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Evaluating the Role of Social Interactions and Shame in Self-Injurious Behaviors using Ecological Momentary Assessment: Feasibility and Preliminary Evaluation

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Abstract

Self-injurious thoughts and behaviors (SITBs) are increasingly prevalent in the United States. The transactional model of emotion dysregulation provides a framework for understanding the development and maintenance of these and related behaviors and suggests that shame and self-invalidation following invalidation from others contribute to their development and recurrence. A comprehensive evaluation of this model would include real-time, in-vivo assessment. Ecological momentary assessment (EMA) can be used to assess the moment-to-moment social responses and subsequent private experiences (emotions, thoughts and sensations) that may contribute to SITBs. The present study evaluated the feasibility and acceptability of using EMA methods to test the relationship among antecedent social invalidation and subsequent shame, self-invalidation, and SITBs. Results suggest that procedures were generally acceptable and feasible, though EMA procedures had somewhat low compliance. Preliminary analyses suggest that social invalidation was significantly associated with subsequent self-invalidation and shame. Social invalidation, self-invalidation and shame were also significantly associated with NSSI urges, but not suicide urges. Shame partially mediated the relationship between social invalidation and NSSI, but self-invalidation did not, and neither was a significant direct predictor of suicide urges. This study is a first step at examining the inter- and intra-personal links among social invalidation, self-invalidation, shame and SITBs in real time.

Keywords: invalidation, shame, NSSI, suicide, ecological momentary assessment, emotion dysregulation.

Introduction

Self-injurious thoughts and behaviors (SITBs) are among the leading causes of death for all age groups (Center for Disease Control (CDC), 2020). SITBs include both suicide-related behaviors (i.e., completed suicide, attempts and ideation) and non-suicidal self-injury (NSSI). NSSI is increasingly prevalent, with high rates among college students (15-35%; Gratz, 2003; McKenzie & Gross, 2014; Nock, et al., 2009). Engaging in NSSI increases risk for subsequent suicide attempts and is an important risk marker for multiple other adverse outcomes (Ohlis et al., 2020). In contrast to the high prevalence of NSSI and suicide attempts, completed suicide is rare, yet has increased steadily over the past 10 years particularly for adolescents and young adults (Garnett et al., 2022).

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Despite the serious nature and high prevalence of SITBs, existing methods for the prediction and prevention of these behaviors are woefully inadequate (Fox et al., 2020). This may be due in part to assessment methods lacking ecological validity (e.g., aggregate self-report data) and to a mismatch of specific assessment methodology to the variability of the behavior. Specifically, data on SITBs has historically focused on static and distal risk factors (e.g., childhood abuse, biological risk factors related to temperament; see Gratz, 2003 for a review). These problems persist despite the well-known limitations of infrequent self-report assessment data (Schacter, 1999; Campbell & Fiske, 1959) as well as a growing body of literature that suggests that people who engage in SITBs are heterogeneous, that SITBs are highly variable over short periods of time, and thus these behaviors do not lend themselves to aggregate or retrospective assessment approaches (e.g., Nock et al., 2009; Kleiman et al., 2017). Ecological momentary assessment (EMA) provides a solution to both issues: EMA is a type of sampling method wherein the subject is assessed multiple times a day over a discreet time period. Evidence suggests that EMA limits recall bias (Shiffman et al., 2008), and increases reliability and ecological validity (Hufford, 2007). There is also evidence that because of the nature of responding to EMA, often through mobile app or short message service (SMS) text-based surveys, participants are more likely to respond accurately about even sensitive topics (Tourangeau & Yan, 2007). EMA methods, grounded in theory, would facilitate a greater examination of the more proximal and often rapidly changing inter- and intra-personal processes that contribute to SITBs and thus may inform the development of successful prevention and intervention programs. Using EMA methods this study evaluated the role of invalidation by others (social invalidation), self-invalidation, and shame in the prediction of SITB urges, directly and indirectly.

Transactional Model of Emotion Dysregulation

The transactional model of emotion dysregulation (also referred to as the biopsychosocial model of the development of Borderline Personality Disorder [BPD] and emotion dysregulation; see Figure 1) can be used to understand the development and maintenance of SITBs broadly, not limited to suicidal behavior (Crowell et al. 2008; Fruzzetti et al., 2005; Linehan, 1993). Portions of the transactional model have been empirically tested, including biological vulnerabilities (e.g., Kuo & Linehan, 2009) and the role of invalidation both in increasing (and validating responses decreasing) emotional arousal (e.g., Shenk & Fruzzetti, 2011; Sturrock & Mellor, 2013; Kaufman et al., 2020) as well as discriminating between clinic and community samples of distressed adolescents (Shenk & Fruzzetti, 2014). Much of the testing has occurred in the context of samples characterized by BPD and related disorders (e.g., Kuo & Linehan, 2009; Sturrock & Mellor, 2013). However, there is also evidence that this model has utility in broader contexts (e.g., young adults [Shenk & Fruzzetti, 2011]), and preliminary evidence the model is applicable to transdiagnostic samples with a history of self-injury (Kaufman et al., 2020).

The model incorporates the role of proximal and distal risk factors, including intrapersonal processes (e.g., affective states including shame, self-invalidation) and interpersonal processes (i.e., validation and invalidation from others). SITBs are hypothesized to develop as a result of transactions between a person with emotion vulnerabilities and others who respond in invalidating ways. This type of transaction leads to emotion dysregulation, which may be defined as an inability to discriminate, monitor, label accurately, moderate or modify emotional experiences so that the individual can act in the service of both short- and long-term goals (Fruzzetti et al., 2008). Thus, when people are dysregulated they are more likely to engage, sometimes automatically, in behaviors (e.g., SITBs) that provide relief or allow them to escape from negative and painful emotional experiences, regardless of the associated collateral damage. Thus, temporary relief often occurs at the expense of pursuing more beneficial longer-term strategies. The functions of SITBs are varied but appear to fall into two (not mutually exclusive) categories: *inter*personal, including accessing help and getting relief from distressing social interactions, and *intra*personal, including escape or avoidance of negative affect.

