patterns that are fundamentally different from those among individual who meet clinical criteria. This may have played out in several ways. For instance, it is possible that how automated or immediate the behavioral response is between planning and action differs between clinical populations and an unselected college student sample. Research shows that, through rehearsal over time, behaviors become more automated and the latency between premeditation and performance lessens (Lally, Van Jaarsveld, Potts, & Wardle, 2010; Wood, & Runger, 2016).

The novelty of the present study may be considered both a limitation and a strength. As mentioned earlier, and considering the present findings, the lack of research on the planning of maladaptive behaviors is startling. Our results indicated that planning does, indeed occur prior to NSSI, and to some extent BE, and suggesting that the label of “impulsive” may not be an entirely

appropriate characterization. Given the dearth of research on planning in psychopathology, scale development in this area is limited, and we therefore used scales whose reliability is untested. This study's measure of planning was adapted from the prior research on binge planning among individuals with eating disorder pathology, and for which internal validity measures were unavailable. It is therefore possible that our assessments of planning in the context of this study had weak construct validity, and future investigations may benefit from use of validated planning measures.

### **Future Directions**

Much about the relationship between planning, impulsivity, and maladaptive behavior patterns remains to be known. One possible direction for future research would be attempt a finer-grained assessment of the relationship between negative affect and planning among individuals who self-harm. As discussed previously, negative affect may be salient for individuals who self-harm in a way that positive affect is not, with the reverse true for individuals who exercise, and that both pathways have downstream impacts on planning for the purpose of affect regulation. Laboratory studies that utilize affect manipulation with these populations could serve to elucidate further the trajectory from negative or positive affect to planning, and then behavior. This kind of research could have the benefit of greater construct validity surrounding affective experiences, while also allowing researchers to measure the mechanisms that may influence how salient positive or negative affect is to different kinds of individuals.

Future research ought also to investigate the more granular aspects of planning that may occur in these behavioral contexts. Perhaps associations exist between certain executive functioning correlates of planning and the planning of emotion regulation behaviors.

Development of a well-validated scale of planning for NSSI, coupled with laboratory experiments to measure participants planning capabilities, while beyond the scope of the current project, could help identify certain strengths that might be able to help individuals clinically, such as in treatment settings that could utilize planning to help extinguish maladaptive behaviors.

The present study provided crucial information about a previously understudied area of psychopathology. The most important contributions of the present research are twofold: that planning occurs in the majority of NSSI and BE behaviors, and it may also help individuals to either reduce their negative affect or increase experiences of positive affect.

## REFERENCES

- Allan, J. L., Sniehotta, F. F., & Johnston, M. (2013). The best laid plans: Planning skill determines the effectiveness of action plans and implementation intentions. *Annals of Behavioral Medicine, 46*,1, 114-12.
- Ammerman, B. A., Jacobucci, R., Kleiman, E. M., Muehlenkamp, J. J., & McCloskey, M. S. (2017). Development and validation of empirically derived frequency criteria for NSSI disorder using exploratory data mining. *Psychological Assessment, 29*, 221–231.  
<https://doi.org/10.1037/pas0000334>
- Anestis, M. D., Selby, E. A., & Joiner, T. E. (2007). The role of urgency in maladaptive behaviors. *Behaviour Research and Therapy, 45*, 3018–3029.  
<https://doi.org/10.1016/j.brat.2007.08.012>
- Armey, M. F., Crowther, J. H., & Miller, I. W. (2011). Changes in Ecological Momentary Assessment Reported Affect Associated With Episodes of Nonsuicidal Self-Injury. *Behavior Therapy, 42*, 579–588. <https://doi.org/10.1016/j.beth.2011.01.002>
- Asarnow, J. R., Porta, G., Spirito, A., Emslie, G., Clarke, G., Wagner, K. D., ... Brent, D. A. (2011). Suicide attempts and nonsuicidal self-injury in the treatment of resistant depression in adolescents: findings from the TORDIA study. *Journal of the American Academy of Child and Adolescent Psychiatry, 50*, 772–781.  
<https://doi:10.1016/j.jaac.2011.04.003>



- Austin P, C. (2010). Estimating multilevel logistic regression models when the number of clusters is low: a comparison of different statistical software procedures. *International journal of biostatistics*, 22, 6, <https://doi.org/10.2202/1557-4679.1195>
- Baca–Garcia, E., Diaz–Sastre, C., García Resa, E., Blasco, H., Braquehais Conesa, D., Oquendo, M. A., ... de Leon, J. (2005). Suicide attempts and impulsivity. *European Archives of Psychiatry and Clinical Neuroscience*, 255, 2, 152–156. <https://doi.org/10.1007/s00406-004-0549-3>
- Bentley, K. H., Cassiello-Robbins, C. F., Vittorio, L., Sauer-Zavala, S., & Barlow, D. H. (2015). The association between nonsuicidal self-injury and the emotional disorders: A meta-analytic review. *Clinical Psychology Review*, 37, 72–88. <https://doi.org/10.1016/j.cpr.2015.02.006>
- Berg, K. C., Cao, L., Crosby, R. D., Engel, S. G., Peterson, C. B., Crow, S. J., ... & Wonderlich, S. A. (2017). Negative affect and binge eating: Reconciling differences between two analytic approaches in ecological momentary assessment research. *International Journal of Eating Disorders*, 50, 10, 1222-1230.
- Berg, K. C., Crosby, R. D., Cao, L., Crow, S. J., Engel, S. G., Wonderlich, S. A., & Peterson, C. B. (2015). Negative affect prior to and following overeating-only, loss of control eating-only, and binge eating episodes in obese adults. *International Journal of Eating Disorders*, 48, 6, 641-65.
- Bernstein, E. E., & McNally, R. J. (2017). Acute aerobic exercise helps overcome emotion regulation deficits. *Cognition and emotion*, 31, 4, 834-843.

- Berridge, K. C., & Robinson, T. E. (1995). The mind of an addicted brain: neural sensitization of wanting versus liking. *Current Directions in Psychological Science*, 4, 71-75.
- Bodell, L. P., Pearson, C. M., Smith, K. E., Cao, L., Crosby, R. D., Peterson, C. B., ... & Berg, K. C. (2019). Longitudinal associations between emotion regulation skills, negative affect, and eating disorder symptoms in a clinical sample of individuals with binge eating. *Eating behaviors*, 32, 69-73
- Bolger, N., Stadler, G., & Laurenceau, J.-P. (2011). Power analysis for intensive longitudinal studies. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 285-301). New York.
- Bresin, K., Carter, D. L., & Gordon, K. H. (2013). The relationship between trait impulsivity, negative affective states, and urge for nonsuicidal self-injury: A daily diary study. *Psychiatry research*, 205, 3, 227-23.
- Bryan, C. J., May, A. M., & Harris, J. (2019). Examining emotion relief motives as a facilitator of the transition from suicidal thought to first suicide attempt among active duty soldiers. *Psychological Services*, 16(2), 293–301. <https://doi.org/10.1037/ser0000234>
- Buckholdt, K. E., Parra, G. R., Anestis, M. D., Lavender, J. M., Jobe-Shields, L. E., Tull, M. T., & Gratz, K. L. (2015). Emotion Regulation Difficulties and Maladaptive Behaviors: Examination of Deliberate Self-harm, Disordered Eating, and Substance Misuse in Two Samples. *Cognitive Therapy and Research*, 39, 140–152. <https://doi.org/10.1007/s10608-014-9655-3>