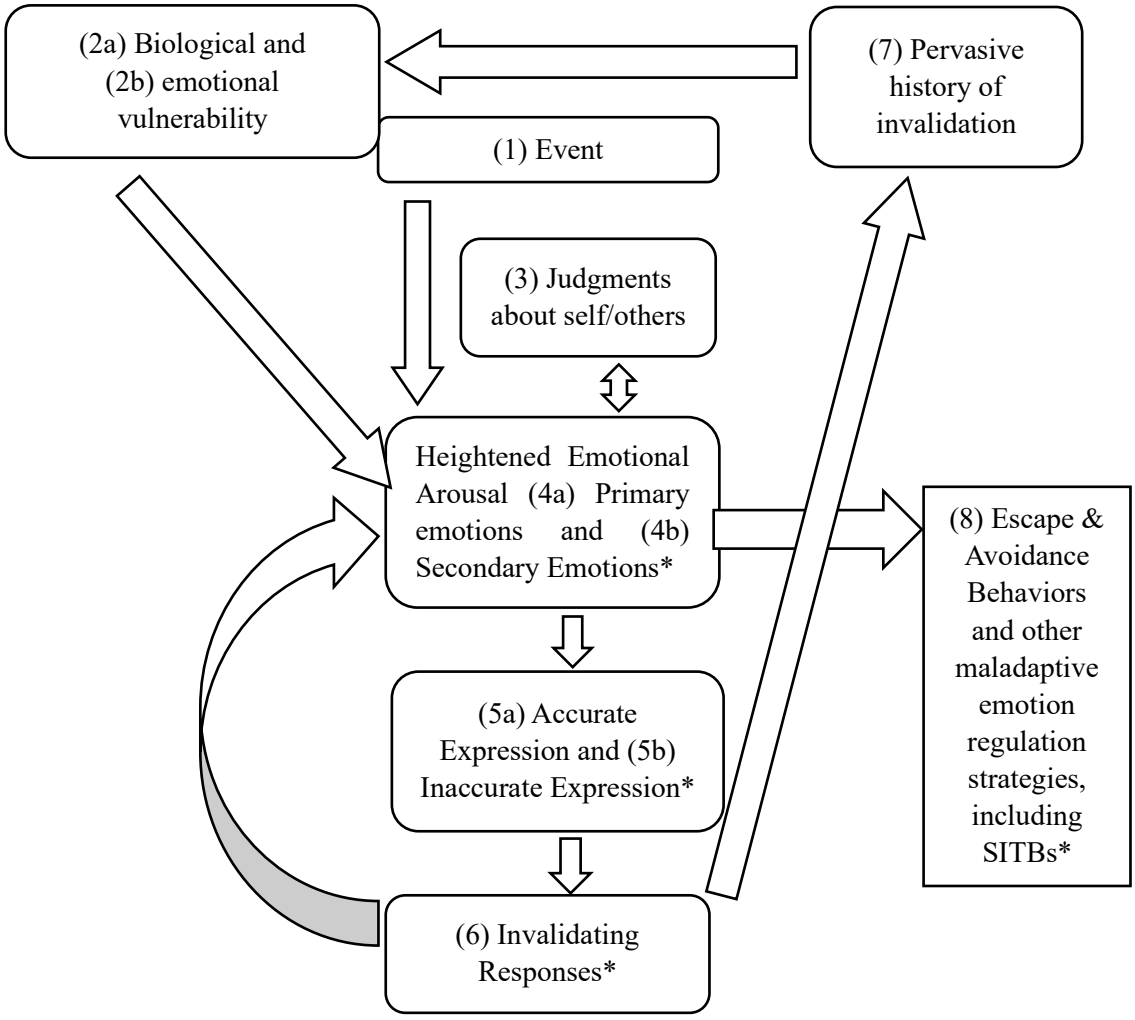

Figure 1. Transactional Model of Emotion Regulation

Interpersonal Process: Invalidation

Invalidation occurs when the other person treats the individual's behaviors, experiences, thoughts and feelings as illegitimate and invalid, and fails to accept or communicate understanding (Fruzzetti et al. 2008). Cross-sectional data suggests that invalidation in adult relationships with parents and romantic partners is associated with emotion dysregulation, difficulty tolerating distress, and BPD symptoms (Sturrock & Mellor, 2013). Studies examining the impact of invalidation on SITBs across time have found that parental invalidation, along with impulsivity and depression, were associated with subsequent engagement in NSSI behaviors (You and Leung, 2012). Maternal invalidation has also been associated with less positive and more negative affect, decreased family cohesiveness and greater adolescent oppositional-defiant behaviors, and conflict escalating behaviors in adolescents with a history of NSSI compared to controls (e.g., Crowell et al., 2013). In a follow-up study aimed at increasing maternal validation, Kaufman et al. (2020) found associated improvements in dyadic affect and interpersonal behavior (e.g., cohesiveness). However, these studies lack ecological validity, as they

relied on retrospective self-report (gathered during only two assessments over the two-year follow up) and lab-based analogue studies. The lab-based environment may have differentially impacted parent behaviors compared to a naturalistic setting. One study has utilizing EMA methods found that momentary parental invalidation, specifically more punishing responses, predicted increased momentary ratings of BPD symptoms in adolescents (Vanwoerden et al., 2022). With one exception (Sturrock & Mellor, 2013), these studies were also limited to parental invalidation, though there may be many other sources of invalidation, including friends, other family members, co-workers, and through social media. Moreover, these studies did not account for the importance of intrapersonal processes, including affective states related to risk or self-invalidation. Thus, they are unlikely to capture how these variables interact in their natural context, particularly the more time-sensitive nuances of these relationships.

Intrapersonal Processes: Shame

Evidence suggests that *intra*personal processes are relevant to suicide risk and are highly variable across time (Kleiman et al., 2017; Kleiman et al., 2018). Engaging in SITBs may be negatively reinforcing in nature by providing relief from negative affective states across time. Mou et al. (2018) found that negative affective states predicted the severity of suicidal thinking for individuals with BPD. Among negative affective states, shame occurs in a social context (Tangney & Dearing, 2003) and may be particularly relevant to SITBs and for individuals who are sensitive to invalidation from others.

There is evidence that shame increases the frequency of NSSI and reducing shame acts as a motivating variable for NSSI, specifically that NSSI down-regulates shame above and beyond other affective states (Schoenleber et al., 2014; Vanderhei et al., 2014). Many EMA studies of SITB either do not report specifically assessing shame (e.g., Fitzpatrick et al., 2020; Gee et al, 2020; Scala et al. 2018) or collapse shame into an aggregate "negative emotion/affect variable" (e.g., Kranzler et al. 2018; Victor et al. 2020). Using EMA methods, Armey and colleagues (2011) found that just prior to engaging in NSSI college students demonstrated increases anger and shame, which peaked during the episode of NSSI and then faded gradually. Moreover, that the pattern of this affective change was unique to NSSI episodes and did not occur in other behavioral contexts.

However, other studies have found that affective states, like shame, have limited utility in the prediction of short-term changes in suicidal ideation (Kleiman et al., 2017), which may be due to the dearth of information collected about social context, despite evidence that these behaviors occur most frequently when socializing (Nock et al., 2009; Shingleton et al., 2014). However, although these studies acknowledged the role of social interactions, the quality of those interactions was not evaluated, nor was its impact on intrapersonal processes. In addition, the authors did not include shame among the affective states' participants could endorse.

Integrating inter- and intrapersonal processes in the prediction of SITBs

Understanding the role of self-invalidation (i.e., thoughts or behaviors that treat one's own experience is unacceptable and illegitimate; Linehan, 1993; Fruzzetti et al., 2008) may help integrate both inter- and intra-personal processes. While to our knowledge there has not been explicit empirical evaluation of self-invalidation, there have been studies that assessed constructs that are consistent with, or overlap substantially with self-invalidation (e.g., self-derogation, self-criticism). Victor and Klonsky (2014) studied emotions as antecedents, then during and immediately following instances of NSSI. Participants identified emotions using an *in vivo* journaling method similar to EMA, as well as a retrospective report. The most common reported "emotion" was self-dissatisfaction and self-derogation, both conceptually related to self-invalidation and shame. However, these studies did not evaluate how social interactions and invalidating responses from others impacted these relationships.

Two studies did capture the relationships among social invalidation, shame, and specific forms of self-invalidation. Flett et al. (2012) found that among college women (but not men) NSSI frequency was associated with parental criticism, socially prescribed perfectionism, overgeneralization of the link between failure and self-worth, self-criticism and shame. Moreover, they found that self-criticism (a

very common form of self-invalidation) was the strongest predictor of NSSI frequency. In addition, they found that shame was associated with a sense of failing to meet social expectations and engaging in self-criticism. In a study of adolescents, Xavier and colleagues (2016) found that shame and depression predicted NSSI indirectly through daily difficulties with peers regarding opinions, beliefs and feelings. As with the previous study, self-criticism was most strongly associated with NSSI. Neither of these studies evaluated causal direction nor captured the frequency of fluctuations in experienced shame or interpersonal difficulties. A more explicit understanding, including the moment-to-moment inter- and intra-personal processes associated with SITBs, is needed.

Only one published study has evaluated the impact of both affective states and social interactions occurring in real-time and in their natural context. Victor et al. (2019) found that internalized negative affect (i.e., shame, guilt, loneliness, and sadness) mediated the relationship between perceived criticism and rejection from others on urges for NSSI and suicide in a sample of women. However, the collapsing of specific affective states limits our understanding of these emotions separately. In addition, the study did not assess whether these negative emotions led to greater self-invalidation or criticism, which could increase the salience of shame and play a key role in increasing the likelihood of subsequent urges.

The Current Study

To our knowledge there has been no explicit evaluation of the transactional model in relation to SITBs using EMA methodology, nor has there been empirical evaluation of the role of self-invalidation specifically in the broader literature. To address these limitations in the literature, the current study is aimed to evaluate the feasibility and acceptability of assessing key elements of the transactional model (e.g., Crowell et al., 2008; Fruzzetti et al., 2005; Linehan, 1993) using EMA methods, and the promise of such assessment with regard to prediction of SITB. Specifically, this study examined (1) whether relationships among social invalidation, heightened shame, self-invalidation, and SITBs could be captured using EMA methods and was acceptable to participants, and whether there was evidence to support theory-derived relationships, including: (2a) whether invalidating responses during social interactions increase immediate self-invalidation and shame; (2b) whether social invalidation, self-invalidation and shame following social interactions increase immediate emotion regulation-related maladaptive coping strategies, particularly SITBs; and finally (2c) whether self-invalidation and shame mediate the relationship between invalidation by others and SITBs.

Method

All study procedures, assessments, and assessment schedule were approved by the university institutional review board.

Participants

Participants were recruited via flyers sent to listservs for professionals treating SITBs, and advertisements on relevant websites and discussion forums (e.g., Reddit self-harm support subreddits). After screening, 25 participants completed the baseline assessment and enrolled in the study (see Figure 2), three of whom did not respond to any prompts. One participant requested to end participation early. See Table 1 for sample characteristics.

Table 1. Participant descriptive characteristics of sample (N = 21)

Demographics		%(n)
Age (Mean ± SD)		28.02 ±6.74
Race		
	White	90.5(19)
	Black	4.8(1)
	Asian	4.8(1)
Ethnicity		
	Hispanic/LatinX	9.5(2)
	None of these	90.5(18)
Sex		
	Female	85.7(18)
	Male	14.3(3)
Income per year		
	Less than $30,000	52.3(11)
	$30k-$49,999	23.8(4)
	$50k-$79,999	0.0(0)
	$80k-$99,999	14.3(3)
	$100k-$149,999	4.8(1)
	More than $150,000	4.8(1)
Type of Therapy		
	Dialectical Behavior Therapy	47.6(10)
	Cognitive Behavior Therapy	19.0(4)
	Other (Eclectic)	9.5(2)
	Don't Know	14.3(3)
	Not in therapy	9.5(2)

Procedures

Recruitment, consent and baseline

Prior to consent, participants were screened via online survey for eligibility criteria: currently residing in the United States, 18+ years of age, fluent in English, a history of four or more instances of self-harm broadly (including NSSI and suicide behaviors), urges for NSSI or suicide ideation within the last two weeks, and access to a smart phone with a data plan. In addition, participants were ineligible if there was evidence of psychotic symptoms within the last month as SITBs may function differently within this population.

Criteria related to recent and lifetime SITBs were based on desire to recruit a high acuity, chronic sample of individuals engaging in SITBs, including data that suggest that there is a steep increase in odds for suicidal behaviors associated with 4+ lifetime instances of NSSI (Paul et al., 2015) and data suggesting more frequent NSSI is differentially associated with problematic client trajectory compared to moderate and low frequency of NSSI (e.g., Muehlenkamp et al., 2017), balanced with not wanting to exclude individuals engaging in suicidal behaviors (e.g., attempts) who are not engaging in NSSI.

After consenting, participants completed the baseline assessments and then were provided a link to enroll in SurveySignal, a short message service (SMS) distribution service, for the EMA phase. Participant engagement was incentivized via a lottery system: for every completed assessment (i.e., baseline, 56 survey prompts, and debrief questionnaire) participants were entered into a lottery, for a maximum of 58 entries. Participants had approximately a 1 in 25 chance at receiving a $250 Amazon gift card.