- Chami, R., Cardi, V., Lawrence, N., MacDonald, P., Rowlands, K., Hodsoll, J., & Treasure, J. (2020). Targeting binge eating in bulimia nervosa and binge eating disorder using inhibitory control training and implementation intentions: a feasibility trial. *Psychological Medicine*, 1-10
- Chaudhury, S. R., Singh, T., Burke, A., Stanley, B., Mann, J. J., Grunebaum, M., ... Oquendo, M. A. (2016). Clinical Correlates of Planned and Unplanned Suicide Attempts: *The Journal of Nervous and Mental Disease*, 204, 806–811.  
<https://doi.org/10.1097/NMD.0000000000000502>
- Chapman, A. L., Gratz, K. L., & Brown, M. Z. (2006). Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behaviour research and therapy*, 44, 3, 371-394.
- Chapman, A. L., Leung, D. W., & Lynch, T. R. (2008). Impulsivity and emotion dysregulation in borderline personality disorder. *Journal of personality disorders*, 22, 2, 148-164.
- Claes, L., Fernández-Aranda, F., Jimenez-Murcia, S., Botella, C., Casanueva, F. F., de la Torre, R., ... Menchón, J. M. (2013). Co-occurrence of nonsuicidal self-injury and impulsivity in extreme weight conditions. *Personality and Individual Differences*, 54, 137–140.  
<https://doi.org/10.1016/j.paid.2012.07.035>
- Colombo, D., Fernández-Álvarez, J., Suso-Ribera, C., Cipresso, P., Valev, H., Leufkens, T., ... & Botella, C. (2020). The need for change: Understanding emotion regulation antecedents and consequences using ecological momentary assessment. *Emotion*, 20, 1, 3.

- Conner, K. R. (2004). A Call for Research on Planned vs. Unplanned Suicidal Behavior. *Suicide and Life-Threatening Behavior*, *34*, 89–98. <https://doi.org/10.1521/suli.34.2.89.32780>
- Conner, K. R., Hesselbrock, V. M., Meldrum, S. C., Schuckit, M. A., Bucholz, K. K., Gamble, S. A., ... Kramer, J. (2007). Transitions to, and Correlates of, Suicidal Ideation, Plans, and Unplanned and Planned Suicide Attempts Among 3,729 Men and Women with Alcohol Dependence. *Journal of Studies on Alcohol and Drugs*, *68*, 654–662. <https://doi.org/10.15288/jsad.2007.68.654>
- Conner, M., Sandberg, T., & Norman, P. (2010). Using action planning to promote exercise behavior. *Annals of Behavioral Medicine*, *40*, 1, 65-76.
- Corruble, E., Damy, C., & Guelfi, J. D. (1999). Impulsivity: A relevant dimension in depression regarding suicide attempts? *Journal of Affective Disorders*, *53*, 211–215. [https://doi.org/10.1016/S0165-0327\(98\)00130-X](https://doi.org/10.1016/S0165-0327(98)00130-X)
- Coskunpinar, A., Dir, A. L., & Cyders, M. A. (2013). Multidimensionality in impulsivity and alcohol use: A meta-analysis using the UPPS-P model of impulsivity. *Alcoholism: Clinical and Experimental Research*, *37*, 9, 1441-1450.
- Forsén Mantilla, E., Clinton, D., Monell, E., Levallius, J., & Birgegård, A. (2022). Impulsivity and compulsivity as parallel mediators of emotion dysregulation in eating-related addictive-like behaviors, alcohol use, and compulsive exercise. *Brain and Behavior*, *12*, 1, e2458

- Garcia, D., Archer, T., Moradi, S. & Andersson-Arntén, A. (2012). Exercise Frequency, High Activation Positive Affect, and Psychological Well-Being: Beyond Age, Gender, and Occupation. *Psychology, 3*, 328-336. doi: 10.4236/psych.2012.34047.
- Garofalo, C., Velotti, P., Callea, A., Popolo, R., Salvatore, G., Cavallo, F., & Dimaggio, G. (2018). Emotion dysregulation, impulsivity, and personality disorder traits: A community sample study. *Psychiatry Research, 266*, 186-192.
- Giles, G. E., Eddy, M. D., Brunyé, T. T., Urry, H. L., Graber, H. L., Barbour, R. L., ... & Kanarek, R. B. (2018). Endurance exercise enhances emotional valence and emotion regulation. *Frontiers in human neuroscience, 398*.
- Goldin, P., Ziv, M., Jazaieri, H., Hahn, K., & Gross, J. J. (2013). MBSR vs aerobic exercise in social anxiety: fMRI of emotion regulation of negative self-beliefs. *Social cognitive and affective neuroscience, 8*, 1, 65-72
- Gratz, K.L. (2006), Risk factors for deliberate self-harm among female college students: The role and interaction of childhood maltreatment, emotional inexpressivity, and affect intensity/reactivity. *American Journal of Orthopsychiatry, 76*: 238-250. <https://doi.org/10.1037/0002-9432.76.2.238>
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of psychopathology and behavioral assessment, 26*, 1, 41-54.

- Grilo, C. M., Ivezaj, V., & White, M. A. (2015). Evaluation of the DSM-5 severity indicator for binge eating disorder in a clinical sample. *Behaviour research and therapy*, *71*, 110–114. <https://doi.org/10.1016/j.brat.2015.05.003>
- Hamza, C. A., Willoughby, T., & Heffer, T. (2015). Impulsivity and nonsuicidal self-injury: A review and meta-analysis. *Clinical Psychology Review*, *38*, 13–24. <https://doi.org/10.1016/j.cpr.2015.02.010>
- Hamza, C., Willoughby, T. (2015) Nonsuicidal self-injury and affect regulation: recent findings from experimental and ecological momentary assessment studies and future directions. *Journal of Clinical Psychology*, *7*, 561–574.
- Han, B., Compton, W. M., Gfroerer, J., & McKeon, R. (2015). Prevalence and correlates of past 12-month suicide attempt among adults with past-year suicidal ideation in the United States. *The Journal of clinical psychiatry*, *76*, 3, 15414.
- Hedeker D, Demirtas H, Mermelstein RJ. (2009). A mixed ordinal location scale model for analysis of Ecological Momentary Assessment (EMA) data. *Stat Interface*. 2009; 2:391-401. doi: 10.4310/sii.2009.v2.n4.a1. PMID: 20357914; PMCID: PMC2847414.
- Hoyle, R. H., & Gottfredson, N. C. (2015). Sample size considerations in prevention research applications of multilevel modeling and structural equation modeling. *Prevention science*, *16*, 7, 987-996. <https://doi.org/10.1007/s11121-014-0489-8>