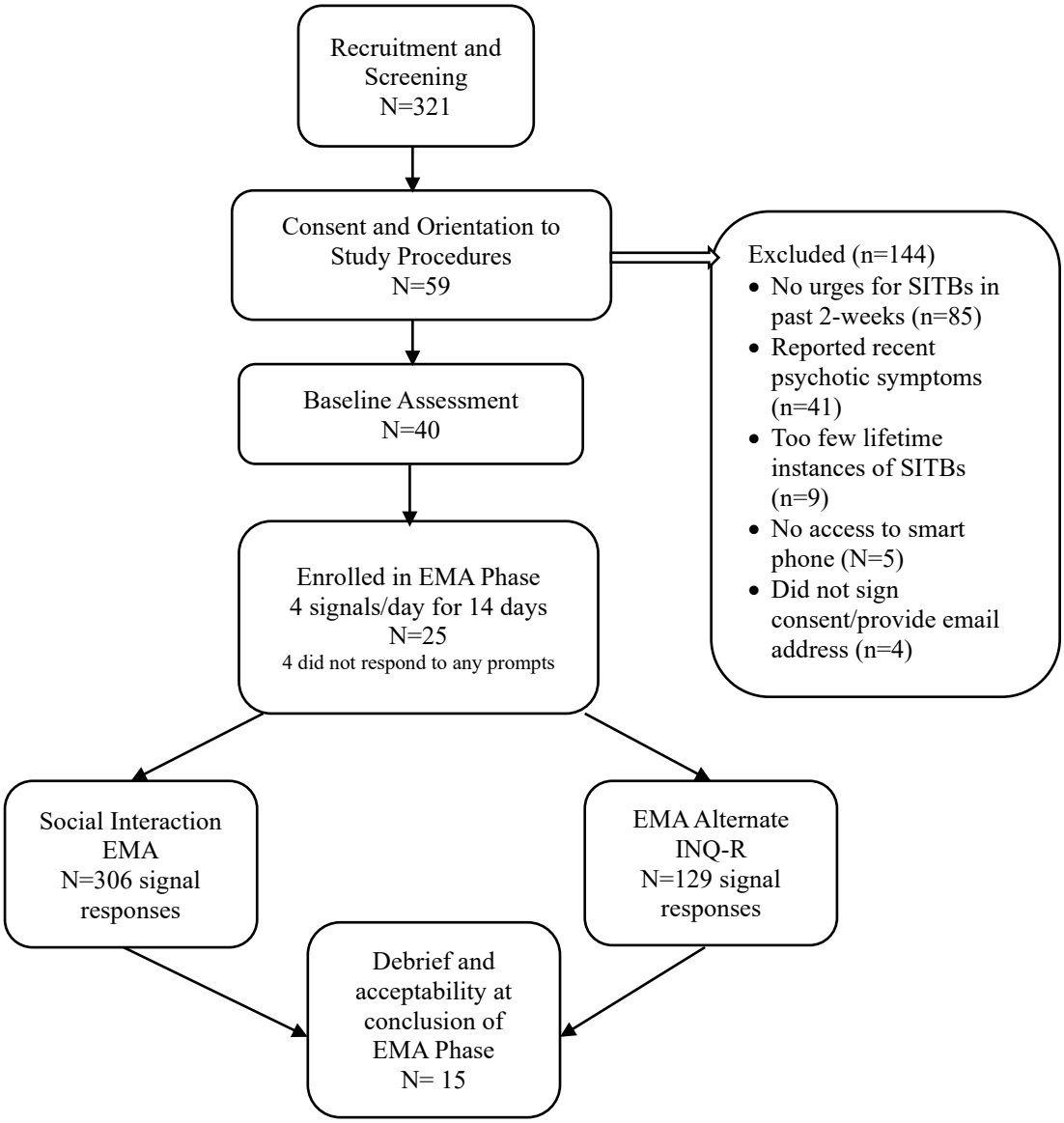

Figure 2. Participant Flow

EMA phase

During the monitoring phase survey prompts were sent SMS/text messages by SurveySignal four times daily for 14 days, for a total of 56 prompts. Frequency of prompts was based on existing EMA literature (e.g., Nock et al., 2009; Kleiman et al., 2017). For each day of participation, texts were randomized across three-hour time blocks to reduce the possibility of missing important social interactions (Shiffman et al., 2008). Prompts were delivered at random times within preset blocks (e.g., random time within 9am-11am window), however overall time frame (i.e., 9am-9pm) was the same for all participants. Each text included a link to the EMA survey on Qualtrics. If participants had a social interaction within the previous hour they were given the Social Interaction EMA (SI-EMA) survey, and if not they were given another survey to control for survey length and response burden. Regardless of which EMA survey they completed, if dangerous behaviors were endorsed above a one on a 0 to 5 scale, participants were provided emergency and crisis numbers, along with a prompt to contact their therapist if they had one, as well as a reminder that the data were not monitored by research or other staff.

Measures

Baseline and screening measures

Participants completed measures at screening and baseline relevant to the current study: 1) Psychosis Screening Questionnaire (PSQ; Bebbington & Nayani, 1995) is a 12-item interview that assesses the presence of psychotic symptoms. The PSQ has demonstrated sensitivity and specificity in the detection of psychosis. Questions from the PSQ interview were delivered as self-report questions without adaptation from the original instrument, with the exception that the timeframe was limited to the past two-months, rather than the past year. A positive screen (i.e., endorsement of psychotic symptom and associated follow-up questions) was used to screen participants out. 2) Demographics survey assessing age, race, sex, as well as current mental health treatment, 3) Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), a 36-item survey evaluating the severity of emotion dysregulation. The DERS has demonstrated reliability and validity, and internal consistency for the total score in this sample was $\alpha = .87$. 4) DBT Ways of Coping Checklist (DBT-WCCL; Neacsiu et al. 2010) consists of 56-items assessing both functional (DSS) and dysfunctional coping strategies (DCS) that are commonly used to regulate emotions. The WCCL has demonstrated reliability and internal consistency. Internal consistency of measure subscales in this sample was DSS $\alpha = .93$ and DCS $\alpha = .87$. The WCCL was not included as a primary outcome measure, but as an additional means of contextualizing the sample to evaluate feasibility. Additional measures were given to assess potential moderators (e.g., shame-proneness, severity of emotion dysregulation). However, due to the limited sample size these measures were not included in analysis.

Ecological momentary assessment (EMA)

In each EMA survey participants were first asked if they had a social interaction within the last hour. The last hour was selected to ensure recollection was recent and limit the possibility of multiple distressing interactions. Based on whether they had a social interaction, they were either given the social interaction EMA (SI-EMA) or an alternative to provide a control for engagement. For consistency and ease of participant response, all Likert-type items were rated on a 0-5 scale ("Very slightly, not at all" to "Very or A Lot").

The SI-EMA included items taken from the Validating and Invalidating Response Scale (VIRS; Lee et al., 2012) and Self-validating and Invalidating Scale (SVSI, Davis et al., Under Review). The VIRS assesses both validating and invalidating responses from others. Items used included questions assessing observable behavior from others (e.g., "The person paid attention to me.") as well as more explicit interpretations of behavior (e.g., "The person treated my thoughts and feelings like they were reasonable."). In contrast, the SVSI assesses the degree to which the individual engages in self-validating or invalidating behaviors (e.g., "I felt like I was overreacting."). Both measures have demonstrated good internal consistency and reliability. However, because of concerns regarding

assessment burden only items consistent with EMA methods were used from these measures and were selected in collaboration with the measure developers. In addition, validating and invalidating antecedents were combined into a single score for social and self-invalidation, with higher scores being indicative of greater invalidation. See supplemental materials for a complete copy of the survey.

To control for assessment length, individuals who had not had a social interaction within the allotted timeframe were given the Interpersonal Needs Questionnaire—Revised (INQ-R; Van Orden, et al., 2012). The INQ-R assesses perceived burdensomeness and thwarted belongingness, which are considered risk factors for SITBs. However, given the small sample size this variable was not evaluated in the current study.

In addition, all participants provided 0-5 Likert-type ratings for subsequent affective states (e.g., loneliness, shame) and their urges for maladaptive emotion regulation strategies, including NSSI, suicide, substance use, and disordered eating, and reported (yes/no) whether they had just engaged in those behaviors.

Acceptability survey

After completion of the entire EMA phase participants were given a study-specific questionnaire aimed at assessing acceptability. Questions assessed study procedures (e.g., "Getting to the surveys from the text message prompt was easy."), item clarity (e.g., "The survey questions were easy to understand.") and experience responding to survey questions (e.g., "Some of the survey questions made me uncomfortable or upset."). All items were rated on a 0-10 Likert-type scale (0-not at all to 10-very). Participants were also able to provide comments regarding their response, as well as any additional feedback at the end of the survey.

Statistical Analyses

To evaluate feasibility and acceptability, response rates to EMA prompts as well as descriptive data from the debriefing questionnaire were evaluated. In addition, feasibility of recruitment was also assessed using descriptive information regarding baseline sample emotion dysregulation and skills use, along with information regarding experiences of SITB urges.

Analyses evaluating relationships between study variables were conducted using the "Lavaan" package for R (Rosseel, 2012). Data and were analyzed using two multilevel parallel mediation models which specified a within person mediation process, wherein shame and self-invalidation mediated the relationship between invalidation by others and urges for NSSI and suicide. Intercepts were allowed to randomly vary at the within-person level (see Figure 3). All observations were included in these models, including responses where urges for NSSI and suicide were rated as zero on the 0-5 scale. Due to the low incidence of engaging in SITBs these variables were not included in analysis

Initially, the analytic plan included examination of between-person level relationships. However, due to difficulties with recruitment during the COVID-19 pandemic and the resulting decrease in social interactions among participants (even while including distanced interactions, such as video chat), examination of these relationships is underpowered. A revised analytic plan was developed, wherein between-person effects were included in the model to better understand the unique contributions of person-level fluctuations, but would not be interpreted due to likely power limitations. It should be noted for all analyses that, given the data structure, a temporal relationship can only be assumed to exist where social invalidation was the antecedent, and therefore the predictor variable and shame, self-invalidation or SITBs were the outcome variables. All questions assessing these outcome variables were framed as being *subsequent* to the social interaction. However, the relationships among shame, self-invalidation and SITBs could be either uni-directional or bi-directional. All variables were modeled at contemporaneously (i.e., at the same timepoint).

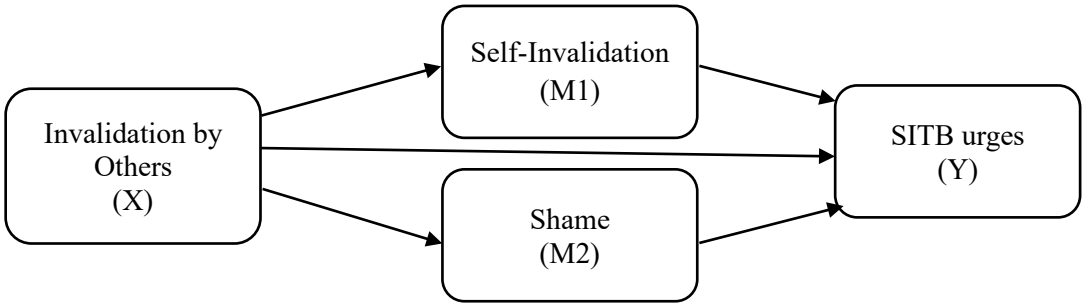

Figure 3. Multilevel Mediation Model: Both Between and Within Person Modeling of the Impact of Invalidation by Others on SITB Urges, Mediated by Self-Invalidation and Shame.

Results

Feasibility and Acceptability

Over the course of the study the response rate for the EMA surveys was 48.5%. Social interactions were reported in 70.3% of responses. Of the participants who completed more than 2 days of EMA data (n = 16), 31.3% completed at least one prompt per day. Despite the relatively low compliance rate, participants who completed the baseline (n = 17) generally gave favorable feedback (see table 2), including high ratings of willingness to participate in similar research in the future (M = 8.76, SD = 2.36).

Table 2. Debrief Survey Feedback

	Min	Max	*M*	*SD*
Participation was acceptable	1.0	10.0	7.76	2.28
Questions were easy to understand	5.0	10.0	9.18	1.55
The Instructions were clear	6.0	10.0	9.47	1.18
Survey questions were interesting	1.0	10.0	6.24	2.77
Survey questions made me uncomfortable or upset	1.0	10.0	3.65	3.14
I enjoyed answering the survey questions overall	1.0	10.0	6.59	2.83
Willingness to participate in future studies	2.0	10.0	8.76	2.36

Baseline measures indicated scores consistent with a highly emotionally dysregulated population. DERS scores were above typical clinical cut-offs (M_{DERS} = 126.05, SD = 16.67; Gratz & Roemer, 2004]). Moreover, the sample was consistent with other clinical samples in terms of engaging in dysfunctional coping ($M_{WCCL\text{-}DCS}$ = 2.04, SD = .45, $Range$ = 1.25 – 2.75) and limited access to more adaptive coping strategies ($M_{WCCL\text{-}DSS}$ = 1.49, SD = .45, $Range$ = .13 – 2.24; Neacsiu et al., 2010). SITB urges across the EMA period were endorsed in 38.8% of total prompts. NSSI urges were endorsed for 23.4% of EMA prompts (M = .97, SD = .97) and suicide urges in 29.9% (M = .94, SD = .93).

Transactional Model

Study aims related to examining relationships among variables consistent with the transactional model were evaluated using the *Lavaan* package for R (Rosseel, 2012). Data and were analyzed using two multilevel parallel mediation models which specified a within person mediation process, wherein shame and self-invalidation mediated the relationship between invalidation by others and urges for NSSI

(model 1) and suicide urges (model 2). Intercepts were allowed to randomly vary at the within-person level.

Data screening and assumptions

Visual inspection of subject scatterplots indicated that relationships were linear and in the expected direction for many, but not all of the participants. There did not appear to be any significant time trends in the data. While inclusion of a time-centered variable is generally desirable, in the absence of apparent time trends (Bolger & Laurenceau, 2013), and due to the small sample size, we did not include the time centered covariate in the model. Normality was assessed using standardized scores for skew and kurtosis with a cut-off 1.96. All variables were non-normal. However, visual inspection of multivariate residuals indicated they approached a normal distribution, and because regression procedures tend to be robust to normality assumptions when residuals are normally distributed, analyses were conducted normally. Five participants were removed during data screening due to large amounts of missing data (e.g., only 1-2 days of EMA data), resulting in a final sample of 16.

In order to evaluate the hypotheses, betas, along with their standard error and 95% CI's were calculated for both fixed effects (i.e., regression lines for relationship pathways) and random effects (i.e., intercepts). There was a very low incidence of missing data at the individual case level (i.e., <1% of observations had at least one missing response to a study variable) that was found to be missing completely at random (Little's MCAR test: $\chi^2 = 11.75$, $df = 13$, $p = .55$). Full information maximum likelihood estimation was used to address missing data points, this approach avoids listwise deletion and performs produces estimates that are consistent with those derived from complete data (Lee & Shi, 2021). Table 2 presents results for both models.

Does Greater Social Invalidation Increase Immediate Occurrence of Self-invalidation and Shame?

The fixed effects of social invalidation on self-invalidation and shame were examined at the within-person level. Results were significant for both self-invalidation ($b = .09$, $SE = .04$, $p = .046$, 95% CI [.001, .17]) and shame ($b = .03$, $SE = .01$, $p = .023$, 95% CI [.004, .05,]) and were in the expected direction. These relationships at the within-person level accounted for a small amount of variance within the model ($R^2_{\text{self-invalidation}} = .013$ and $R^2_{\text{shame}} = .017$). This result indicates that as ratings of invalidation increased there was a subsequent (though small) increase in self-invalidation and shame scores.

Are Social invalidation, Subsequent Self-invalidation and Shame Following those Social Interactions, Associated with Increased Urges for SITBs?

Examination of the fixed effects of invalidation, self-invalidation and shame on NSSI and suicide provided mixed support for the transactional model. Shame was significantly associated with NSSI urges at the within-person level ($b = .23$, $SE = .05$, $p < .001$, 95% CI [.13, .33]), as were self-invalidation ($b = .06$, $SE = .01$, $p < .001$, 95% CI [.03, .08]), and social invalidation ($b = .02$, $SE = .01$, $p = .01$, 95% CI [.004, .03]). These relationships approached significance for the model with suicide urges as the outcome variable (see Table 3).

Does Self-invalidation and Shame Mediate the Relationship between Invalidation by Others and SITBs?

For NSSI, the direct effect of social invalidation was significant ($b = .01$, $SE = .00$, $p = .004$, 95% CI [-.02, .004]). The indirect effect of social invalidation on NSSI through self-invalidation was not significant ($b = -.01$, $SE = .00$, $p = .08$, 95% CI [.00, .01]). However, the indirect effect of social invalidation on NSSI urges through shame was significant ($b = -.01$, $SE = .00$, $p = .04$, 95% CI [.00, .01]). Only the direct effect of social invalidation on suicide urges was significant ($b = .00$, $SE = .01$, $p = .01$, 95% CI [.00, .01]). Neither of the indirect effects of social invalidation on suicide urges through self-invalidation and shame were significant. Study variables at the within person level, including direct and indirect effects, accounted for 22.3% variance in NSSI ratings and 6.2% of suicide ratings.

Table 3. Multilevel Mediation-- Fixed Effects of Invalidation on Self-Invalidation and Shame, and Invalidation, Self-Invalidation and Shame on NSSI and Suicide Urges

Within-Person Effects	Self-Invalidation		Shame		NSSI Urges		Suicide Urges	
	B (SE)	95% CI	B (SE)	95% CI	B (SE)	95% CI	B (SE)	95% CI
Invalidation	.09 (.04)*	.00, .17	.03 (.01)*	.00, .05	.02 (.01)*	.00, .03	.01 (.01)†	.00, .03
Self-Invalidation					.06 (.01)***	.03, .08	.03 (.01)†	-.00, .05
Shame					.23 (.05)***	.13, .33	.08 (.05)†	-.01, .18
Direct Effect: Invalidation					.01 (.00)**	.00, .02	.00 (.01)*	.00, .01
Indirect Effect: Self-Invalidation					.01 (.00)†	.00, .01	.00 (.00)	-.00, .01
Indirect Effect: Shame					.01 (.00)**	.00, .01	.00 (.00)	-.00, .01
Between-Person Effects	**Self-Invalidation**		**Shame**		**NSSI Urges**		**Suicide Urges**	
	B (SE)	**95% CI**	**B (SE)**	**95% CI**	**B (SE)**	**95% CI**	**B (SE)**	**95% CI**
Invalidation	.59 (.33)†	-.06, 1.23	.24 (.10)*	.06, .43	-.001 (.11)	-.22, .24	.07 (.15)	-.22, .35
Self-Invalidation					-.14 (.11)	-.36, .08,	-.21 (.14)	-.49, .06
Shame					.83 (.40)*	.02, 1.64	.08 (.05)†	-.01, .18