- Jeon, H. J., Lee, J.-Y., Lee, Y. M., Hong, J. P., Won, S.-H., Cho, S.-J., ... Cho, M. J. (2010). Unplanned versus planned suicide attempters, precipitants, methods, and an association with mental disorders in a Korea-based community sample. *Journal of Affective Disorders, 127*, 274–280. <https://doi.org/10.1016/j.jad.2010.05.027>
- Jacobson, C. M., & Gould, M. (2007). The Epidemiology and Phenomenology of Nonsuicidal Self-Injurious Behavior Among Adolescents: A Critical Review of the Literature. *Archives of Suicide Research, 11*, 2, 129–147. <https://doi.org/10.1080/13811110701247602>
- Johnson, S. L., Tharp, J. A., Peckham, A. D., Sanchez, A. H., & Carver, C. S. (2016). Positive urgency is related to difficulty inhibiting prepotent responses. *Emotion, 16*(5), 750.
- Joiner, T., Kalafat, J., Draper, J., Stokes, H., Knudson, M., & McKeon, R. (2007). Establishing Standards for the Assessment of Suicide Risk Among Callers to the National Suicide Prevention Lifeline. *Suicide and Life-Threatening Behavior, 37*, 353 – 365.
- Joiner, T. E., Rudd, M. D., & Rajab, M. H. (1997). The Modified Scale for Suicidal Ideation among Suicidal Adults: Factors of suicidality and their relation to clinical and diagnostic indicators. *Journal of Abnormal Psychology, 106*, 260-265.
- Joiner, T., Steer, R., Brown, G., Beck, A. T., Pettit, J. W., & Rudd, M. D. (2003). Worst-point suicidal plans: A dimension of suicidality predictive of past suicide attempts and eventual death by suicide. *Behaviour Research & Therapy, 41*, 1469-1480.

- Kessler, R. C., Borges, G., & Walters, E. E. (1999). Prevalence of and Risk Factors for Lifetime Suicide Attempts in the National Comorbidity Survey. *Archives of General Psychiatry*, *56*, 7, 617. <https://doi.org/10.1001/archpsyc.56.7.617>
- Kiekens, G., Hasking, P., Bruffaerts, R., Alonso, J., Auerbach, R. P., Bantjes, J., ... & Kessler, R. C. (2021). Non-suicidal self-injury among first-year college students and its association with mental disorders: results from the World Mental Health International College Student (WMH-ICS) initiative. *Psychological medicine*, 1-12. <https://doi.org/10.1017/S0033291721002245>
- Kiekens, G., Hasking, P., Claes, L., Boyes, M., Mortier, P., Auerbach, R. P., ... Bruffaerts, R. (2019). Predicting the incidence of nonsuicidal self-injury in college students. *European Psychiatry*, *59*, 44–51. <https://doi.org/10.1016/j.eurpsy.2019.04.002>
- Klonsky, E. D. (2009). The functions of self-injury in young adults who cut themselves: Clarifying the evidence for affect-regulation. *Psychiatry Research*, *166*, 2–3, 260–268. <https://doi.org/10.1016/j.psychres.2008.02.008>
- Klonsky, E. D., & Glenn, C. R. (2009). Assessing the Functions of Nonsuicidal Self-injury: Psychometric Properties of the Inventory of Statements About Self-injury (ISAS). *Journal of Psychopathology and Behavioral Assessment*, *31*, 215–219. <https://doi.org/10.1007/s10862-008-9107-z>
- Klonsky, E. D., & May, A. (2010). Rethinking Impulsivity in Suicide. *Suicide and Life-Threatening Behavior*, *40*, 6, 612–619. <https://doi.org/10.1521/suli.2010.40.6.612>



- Klonsky, E. D., & May, A. M. (2014). Differentiating suicide attempters from suicide ideators: A critical frontier for suicidology research. *Suicide and Life-Threatening Behavior, 44*, 1, 1-5.
- Kopetz, C. E., Woerner, J. I., & Briskin, J. L. (2018). Another look at impulsivity: Could impulsive behavior be strategic? *Social and Personality Psychology Compass, 12*, 5, e12385.
- Lally, P., Van Jaarsveld, C. H., Potts, H. W., & Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. *European journal of social psychology, 40*, 6, 998-1009.
- Lloyd-Richardson, E. E., Perrine, N., Dierker, L., & Kelley, M. L. (2007). Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. *Psychological medicine, 37*, 8, 1183-1192
- Lockwood, J., Daley, D., Townsend, E., & Sayal, K. (2017). Impulsivity and self-harm in adolescence: A systematic review. *European Child & Adolescent Psychiatry, 26*, 387–402. <https://doi.org/10.1007/s00787-016-0915-5>
- Maas, C. J., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology, 1*, 3, 86-92. <https://doi.org/10.1027/1614-2241.1.3.86>
- Manasse, S. M., Murray, H. B., Parker, M., Forman, E. M., & Juarascio, A. S. (2019). A characterization of binge planning behavior in individuals with binge-spectrum eating disorders. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*. <https://doi.org/10.1007/s40519-019-00697-6>

- Martin Ginis, K. A., & Bray, S. R. (2010). Application of the limited strength model of self-regulation to understanding exercise effort, planning and adherence. *Psychology and Health, 25*,10, 1147-1160.
- Matthews, M., Webb, T. L., Shafir, R., Snow, M., & Sheppes, G. (2021). Identifying the determinants of emotion regulation choice: a systematic review with meta-analysis. *Cognition and Emotion, 35*, 6, 1056-1084.
- May, A. M., & Victor, S. E. (2018). From ideation to action: recent advances in understanding suicide capability. *Current Opinion in Psychology, 22*, 1-6.
- McIntyre, C. W., Watson, D., & Cunningham, A. C. (1990). The effects of social interaction, exercise, and test stress on positive and negative affect. *Bulletin of the Psychonomic Society, 28*, 2, 141-143.
- McManus, S., Gunnell, D., Cooper, C., Bebbington, P. E., Howard, L. M., Brugha, T., ... Appleby, L. (2019). Prevalence of nonsuicidal self-harm and service contact in England, 2000–14: Repeated cross-sectional surveys of the general population. *The Lancet Psychiatry, 6*, 573 – 581. [https://doi.org/10.1016/S2215-0366\(19\)30188-9](https://doi.org/10.1016/S2215-0366(19)30188-9)
- Medland, H., De France, K., Hollenstein, T., Mussoff, D., & Koval, P. (2020). Regulating emotion systems in everyday life. *European Journal of Psychological Assessment*
- Muehlenkamp, J. J., Claes, L., Havertape, L., & Plener, P. L. (2012). International prevalence of adolescent nonsuicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health, 6*, 10. <https://doi.org/10.1186/1753-2000-6-10>