†$p < .10$, *$p \leq .05$, **$p \leq .01$, ***$p \leq .01$

Note: NSSI = Non-suicidal self-injury. Additionally, NSSI and Suicide Urge models were modelled separately, but are reported together here

Discussion

A greater understanding of the proximal antecedent variables to SITBs is critical to assess and intervene on SITBs more effectively, as well as to prevent SITBs more generally. This study aimed to evaluate the feasibility and acceptability of evaluating the transactional model of emotion regulation, as well as the role of proximal variables suggested by the model that may be associated with SITBs. This is particularly necessary given that real-time evaluation of variables related to the transactional model have been limited to lab-based analogue studies of parent-child dyads. Moreover, inclusion of specific affective states or the role of self-invalidation within the existing literature is limited. Results of this study suggest that EMA evaluation of the transactional model was somewhat feasible and acceptable to participants. Participants were able to report on social interactions regularly and reported that EMA survey procedures and questions were acceptable and understandable in the debrief survey at the conclusion of the EMA phase. However, it should be noted that study acceptability questions were created by the authors, and not based on validated acceptability measures.

An additional issue is the relatively low EMA response rate. Meta-analyses of EMA response rates generally suggest higher compliance broadly (e.g., 79%; Wrzus & Neubauer, 2022) and in suicidal populations more specifically (range 52% - 89.7%; Sedano-Capdevila et al., 2021). It is unclear what factors contributed to poor compliance. There are two potential contributors unrelated to study procedures that are likely: (1) timing of the study in the context of the emergence of the COVID-19 pandemic, and (2) incentive structure. Recruitment for this study began in February of 2020 through August of 2020, during the emergence of COVID-19 and months surrounding implementation of quarantine procedures and thus represent a period of extraordinary uncertainty. A comparison of the

signal responses completed before and after May 15th, 2020 (chosen due to greater consistency in social distancing measures nationally [Adolph et al., 2020]) showed that the percent of responses that reported on a social interaction had dropped from 88% to 63%. At debrief 100% participants reported that their social interactions had decreased due to the pandemic, and one participant reported that it had specifically been aversive to be asked about social interactions at a time of isolation. It is possible that the nature of the study combined with the timing of its deployment resulted in participant avoidance of EMA prompts.

In addition to the impact of the pandemic, incentive structure may also have contributed to poor compliance. Incentives have been associated with higher EMA compliance rates, data quality, and willingness to participate (Wrzus & Neubauer, 2022). Experimental studies manipulating incentive schedule among other strategies to increase compliance found that increasing incentives was the only reliable means of increasing participation in EMA protocols (Kleiman et al., 2021). Moreover, in suicidal populations poorer EMA compliance rates have been seen in studies where compensation was not directly tied to study participation (Rodriguez-Blanco et al., 2018). As this study was unfunded there were limitations to incentivizing participation, and it is likely that the value of a raffle entry was insufficiently incentivizing. Replication would help understand whether there were specific effects due to study procedures, incentives, or "COVID cohort" effects present that may have influence participation overall, as well as the frequency, quality, and impact of social invalidation.

Interestingly, despite the compliance rate and external sources of stress, participants reported a high degree of willingness to participate in future studies, even when responding to survey questions caused moderate discomfort. It is also possible that participating in the EMA protocol itself had a salutary diminishing effect on urges for SITBs generally (Denchev et al. 2018), and on suicide urges in particular. This was supported by those who completed the debriefing survey (n = 4) who reported that participation in the EMA helped them track and validate emotions, as well as cope more positively. However, replication studies may require additional recruitment strategies to achieve a sample representative of the broader population of individuals engaging in SITBs, and/or more completed samples for each participant, as the final sample had relatively modest ratings of urges for NSSI and suicide and the majority were recruited from support-based discussion forums. All of these factors suggest the sample may have tended toward high motivation for improvement. Together, this sample may be more representative of an in-treatment sample and less a cross section of people engaging in SITBs.

In terms of the evaluation of the transactional model, at the within-person level social invalidation was associated with increased shame, self-invalidation, and NSSI urges. Also in support of the model were significant associations between NSSI urges and self-invalidation, as well as shame. Additionally, shame partially mediated the relationship between social invalidation and NSSI urges. These results provide some preliminary evidence for a portion of the transactional model of emotion regulation; specifically, that invalidating responses from others are associated with heightened shame and increase the likelihood of further self-invalidating responses. In addition, they underscore the salience of shame and self-invalidation in the understanding of SITBs. Findings also provide additional support for the core of the transactional model, namely that social invalidation, self-invalidation and heightened shame (dysregulated emotion) are associated with SITBs. While these relationships only approached significance with regard to suicide, this may be due to the sample being underpowered to detect an effect, particularly given that there was less variability in suicide ratings (i.e., 93.4% of ratings were $\leq$ 2) compared to NSSI urges, as well as the sample's high engagement in treatment. However, given the temporal structure of the data, it is important to note that directionality and prediction cannot be assumed. It is also conceivable, and the transactional model would support, that these variables also function in the opposing direction (i.e., dysregulated emotion, and associated SITBs, predicting invalidation). Future studies would benefit from larger samples with more observations that would allow for assessment of temporal relationships, as well as consideration of different variable structures consistent with the larger transactional model (e.g., serial mediation, opposing directionality) to identify

the most complete and parsimonious representation of the relationships among social invalidation, shame and self-invalidation in the prediction of SITBs.

Taken together, these findings illustrate the need for interventions that promote resilience and positive coping in response to invalidating social and family environments that are not necessarily amenable to change, or at least not able to change readily. They also support delivery of interventions in the social and family environments to increase validation and decrease invalidation before SITBs become more entrenched behaviors. Treatments consistent with the transactional model of emotion dysregulation, such as Dialectical Behavior Therapy (DBT, Linehan, 1993), as well as parent, couple or family programs (e.g., multifamily DBT groups (Miller et al., 2006), Family Connections (Hoffman et al., 2005), or parent skills (Payne & Fruzzetti, 2022) that focus on parents, partners or others developing acceptance and validation skills to help others regulate painful emotions, including shame, may be particularly helpful for this population.

Given that one goal of the current study was to inform a larger replication, there are a number of next steps and limitations we plan to address in the future. The small sample size limits the confidence with which findings can be interpreted. It also limits the number of variables and parameters that could be included in evaluation of the transactional model (e.g., potential moderators, covariance of slopes and intercepts). This is unfortunate, as the significant variation among intercepts hints at the presence of one or more moderating variables (e.g., severity, shame-proneness) that were not able to be included in the model. The study also suffered from a lack of sample diversity, and subsequent replication will require oversampling persons of color as well as male participants, to ensure inclusivity and to evaluate whether these relationships operate similarly across person and demographic differences.

An additional limitation is the way in which social invalidation was scored. By combining validating and invalidating antecedents into a single scale it may be that nuances in the data were not captured. For example, some interactions are likely characterized by both validating and invalidating social responses (e.g., "I'm sorry you feel that way, but you did not try hard enough," when there was effort); in these cases the invalidation was very salient but may not have been captured by the scale. In addition, there may be differences in the impact of social invalidation based on the relationship with the person. For example, social invalidation from some people may have a much greater impact than others, depending on the type of relationship.