- Nagata, J. M., Compte, E. J., Murray, S. B., Schauer, R., Pak, E., Flentje, A., ... & Obedin-Maliver, J. (2021). Community norms for the eating disorder examination questionnaire (EDE-Q) among cisgender bisexual plus women and men. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 26, 7, 2227-2239.
- Nakagawa, A., Grunebaum, M. F., Oquendo, M. A., Burke, A. K., Kashima, H., & Mann, J. J. (2009). Clinical correlates of planned, more lethal suicide attempts in major depressive disorder. *Journal of Affective Disorders*, 112,1–3, 237–242.  
<https://doi.org/10.1016/j.jad.2008.03.021>
- Nock, M. K. (2009). Why Do People Hurt Themselves?: New Insights Into the Nature and Functions of Self-Injury. *Current Directions in Psychological Science*, 18, 78–83.  
<https://doi.org/10.1111/j.1467-8721.2009.01613.x>
- Nock, M., Joiner, T., Gordon, K., Lloyd-Richardson, E., & Prinstein, M. (2006). Nonsuicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research*, 144, 65–72. <https://doi.org/10.1016/j.psychres.2006.05.010>
- Owens, D., Horrocks, J., & House, A. (2002). Fatal and non-fatal repetition of self-harm: Systematic review. *British Journal of Psychiatry*, 181, 193–199.  
<https://doi.org/10.1192/bjp.181.3.193>
- Parker, M. N., Wilkinson, M. L., Hunt, R. A., Ortiz, A., Manasse, S. M., & Juarascio, A. S. (2022). Eating expectancies and hedonic hunger among individuals with bulimia-spectrum eating disorders who plan binge-eating episodes. *International Journal of Eating Disorders*, 55, 1, 120-124

- Pérez, S., Ros, M. C., Folgado, J. E. L., & Marco, J. H. (2019). Non-suicidal Self-injury Differentiates Suicide Ideators and Attempters and Predicts Future Suicide Attempts in Patients with Eating Disorders. *Suicide and Life-Threatening Behavior*, *49*, 5, 1220-123.
- Prinstein, M. J. (2008). Introduction to the special section on suicide and nonsuicidal self-injury: A review of unique challenges and important directions for self-injury science. *Journal of Consulting and Clinical Psychology*, *76*, 1–8. <https://doi.org/10.1037/0022-006X.76.1.1>
- Ren, Y., You, J., Zhang, X., Huang, J., Conner, B. T., Sun, R., ... & Lin, M. P. (2019). Differentiating suicide attempters from suicide ideators: the role of capability for suicide. *Archives of suicide research*, *23*,1, 64-81.  
<https://doi.org/10.1080/13811118.2018.1426507>
- Robinson, K., Garisch, J. A., & Wilson, M. S. (2021). Nonsuicidal self-injury thoughts and behavioural characteristics: Associations with suicidal thoughts and behaviours among community adolescents. *Journal of affective disorders*, *282*, 1247-1254.
- Rodríguez-Blanco, L., Carballo, J. J., & Baca-García, E. (2018). Use of Ecological Momentary Assessment (EMA) in Nonsuicidal Self-Injury (NSSI): A systematic review. *Psychiatry Research*, *263*, 212–219.
- Sellers, C. M., Díaz-Valdés, A., Porter, A. C., Glenn, C. R., Miller, A. B., Battalen, A. W., & O'Brien, K. H. M. (2021). Nonsuicidal self-injury, suicide planning, and suicide attempts among high-risk adolescents prior to psychiatric hospitalization. *Research on child and adolescent psychopathology*, *49*, 11, 1503-1511.

- Schatten, H. T., Allen, K. J., & Arney, M. F. (2020). Assessment of emotion dysregulation using ecological momentary assessment.
- Schreiber, L. R., Grant, J. E., & Odlaug, B. L. (2012). Emotion regulation and impulsivity in young adults. *Journal of psychiatric research, 46*(5), 651-65
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E.,...Dunbar, G. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The Development and Validation of a Structured Diagnostic Psychiatric Interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*, 22-33.
- Sheeran, P., & Webb, T. L. (2016). The intention–behavior gap. *Social and personality psychology compass, 10*,9, 503-518
- Shieh, Y. Y., & Fouladi, R. T. (2003). The effect of multicollinearity on multilevel modeling parameter estimates and standard errors. *Educational and psychological measurement, 63*(6), 951-985
- Sheppes, G., Scheibe, S., Suri, G., & Gross, J. J. (2011). Emotion-regulation choice. *Psychological science, 22*, 11, 1391-1396.
- Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology, 4*, 1-32.
- Spangenberg, L., Forkmann, T., Glaesmer, H. Investigating dynamics and predictors of suicidal behaviors using ambulatory assessment. *Neuropsychiatr 2015; 29*: 139–143.
- Stahl, C., Voss, A., Schmitz, F., Nuszbaum, M., Tüscher, O., Lieb, K., & Klauer, K. C. (2014). Behavioral components of impulsivity. *Journal of Experimental Psychology: General, 143*,2, 850–886. <https://doi.org/10.1037/a0033981>

- Strickland, J.C. & Johnson, M.W. (2020). Rejecting Impulsivity as a Construct: A theoretical, empirical, and sociocultural argument. *Psychological Review*, 128, 2, 336 – 361.
- Swerdlow, B. A., Pearlstein, J. G., Sandel, D. B., Mauss, I. B., & Johnson, S. L. (2020). Maladaptive behavior and affect regulation: A functionalist perspective. *Emotion*, 20, 1, 75–79. <https://doi.org/10.1037/emo0000660>
- Taylor, P. J., Jomar, K., Dhingra, K., Forrester, R., Shahmalak, U., & Dickson, J. M. (2018). A meta-analysis of the prevalence of different functions of nonsuicidal self-injury. *Journal of Affective Disorders*, 227, 759–769. <https://doi.org/10.1016/j.jad.2017.11.073>
- Tuson, K. M., Sinyor, D., & Pelletier, L. G. (1995). Acute exercise and positive affect: An investigation of psychological processes leading to affective change. *International Journal of Sport Psychology*.
- Van Orden, K., Witte, T., Gordon, K., Bender, T., & Joiner, T. (2008). Suicidal desire and the capability for suicide: Tests of the interpersonal-psychological theory of suicidal behavior in adults. *Journal of Consulting & Clinical Psychology*, 76, 72-83.
- Vazire, S., & Funder, D. C. (2006). Impulsivity and the self-defeating behavior of narcissists. *Personality and social psychology review*, 10,2, 154-165.
- Velotti, P., Garofalo, C., Petrocchi, C., Cavallo, F., Popolo, R., & Dimaggio, G. (2016). Alexithymia, emotion dysregulation, impulsivity, and aggression: A multiple mediation model. *Psychiatry research*, 237, 296-303.

- Victor, S. E., Glenn, C. R., & Klonsky, E. D. (2012). Is non-suicidal self-injury an “addiction”? A comparison of craving in substance use and non-suicidal self-injury. *Psychiatry research, 197*(1-2), 73-77.
- Victor, S. E., & Klonsky, E. D. (2014). Daily emotion in non-suicidal self-injury. *Journal of Clinical Psychology, 70*,4, 364-375.
- 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*, 1063. [https://doi.org/ 10.1037//0022-3514.54.6.1063](https://doi.org/10.1037//0022-3514.54.6.1063)
- Weiss, N. H., Tull, M. T., Viana, A. G., Anestis, M. D., & Gratz, K. L. (2012). Impulsive behaviors as an emotion regulation strategy: Examining associations between PTSD, emotion dysregulation, and impulsive behaviors among substance dependent inpatients. *Journal of anxiety disorders, 26*(3), 453-458.
- Wheeler, L., & Reis, H. T. (1991). Self-recording of everyday life events: Origins, types, and uses. *Journal of personality, 59*, 339-354. <https://doi.org/10.1111/j.1467-6494.1991.tb00252.x>
- Whiteside, S. P., & Lynam, D. R. (2001). The Five Factor Model and Impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences, 30*, 669–689. [https://doi.org/10.1016/S0191-8869\(00\)00064-7](https://doi.org/10.1016/S0191-8869(00)00064-7)

Wonderlich, J. A., Crosby, R. D., Engel, S. G., Crow, S. J., Peterson, C. B., Le Grange, D., ... & Fischer, S. (2022). Negative affect and binge eating: Assessing the unique trajectories of negative affect before and after binge-eating episodes across eating disorder diagnostic classifications. *International Journal of Eating Disorders*, 55, 2, 223-230.

Wood, W., & Rünger, D. (2016). Psychology of habit. *Annual review of psychology*, 67, 289-314.



## APPENDIX A: BASELINE MEASURES

### *Demographic Information (fill in the blank)*

1. What is your gender?
2. What is your race / ethnicity?
3. What is your current age?

### *Self-Harm Screen*

1. During the past two weeks, you have engaged in any deliberate self-harm behaviors without the intention to die? (Here, self-harm means behaviors such as cutting, burning, scratching, or otherwise hurting your body intentionally, but without the intent to die.)  
Yes / No

(If Self-harm screen = yes, participant was shown questions 2 -14. If self-harm screen = no, participant was skipped to question 15)

2. This questionnaire asks about a variety of self-harm behaviors. Please only endorse a behavior if you have done it intentionally (i.e., on purpose) and without suicidal intent (i.e., without the intention to die).

Please estimate the number of times in your life you have intentionally (i.e., on purpose) performed each type of non-suicidal self-harm (e.g., 0, 10, 100, 500):

*Cutting*

*Severe Scratching*

*Biting*

*Burning*

*Interfering w/ Wound Healing (e.g., picking scabs)*

*Carving*

*Rubbing Skin Against Rough Surface*

*Pinching*

*Sticking Self w/ Needles*

*Pulling Hair*

*Swallowing Dangerous Substances*

*Other (please specify) \_\_\_\_\_*

3. If you feel that you have a main form of self-harm, please indicate below which kind you consider to be your main form of self-harm:
4. At what age did you first harm yourself:
5. Please indicate the approximate date of your most recent episode of self-harm:
6. Do you experience physical pain during self-harm? *Yes/Sometimes /No*
7. When you self-harm, are you alone? *Yes/Sometimes/No*
8. Typically, how much time elapses from the time you have the urge to self-harm until you act on the urge? *< 1 hour / 1 - 3 hours / 3 - 6 hours / 6 - 12 hours / 12 - 24 hours /> 1 day*
9. Do you want to stop self-harming? *Yes /Maybe /No*
10. Please rate the following statements in terms of how relevant they are to you.

*0 = not relevant, 1 = somewhat relevant, 2 = very relevant*

*“When I self-harm, I am ...*

*... calming myself down*

*... creating a boundary between myself and others*

*... punishing myself*

*... giving myself a way to care for myself (by attending to the wound)*

*... causing pain so I will stop feeling numb*

*... avoiding the impulse to attempt suicide*

*... doing something to generate excitement or exhilaration*

*... bonding with peers*

*... letting others know the extent of my emotional pain*

*... seeing if I can stand the pain*

*... creating a physical sign that I feel awful*

*... getting back at someone*

*... ensuring that I am self-sufficient*

*... releasing emotional pressure that has built up inside of me*

*... demonstrating that I am separate from other people*

*... expressing anger towards myself for being worthless or stupid*

*...creating a physical injury that is easier to care for than my emotional distress*

...trying to feel something (as opposed to nothing) even if it is physical pain  
 ...responding to suicidal thoughts without actually attempting suicide.  
 ... entertaining myself or others by doing something extreme  
 ...fitting in with others  
 ... seeking care or help from others  
 ... demonstrating I am tough or strong  
 ... proving to myself that my emotional pain is real  
 ... getting revenge against others  
 ... demonstrating that I do not need to rely on others for help  
 ... reducing anxiety, frustration, anger, or other overwhelming emotions  
 ... establishing a barrier between myself and others  
 ... reacting to feeling unhappy with myself or disgusted with myself  
 ... allowing myself to focus on treating the injury, which can be gratifying or satisfying  
 ... making sure I am still alive when I don't feel real  
 ... putting a stop to suicidal thoughts  
 ... pushing my limits in a manner akin to skydiving or other extreme activities  
 ... creating a sign of friendship or kinship with friends or loved ones  
 ... keeping a loved one from leaving or abandoning me  
 ... proving I can take the physical pain  
 ... signifying the emotional distress I'm experiencing  
 ... trying to hurt someone close to me  
 ... establishing that I am autonomous/independent

11. Over the past 2 weeks, have you known more than an hour in advance that a self-harm episode will occur? *Yes No*
12. On how many of the occasions did you know more than an hour in advance that an episode would occur? *Never /Rarely/Less than half of occasions/Half of occasions/More than half of occasions/Often /All occasions*
13. Over the past 2 weeks, when you have self-harmed, did you take steps beforehand to plan for, or to facilitate self-harm (e.g., obtaining a specific item or tool with which to harm yourself)? *Yes /No*

14. On how many of the occasions did you take steps beforehand to plan for or facilitate self-harm?

*Never /Rarely/Less than half of occasions/Half of occasions/More than half of occasions/Often /All occasions*

***Binge Eating Screen***

15. During the past two weeks, have you had any episodes of binge eating?

*(Binge eating here is described as: Consuming what others might consider a very large amount of food in one sitting AND experiencing loss of control or distress at the time of eating) Yes /No*

*(if binge eating screen = yes, participant was shown questions 16 – 28. If binge eating = no, participant was skipped to question 29)*

16. Please estimate the number of times in your life you have had each of the following types of experiences related to binge eating (e.g., 0, 10, 100, 500):

*I felt I could not stop eating once I had started*

*I ate so quickly I felt sick or uncomfortable*

*I ate so fast I almost forgot to chew*

*I ate when I wasn't hungry*

*I ate because I was bored*

*I felt remorse after eating*

*I felt sick after eating*

*I purged after eating*

17. If you feel that you have a primary experience of binge eating please indicate below which kind you consider to be your main form binge eating (e.g., late night, when i'm feeling lonely/bored, after certain experiences, etc):

1. At what age did you first binge eat?
2. Please indicate the approximate date of your most recent binge (day/month/year)
3. Do you experience physical pain during binge episodes? *Yes /Sometimes/No*
4. When you binge eat, are you alone? *Yes /Sometimes /No*

5. Typically, how much time elapses from the time you have the urge to binge until you act on the urge?

*< 1 hour/ 1 - 3 hours/ 3 - 6 hours/ 6 - 12 hours / 12 - 24 hours / > 1 day*

6. Do you want to stop binge eating? *Yes / Maybe / No*

7. Please rate the following statements in terms of how relevant they are to you.

“ When I binge eat, I am ...