Finally, as noted these data were collected from late February 2020 – early August 2020, during the emergence of the COVID-19 pandemic, which may have affected both participation in general and results specifically. Even among those who were able to complete questions based on interactions, they likely largely occurred online or through other electronic means, during a challenging social transition due to the pandemic. This may have provided limited opportunities for validation or increased opportunities for invalidation (e.g., misunderstandings via text messages, inattention during video-calls). The importance and quality of the relationship to others may also have been impacted by COVID-19 (e.g., more interactions online with less important individuals). This may have increased the salience of other cues for SITBs (e.g., loneliness) that become more relevant in the absence of social transactions and their sequelae and may have resulted in very conservative outcomes related to social invalidation.

In addition to addressing these limitations, identification of potential moderating variables, as well as comparisons with other explanatory models (e.g., the Interpersonal Theory, Hopelessness Theory) would be useful in increasing specificity from a precision medicine perspective. Additionally, because disorders characterized by SITBs (e.g., BPD, some forms of depression, and any problems that include very severe emotion dysregulation) may include transient psychotic symptoms, future studies would benefit from either a more temporally proximal cut-off for psychotic symptoms or a more flexible approach, such as assessing the intensity and level of impairment due to psychotic symptoms at baseline. Future studies may also benefit from partnerships with local emergency departments or other recruitment methods in order to recruit a sample that is both severe and less effective in marshalling resources (e.g., treatment access, use of additional online supports). Finally, despite attempts to recruit a sample currently experiencing SITBs, these behaviors still occur at relatively low rates, and therefore

days without urges may have influenced model estimates. Removal of days without urges may also limit generalizability, thus statistical approaches that model days without urges and days with urges concurrently and separately (e.g., zero-inflated models; Zuur, et al. 2009) may be helpful, though such approaches are not currently compatible with mediation and require larger sample sizes (Channouf et al., 2014).

This study represents a first step at examining the relationships among inter- and intra-personal variation in social invalidation, self-invalidation, shame and SITBs. These data suggest that EMA methods assessing relationships between social invalidation, self-invalidation and shame are feasible and warrant further study in the prediction of SITBs. Moreover, present data suggest that studies and interventions attempting to assess and intervene on more proximal variables to SITBs would benefit from inclusion of these variables. They also provide a preliminary argument for interventions for both the individual and the social and family environments that increase validation skills and skills for regulating or managing the experience of shame. In addition to attempting to evaluate the role of specific variables in the prediction of SITB urges, this study also provides tentative but promising support for an organizing theory and associated mechanisms.

Additional Information

Supplementary Material

EMA items available at https://osf.io/6fwk2

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Conflict of Interest

None

Ethical approval

All study materials and procedures were approved by the University of Nevada, Reno Institutional Review Board (#1343510-1)

Data Availability

Data is available upon reasonable request to the first author

Author CRediT Statement

Allison Ruork: Conceptualization, project administration, methodology, data management, formal analysis, investigation, writing of original draft. *Holly Hazlett-Stevens:* Conceptualization, supervision, review and editing of drafts; *Alan Fruzzetti:* Conceptualization, methodology, primary supervision, review and editing of drafts

References

Adolph, C., Amano, K., Bang-Jensen, B., Fullman, N., & Wilkerson, J. (2020). Pandemic politics: Timing state-level social distancing responses to COVID-19. *medRxiv*.

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*(4), 579-588.

Bebbington, P., & Nayani, T. (1995). The psychosis screening questionnaire. *International Journal of methods in Psychiatric research, 5*(1), 11–19.

Bolger, N., & Laurenceau, J. P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. New York, NY: Guilford Press.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological bulletin*, *56*(2), 81.

Centers for Disease Control and Prevention (2020). National Center for Injury Prevention and Control. Ten Leading Causes of Death and Injury. Retrieved May 2, 2022. https://www.cdc.gov/injury/wisqars/LeadingCauses_images.html

Channouf, N., Fredette, M., & MacGibbon, B. (2014). Power and sample size calculations for Poisson and zero-inflated Poisson regression models. *Computational statistics & data analysis*, *72*, 241-251.

Crowell, S. E., Baucom, B. R., McCauley, E., Potapova, N. V., Fitelson, M., Barth, H., Smith, C. J., & Beauchaine, T. P. (2013). Mechanisms of contextual risk for adolescent self-injury: Invalidation and conflict escalation in mother–child interactions. *Journal of Clinical Child & Adolescent Psychology*, *42*(4), 467-480.

Crowell, S. E., Beauchaine, T. P., & Lenzenwger, M. F. (2008). The development of borderline personality disorder and self-injurious behavior. *Child and adolescent psychopathology*, 510-539.

Denchev, P., Pearson, J. L., Allen, M. H., Claassen, C. A., Currier, G. W., Zatzick, D. F., &
Schoenbaum, M. (2018). Modeling the cost-effectiveness of interventions to reduce suicide risk among hospital emergency department patients. *Psychiatric services*, *69*(1), 23-31.

Fitzpatrick, S., Kranzler, A., Fehling, K., Lindqvist, J., & Selby, E. A. (2020). Investigating the
role of the intensity and duration of self-injury thoughts in self-injury with ecological momentary assessment. *Psychiatry research*, *284*, 112761.

Flett, G. L., Goldstein, A. L., Hewitt, P. L., & Wekerle, C. (2012). Predictors of deliberate self-harm behavior among emerging adolescents: An initial test of a self-punitiveness model. *Current psychology*, *31*(1), 49-64.

Fox, K. R., Huang, X., Guzmán, E. M., Funsch, K. M., Cha, C. B., Ribeiro, J. D., & Franklin, J.
C. (2020). Interventions for suicide and self-injury: A meta-analysis of randomized controlled trials across nearly 50 years of research. *Psychological bulletin*, *146*(12), 1117.

Fruzzetti, A.E., Crook, W., Erikson, K., Lee, J., & Worrall, J. M. (2008). Emotion regulation. In W. T. O'Donohue & J. E. Fisher (Eds.), *Cognitive behavior therapy: Applying empirically supported techniques in your practice* (2nd Ed) (pp. 174-186). New York: Wiley.

Fruzzetti, A. E., & Shenk, C. (2008). Fostering validating responses in families. *Social Work in Mental Health*, *6*(1-2), 215–227.

Fruzzetti, A. E., Shenk, C., & Hoffman, P. D. (2005). Family interaction and the development of borderline personality disorder: A transactional model. *Development and Psychopathology, 17*, 1007-1030.

Garnett M.F., Curtin S.C. & Stone D.M. (2022). Suicide Mortality in the United States, 2000–2020. NCHS Data Brief. 2022;(433):1-8.

Gratz, K. L. (2003). Risk factors for and functions of deliberate self-harm: An empirical and conceptual review. *Clinical Psychology: Science and Practice*, *10*(2), 192-205.

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.

Gee, B. L., Han, J., Benassi, H., & Batterham, P. J. (2020). Suicidal thoughts, suicidal behaviours and self-harm in daily life: A systematic review of ecological momentary assessment studies. *Digital health*, *6*, 2055207620963958.

Hoffman, P. D., Fruzzetti, A. E., Buteau, E., Neiditch, E. R., Penney, D., Bruce, M. L., Hellman, F., & Struening, E. (2005). Family connections: a program for relatives of persons with borderline personality disorder. *Family process*, *44*(2), 217-225.

Hufford, M. R. (2007). Special methodological challenges and opportunities in ecological momentary assessment. *The science of real-time data capture: Self-reports in health research*, 54-75.

Kaufman, E. A., Puzia, M. E., Godfrey, D. A., & Crowell, S. E. (2020). Physiological and behavioral effects of interpersonal validation: A multilevel approach to examining a core intervention strategy among self-injuring adolescents and their mothers. *Journal of Clinical Psychology*, *76*(3), 559-580.