*... calming myself down*

*... creating a boundary between myself and others*

*... punishing myself (*

*... giving myself a way to care for myself (by attending to the wound)*

*... causing pain so I will stop feeling numb*

*... avoiding the impulse to attempt suicide*

*... doing something to generate excitement or exhilaration*

*... bonding with peers*

*... letting others know the extent of my emotional pain*

*... seeing if I can stand the pain*

*... creating a physical sign that I feel awful*

*... getting back at someone*

*... ensuring that I am self-sufficient*

*... releasing emotional pressure that has built up inside of me*

*... demonstrating that I am separate from other people*

*... expressing anger towards myself for being worthless or stupid*

*...creating a physical injury that is easier to care for than my emotional distress*

*...trying to feel something (as opposed to nothing) even if it is physical pain*

*...responding to suicidal thoughts without actually attempting suicide.*

*... entertaining myself or others by doing something extreme*

*...fitting in with others*

*... seeking care or help from others*

*... demonstrating I am tough or strong*

*... proving to myself that my emotional pain is real*

*... getting revenge against others*

- ... *demonstrating that I do not need to rely on others for help*
- ... *reducing anxiety, frustration, anger, or other overwhelming emotions*
- ... *establishing a barrier between myself and others*
- ... *reacting to feeling unhappy with myself or disgusted with myself*
- ... *allowing myself to focus on treating the injury, which can be gratifying or satisfying*
- ... *making sure I am still alive when I don't feel real*
- ... *putting a stop to suicidal thoughts*
- ... *pushing my limits in a manner akin to skydiving or other extreme activities*
- ... *creating a sign of friendship or kinship with friends or loved ones*
- ... *keeping a loved one from leaving or abandoning me*
- ... *proving I can take the physical pain*
- ... *signifying the emotional distress I'm experiencing*
- ... *trying to hurt someone close to me*
- ... *establishing that I am autonomous/independent*

8. Over the past 2 weeks, have you known more than an hour in advance that a binge episode will occur?

*Yes /No*

On how many of the occasions did you know more than an hour in advance that an episode would occur? *Never /Rarely/Less than half of occasions/Half of occasions/More than half of occasions/Often /All occasions*

9. Over the past 2 weeks, when you had a binge episode, did you take steps beforehand to plan for, or to facilitate binge eating (e.g., grocery shopping for specific food on which to binge)? *Yes/No*

10. On how many of the occasions did you take steps beforehand to plan for or facilitate binge eating?

*Never /Rarely/Less than half of occasions/Half of occasions/More than half of occasions/Often /All occasions*

***Physical Activity Screen***

(if physical activity screen = yes, participant was shown questions 29 – 41 If physical activity screen = no, participant was skipped to question 42)

11. The following questions ask you to consider certain behavior and experiences that you may have had over the past two weeks.
- In the past two weeks, have you completed any voluntary (e.g., not as part of your job or something someone else asked you to do) and purposeful (e.g., taking a walk as opposed to walking around a grocery store) physical activity or exercise?  
(Examples include: walking, yoga, weight-training, jogging, running, swimming, bike riding, gym classes, or something similar.) *Yes / No*
12. This questionnaire asks about a variety of physical activity and exercise behaviors. Please only endorse a behavior if you have done it voluntarily (i.e., because you wanted to) and intentionally (i.e., on purpose).
- Please estimate the number of times in your life you have intentionally (i.e., on purpose) performed each type of exercise (e.g., 0, 10, 100, 500):
- Yoga*
  - Walking*
  - Jogging*
  - Running*
  - Swimming*
  - Biking*
  - Surfing*
  - Play a sport*
  - Lifting weights*
  - Pilates*
  - Group Exercise Classes*
  - Other (please specify)*
13. If you feel that you have a main form of physical activity, please indicate below which kind you consider to be your main form of physical activity:
14. At what age did you first engage in voluntary, intentional physical activity?
15. When did you most recently engage in voluntary, intentional physical activity (day/month/year)
16. Do you experience physical pain during physical activity *Yes /Sometimes/No*

17. When you exercise or engage in physical activity, are you usually alone?  
*Yes/Sometimes/No*
18. Typically, how much time elapses from the time you have the urge to exercise until you act on the urge to exercise or engage in physical activity? *< 1 hour 1 - 3 hours 3 - 6 hours 6 - 12 hours 12 - 24 hours > 1 day*
19. Please rate the following statements in terms of how relevant they are to you“When I exercise, I am ...
- ... calming myself down*
  - ... creating a boundary between myself and others*
  - ... punishing myself*
  - ... giving myself a way to care for myself (by attending to the wound)*
  - ... causing pain so I will stop feeling numb*
  - ... avoiding the impulse to attempt suicide*
  - ... doing something to generate excitement or exhilaration*
  - ... bonding with peers*
  - ... letting others know the extent of my emotional pain*
  - ... seeing if I can stand the pain*
  - ... creating a physical sign that I feel awful*
  - ... getting back at someone*
  - ... ensuring that I am self-sufficient*
  - ... releasing emotional pressure that has built up inside of me*
  - ... demonstrating that I am separate from other people*
  - ... expressing anger towards myself for being worthless or stupid*
  - ...creating a physical injury that is easier to care for than my emotional distress*
  - ...trying to feel something (as opposed to nothing) even if it is physical pain*
  - ...responding to suicidal thoughts without actually attempting suicide.*
  - ... entertaining myself or others by doing something extreme*
  - ...fitting in with others*
  - ... seeking care or help from others*
  - ... demonstrating I am tough or strong*
  - ... proving to myself that my emotional pain is real*



- ... getting revenge against others
- ... demonstrating that I do not need to rely on others for help
- ... reducing anxiety, frustration, anger, or other overwhelming emotions
- ... establishing a barrier between myself and others
- ... reacting to feeling unhappy with myself or disgusted with myself
- ... allowing myself to focus on treating the injury, which can be gratifying or satisfying
- ... making sure I am still alive when I don't feel real
- ... putting a stop to suicidal thoughts
- ... pushing my limits in a manner akin to skydiving or other extreme activities
- ... creating a sign of friendship or kinship with friends or loved ones
- ... keeping a loved one from leaving or abandoning me
- ... proving I can take the physical pain
- ... signifying the emotional distress I'm experiencing
- ... trying to hurt someone close to me
- ... establishing that I am autonomous/independent

20. Over the past 2 weeks, have you known more than an hour in advance that an episode of physical activity will occur? *Yes/No*
21. If answered YES above, on how many of the occasions did you know more than an hour in advance that an episode would occur?
22. Over the past 4 weeks, when you engaged in voluntary, intentional physical activity, did you take steps beforehand to plan for, or to facilitate exercise (e.g., picking out exercise clothes or locating other exercise equipment)? *Yes/No*

If you answered YES above, on how many of the occasions did you take steps beforehand to plan for or facilitate exercise? *Never /Rarely/Less than half of occasions/Half of occasions/More than half of occasions/Often /All occasions*

***Urgency-Premeditation-Perseverance-Sensation Seeking-Positive Urgency Scale (UPPS-P)***

23. Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement.