Kleiman, E. M., Turner, B. J., Fedor, S., Beale, E. E., Huffman, J. C., & Nock, M. K. (2017). Examination of real-time fluctuations in suicidal ideation and its risk factors: Results from two ecological momentary assessment studies. *Journal of abnormal psychology*, *126*(6), 726.

Kleiman, E. M., Coppersmith, D. D., Millner, A. J., Franz, P. J., Fox, K. R., & Nock, M. K. (2018). Are suicidal thoughts reinforcing? A preliminary real-time monitoring study on the potential affect regulation function of suicidal thinking. Journal of affective disorders, 232, 122-126.

Kranzler, A., Fehling, K. B., Lindqvist, J., Brillante, J., Yuan, F., Gao, X., Miller, A. L., & Selby, E. A. (2018). An ecological investigation of the emotional context surrounding nonsuicidal self-injurious thoughts and behaviors in adolescents and young adults. *Suicide and Life-Threatening Behavior*, *48*(2), 149-159.

Kuo, J. R., & Linehan, M. M. (2009). Disentangling emotion processes in borderline personality disorder: physiological and self-reported assessment of biological vulnerability, baseline intensity, and reactivity to emotionally evocative stimuli. *Journal of abnormal psychology*, *118*(3), 531.

Lee, J.**,** Lee, M., Hyun, M., & Fruzzetti, A.E. (2012). Validity study of the Validating and Invalidating Response Scale (VIRS) among college women with dating violence. *The Journal of Stress, 20*, 159-167.

Lee, T., & Shi, D. (2021). A comparison of full information maximum likelihood and multiple imputation in structural equation modeling with missing data. *Psychological Methods*, *26*(4), 466–485. https://doi.org/10.1037/met0000381

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. Guilford.

McKenzie, K. C., & Gross, J. J. (2014). Nonsuicidal self-injury: An emotion regulation perspective. *Psychopathology*, *47*(4), 207–219.

Miller, A. L., Rathus, J. H., & Linehan, M. M. (2006). *Dialectical behavior therapy with suicidal adolescents*. Guilford Press.

Mou, D., Kleiman, E. M., Fedor, S., Beck, S., Huffman, J. C., & Nock, M. K. (2018). Negative affect is more strongly associated with suicidal thinking among suicidal patients with borderline personality disorder than those without. *Journal of psychiatric research.*

Neacsiu, A. D., Rizvi, S. L., Vitaliano, P. P., Lynch, T. R., & Linehan, M. M. (2010). The dialectical behavior therapy ways of coping checklist: development and psychometric properties. *Journal of clinical psychology, 66*(6), 563-582.

Nock, M. K., Prinstein, M. J., & Sterba, S. K. (2009). Revealing the form and function of self-injurious thoughts and behaviors: A real-time ecological assessment study among adolescents and young adults. *Journal of abnormal psychology*, *118*(4), 816.

Ohlis, A., Bjureberg, J., Lichtenstein, P., D'Onofrio, B. M., Fruzzetti, A. E., Cederlöf, M., & Hellner, C. (2020). Comparison of suicide risk and other outcomes among boys and girls who self-harm. *European Child & Adolescent Psychiatry.* doi.org/10.1007/s00787-020-01490-y

Rodriguez-Blanco, L., Carballo, J. J., & Baca-Garcia, E. (2018). Use of ecological momentary assessment (EMA) in non-suicidal self-injury (NSSI): A systematic review. *Psychiatry research*, *263*, 212-219.

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of statistical software*, *48*, 1-36.

Scala, J. W., Levy, K. N., Johnson, B. N., Kivity, Y., Ellison, W. D., Pincus, A. L., Wilson, S. J., & Newman, M. G. (2018). The role of negative affect and self-concept clarity in predicting self-injurious urges in borderline personality disorder using ecological momentary assessment. *Journal of Personality Disorders*, *32*(Supplement), 36-57.

Schacter, D. L. (1999). The seven sins of memory: Insights from psychology and cognitive neuroscience. *American psychologist*, *54*(3), 182.

Schoenleber, M., Berenbaum, H., & Motl, R. (2014). Shame-related functions of and motivations for self-injurious behavior. *Personality Disorders: Theory, Research, and Treatment*, *5*(2), 204–211.

Sedano-Capdevila, A., Porras-Segovia, A., Bello, H. J., Baca-García, E., & Barrigon, M. L. (2021). Use of ecological momentary assessment to study suicidal thoughts and behavior: a systematic review. *Current psychiatry reports*, *23*(7), 1-17.

Shenk, C. E., & Fruzzetti, A. E. (2011). The impact of validating and invalidating responses on emotional reactivity. *Journal of Social and Clinical Psychology*, *30*(2), 163–183.

Shenk, C., & Fruzzetti, A. E. (2014). Parental validating and invalidating responses and adolescent psychological functioning: An observational study. *The Family Journal, 22,* 43-48.

Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annu. Rev. Clin. Psychol.*, *4*, 1-32.

Shingleton, R. M., Eddy, K. T., Keshaviah, A., Franko, D. L., Swanson, S. A., Yu, J. S., Krishna, M., Nock, M. K., & Herzog, D. B. (2013). Binge/purge thoughts in nonsuicidal self-injurious adolescents: An ecological momentary analysis. *International journal of eating disorders*, *46*(7), 684-689.

Sturrock, B., & Mellor, D. (2014). Perceived emotional invalidation and borderline personality disorder features: A test of theory. *Personality and mental health*, *8*(2), 128-142.

Tangney, J. P., & Dearing, R. L. (2003). *Shame and guilt*. Guilford Press.

Tourangeau, R., & Yan, T. (2007). Sensitive questions in surveys. *Psychological bulletin*, *133*(5), 859.

Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner Jr., T. E. (2010). The interpersonal theory of suicide. *Psychological review*, *117*(2), 575.

VanDerhei, S., Rojahn, J., Stuewig, J., & McKnight, P. E. (2014). The effect of shame-proneness, guilt-proneness, and internalizing tendencies on nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*, *44*(3), 317-330.

Vanwoerden, S., Byrd, A. L., Vine, V., Beeney, J. E., Scott, L. N., & Stepp, S. D. (2022). Momentary borderline personality disorder symptoms in youth as a function of parental invalidation and youth-perceived support. *Journal of Child Psychology and Psychiatry*, *63*(2), 178-186.

Victor, S. E., & Klonsky, E. D. (2014). Daily emotion in non-suicidal self-injury. *Journal of Clinical Psychology*, *70*(4), 364–375.

Victor, S. E., Scott, L. N., Stepp, S. D., & Goldstein, T. R. (2019). I Want You to Want Me: Interpersonal Stress and Affective Experiences as Within-Person Predictors of Nonsuicidal Self-Injury and Suicide Urges in Daily Life. *Suicide and Life-Threatening Behavior*, *49*(4), 1157-1177.

Xavier, A., Gouveia, J. P., & Cunha, M. (2016). Non-suicidal self-injury in adolescence: The role of shame, self-criticism and fear of self-compassion. In *Child & Youth Care Forum* (Vol. 45, No. 4, pp. 571-586). Springer US.

You, J., & Leung, F. (2012). The role of depressive symptoms, family invalidation and behavioral impulsivity in the occurrence and repetition of non-suicidal self-injury in Chinese adolescents: a 2-year follow-up study. *Journal of Adolescence*, *35*(2), 389-395.

Wrzus, C., & Neubauer, A. B. (2022). Ecological momentary assessment: a meta-analysis on designs, samples, and compliance across research fields. *Assessment*, 10731911211067538.

Zuur, A. F., Ieno, E. N., Walker, N. J., Saveliev, A. A., & Smith, G. M. (2009). Zero-truncated and zero-inflated models for count data. In *Mixed effects models and extensions in ecology with R* (pp. 261-293). Springer, New York, NY.