*1 = Agree Strongly to 4 = Disagree Strongly*

*I have a reserved and cautious attitude toward life.*

*I have trouble controlling my impulses.*

*I generally seek new and exciting experiences and sensations.*

*I generally like to see things through to the end.*

*When I am very happy, I can't seem to stop myself from doing things that can have bad consequences.*

*My thinking is usually careful and purposeful.*

*I have trouble resisting my cravings (for food, cigarettes, etc.).*

*I'll try anything once.*

*I tend to give up easily.*

*When I am in great mood, I tend to get into situations that could cause me problems.*

*I am not one of those people who blurt out things without thinking.*

*I often get involved in things I later wish I could get out of.*

*I like sports and games in which you have to choose your next move very quickly.*

*Unfinished tasks really bother me.*

*When I am very happy, I tend to do things that may cause problems in my life.*

*I like to stop and think things over before I do them.*

*When I feel bad, I will often do things I later regret in order to make myself feel better now.*

*I would enjoy water skiing.*

*Once I get going on something I hate to stop*

*I tend to lose control when I am in a great mood.*

*I don't like to start a project until I know exactly how to proceed.*

*Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse*

*I quite enjoy taking risks.*

*I concentrate easily*

*When I am really ecstatic, I tend to get out of control.*

*I would enjoy parachute jumping.*

*I finish what I start.*

*I tend to value and follow a rational, "sensible" approach to things.*

*When I am upset I often act without thinking.*

*Others would say I make bad choices when I am extremely happy about something.*

*I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.*

*I am able to pace myself so as to get things done on time.*

*I usually make up my mind through careful reasoning.*

*When I feel rejected, I will often say things that I later regret.*

*Others are shocked or worried about the things I do when I am feeling very excited.*

*I would like to learn to fly an airplane.*

*I am a person who always gets the job done.*

*I am a cautious person.*

*It is hard for me to resist acting on my feelings.*

*When I get really happy about something, I tend to do things that can have bad consequences.*

*I sometimes like doing things that are a bit frightening.*

*I almost always finish projects that I start.*

*Before I get into a new situation I like to find out what to expect from it.*

*I often make matters worse because I act without thinking when I am upset.*

*When overjoyed, I feel like I can't stop myself from going overboard.*

*I would enjoy the sensation of skiing very fast down a high mountain slope.*

*Sometimes there are so many little things to be done that I just ignore them all.*

*I usually think carefully before doing anything.*

*When I am really excited, I tend not to think of the consequences of my actions.*

*In the heat of an argument, I will often say things that I later regret.*

*I would like to go scuba diving.*

*I tend to act without thinking when I am really excited.*

*I always keep my feelings under control.*

*When I am really happy, I often find myself in situations that I normally wouldn't be comfortable with.*

*Before making up my mind, I consider all the advantages and disadvantages.*

*I would enjoy fast driving.*

*When I am very happy, I feel like it is ok to give in to cravings or overindulge.*

*Sometimes I do impulsive things that I later regret.*

*I am surprised at the things I do while in a great mood.*

### ***Difficulties In Emotion Regulation Scale***

24. Please indicate how often the following statements apply to you by selecting the appropriate response from the scale below.

*1 = Almost Never to 5 = Almost Always*

*(Almost Never = 0 - 10% of the time Sometimes = 11-35% of the time About half the time = 36-65% of the time Most of the time = 66-90% of the time almost always = 91-100% of the time )*

*I am clear about my feelings.*

*I pay attention to how I feel.*

*I experience my emotions as overwhelming and out of control.*

*I have no idea how I am feeling.*

*I have difficulty making sense out of my feelings.*

*I am attentive to my feelings.*

*I know exactly how I am feeling.*

*I care about what I am feeling.*

*I am confused about how I feel.*

*When I'm upset, I acknowledge my emotions.*

*When I'm upset, I become angry with myself for feeling that way.*

*When I'm upset, I become embarrassed for feeling that way.*

*When I'm upset, I have difficulty getting work done.*

*When I'm upset, I become out of control.*

*When I'm upset, I believe that I will remain that way for a long time.*

*When I'm upset, I believe that I will end up feeling very depressed.*

*When I'm upset, I believe that my feelings are valid and important.*

*When I'm upset, I have difficulty focusing on other things*

*When I'm upset, I feel out of control.*

*When I'm upset, I can still get things done.*

*When I'm upset, I feel ashamed at myself for feeling that way.*

*When I'm upset, I know that I can find a way to eventually feel better.*

*When I'm upset, I feel like I am weak.*

*When I'm upset, I feel like I can remain in control of my behaviors.*

*When I'm upset, I feel guilty for feeling that way*

*When I'm upset, I have difficulty concentrating.*

*When I'm upset, I have difficulty controlling my behaviors.*

*When I'm upset, I believe there is nothing I can do to make myself feel better.*

*When I'm upset, I become irritated at myself for feeling that way.*

*When I'm upset, I start to feel very bad about myself.*

*When I'm upset, I believe that wallowing in it is all I can do.*

*When I'm upset, I lose control over my behavior.*

*When I'm upset, I have difficulty thinking about anything else.*

*When I'm upset I take time to figure out what I'm really feeling.*

*When I'm upset, it takes me a long time to feel better.*

*When I'm upset, my emotions feel overwhelming.*

## APPENDIX B: EMA MEASURES

1. Please enter your unique, 4-digit code number:
2. This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space provided for each word. Indicate to what extent you have felt this way since the last prompt.

*1 = Not at All to 5 = Extremely*

*Upset*

*Hostile*

*Alert*

*Ashamed*

*Inspired*

*Nervous*

*Determined*

*Attentive*

*Active*

*Afraid*

3. Since the most recent prompt, have you engaged in any deliberate self-harm without the intention to die? *Yes / No*
4. Which of the following behaviors did you engage in since the last prompt?(check any/all that apply.)

*Cutting*

*Severe Scratching*

*Biting*

*Banging or Hitting Self*

*Burning*

*Interfering w/ Wound Healing*

*Carving*

*Rubbing Skin Against Rough*

*Surface*

*Pinching*

*Sticking Self w/ Needles*

*Pulling Hair*

*Swallowing dangerous*

*Other (please specify):*

5. For how long did you engage in the behavior indicated above?

*less than 5 seconds /5 – 60 s /1 – 5 min /5 min - 30 min /30 min – 60 min /60 min – 90 min /90 min - 2 hours /more than 2 hours*

6. Since the most recent prompt, have you planned to engage in any self harm behaviors?

(Planning here indicates thinking about and/or getting ready to do a behavior, but NOT yet doing the behavior.) *Yes/ No*

7. Here is list of things that people may do when planning to engage in deliberate self-harm.

Which of these did you engage in? (check any/all that apply).

*Consider specific types of self-harm*

*Choose a specific type of self-harm*

*Imagine a specific form of self-harm*

*Visualize myself hurting myself*

*Consider what tools I might need to harm myself*

*Obtain/locate exercise tools or other items for my self-harm.*

*Consider where I might harm myself (e.g., in my room, in a private space at home, outside somewhere, etc.).*

*Schedule time in my day to harm myself*

*Imagine how I will feel when I self-harm*

*Other*

8. How long did you spend planning as indicated above?

*less than 5 seconds /5 – 60 s /1 – 5 min /5 min - 30 min /30 min – 60 min /60 min – 90 min /90 min - 2 hours /more than 2 hours*

### EMA Surveys: Binge Eating

1. Please enter your unique, 4-digit code number:
2. This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space provided for each word.

Indicate to what extent you have felt this way since the last prompt.

*1 = Not at All to 5 = Extremely*

*Upset*

*Hostile*

*Alert*

*Ashamed*

*Inspired*

*Nervous*

*Determined*

*Attentive*

*Active*

*Afraid*

3. Since the last prompt, have you had any episodes of binge eating?  
(Binge eating here is described as consuming what others might consider a very large amount of food in one sitting AND experiencing loss of control or distress at the time of eating OR eating so much that you feel sick or like you want to purge.) *Yes/No*
4. Which of the following behaviors did you engage in since the last prompt?(check any/all that apply.)

*I felt I could not stop eating once I had started*

*I ate so quickly I felt sick or uncomfortable*

*I ate so fast I almost forgot to chew*

*I ate when I wasn't hungry*

*I ate because I was bored*



*I felt remorse after eating*

*I felt sick after eating*

*I purged after eating*

5. For how long did you engage in the behavior indicated above?  
*less than 5 seconds /5 – 60 s /1 – 5 min /5 min - 30 min /30 min – 60 min /60min – 90 min /90 min - 2 hours /more than 2 hours*
6. Since the last prompt, have you planned any episodes of binge eating? Yes/No  
(Planning here indicates thinking about and/or getting ready to do a behavior, but NOT yet doing the behavior.) *Yes/ No*
7. Here is list of things that people may do when planning to binge eat. Which of these did you do? (check any/all that apply).  
*Considering different types of food*  
*Choose a specific food or place to eat*  
*Imagine yourself tasting a specific food*  
*Visualize myself eating*  
*Consider where I might obtain food for a binge*  
*Obtain food for a binge*  
*Consider where I might binge eat*  
*Schedule time in my day to binge eat*  
*Other (please specify)*
8. How long did you spend planning as indicated above?  
*less than 5 seconds /5 – 60 s /1 – 5 min /5 min - 30 min /30 min – 60 min /60 min – 90 min /90 min - 2 hours /more than 2 hours*

EMA Surveys: Physical Activity

1. Please enter your unique, 4-digit code number

2. This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space provided for each word.

Indicate to what extent you have felt this way since the last prompt.

*1 = Not at All to 5 = Extremely*

*Upset*

*Hostile*

*Alert*

*Ashamed*

*Inspired*

*Nervous*

*Determined*

*Attentive*

*Active*

*Afraid*

3. Since the most recent prompt, have you engaged in any voluntary, intentional physical activity (i.e., have you exercised) *Yes/No*
4. Which of the following behaviors did you engage in since the last prompt?

(check any/all that apply.)

*Yoga*

*Walking*

*Jogging*

*Running*

*Swimming*

*Biking*

*Surfing*

*Played a sport*

*Lifting weights*

*Pilates*

*Group Exercise Classes*

*Other (please specify)*

5. How long did you engage in the behavior indicated above?  
less than 5 seconds /5 – 60 s /1 – 5 min /5 min - 30 min /30 min – 60 min /60 min – 90 min  
/90 min - 2 hours /more than 2 hours
6. Since the most recent prompt, have you planned to engage in any voluntary, intentional physical activity (i.e., have you exercised) ?  
(Please note, planning here indicates thinking about and/or getting ready to do a behavior, but NOT yet doing the behavior.) *Yes/No*
7. Here is list of things that people may do when planning to exercise. Which of these did you engage in? (check any/all that apply).  
Consider specific types of exercise  
Choose a specific type of exercise  
*Imagine myself doing a specific exercise*  
*Visualize myself exercising*  
*Consider where I might exercise*  
*Obtain clothes/equipment for exercising*  
*Schedule time in my day to exercise*  
*Other (please specify)*

## APPENDIX C: PLANNING

Table 4. Frequency of Self-Reported Forms of Planning by Group**			
	NSSI (n = 69)	BE* (n = 64)	PA (n=87)
Consider specific types of behavior	50	55	49
Choose a specific type of behavior	29	36	56
Imagine a specific type of behavior	45	45	47
Visualize myself doing the behavior	62	49	42
Consider tools/equipment needed for the behavior	19	32	18
Obtain tools/equipment needed for the behavior	7	18	23
Consider where I would do the behavior	18	22	20
Schedule time to do the behavior	2	12	29
Imagine how I will feel when I do the behavior	33	4	37

\* For the BE group, the questions on specific types of behavior referenced to specific types of food, not behavior

Table 5. Frequency of Time Spent Planning by Group**			
	NSSI (n = 69)	BE (n = 64)	PA (n=87)
Less than 5 seconds	7	6	4
5 – 60 seconds	9	6	30
1 -5 minutes	33	13	31
5 – 30 minutes	15	24	9
30 – 60 minutes	4	10	8
60 – 90 minutes	1	2	2
90 minutes – 2 hours	0	2	1
More than 2 hours	0	1	2

*\*N refers to number of instances where respondents answered “yes” to the question: “Regardless of whether you did or did not perform the behavior, have did you plan to do the behavior since the last prompt*

## APPENDIX D: IRB APPROVAL



### APPROVAL

April 26, 2021

Rose Miller

Dear Rose Miller:

On 4/26/2021, the IRB reviewed and approved the following protocol:

Application Type:	Initial Study
IRB ID:	STUDY002418
Review Type:	Expedited 7
Title:	Emotion Regulation Behaviors in Daily Life
Approved Protocol and Consent(s)/Assent(s):	<ul style="list-style-type: none"><li>• RHM_IRB_MAtHesis_4.20.21.docx;</li><li>• InformedConsent_42221rhm.pdf;</li></ul> <p>Approved study documents can be found under the 'Documents' tab in the main study workspace. Use the stamped consent found under the 'Last Finalized' column under the 'Documents' tab.</p>

Within 30 days of the anniversary date of study approval, confirm your research is ongoing by clicking Confirm Ongoing Research in BullsIRB, or if your research is complete, submit a study closure request in BullsIRB by clicking Create Modification/CR.

Your study qualifies for a waiver of the requirements for the documentation of informed consent for online research activities as outlined in the federal regulations at 45 CFR 46.117(c).

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

Jennifer Walker  
IRB Research Compliance Administrator

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**Institutional Review Boards / Research Integrity & Compliance**

FWA No. 00001669

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