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The Interaction of Shame and Urgency in Non-Suicidal Self-Injury and Suicide Attempts

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Abstract
Urgency, the trait-like tendency to respond to heightened emotion states with rash action, has been associated with both non-suicidal self-injury (NSSI) and suicide attempts (Lynam et al., 2011). Limited research has sought to identify specific emotions that may trigger NSSI or suicide attempts for those with high urgency. We examined shame as a candidate emotion. We hypothesized that greater shame-proneness, in combination with greater urgency, would explain unique variance in NSSI and suicide attempt history in two community samples (Ns = 192 and 225). Logistic and negative binomial regression analyses examined the effects of shame, urgency, and their interaction on the presence (vs. absence) and frequency of NSSI and suicide attempts. The proposed interaction of shame and urgency was related to greater risk and frequency of NSSI and suicide attempts when examining simple slopes, across the six models tested, particularly when urgency was high. Further research should examine shame as a trigger for self-harm in the context of heightened urgency using time series designs.

Keywords NSSI, suicide attempt, self-harm, urgency, shame

Globally, over 700,000 people die by suicide per year – a statistic that has existed for over a decade and likely underestimates the true number of lives lost. In addition, suicide was the fourth leading cause of death among young people ages 15-19 in 2019 (World Health Organization, 2021). Predicting suicide attempts is extremely difficult, with few robust predictors (Franklin et al., 2017). Some correlates of suicide attempts include female and non-binary gender identities, mood and impulse-control disorders, and childhood trauma (Horwitz et al., 2020; Miller et al., 2013; Nock et al., 2008). One of the best indicators of suicide attempt history is engagement in non-suicidal self-injury (NSSI; intentional destruction of one's body tissue without intent to die; Nock, 2009), which is relates to a more than four-fold increase in suicide attempt risk (ACHA National College Health Assessment, 2018). NSSI is, moreover, a serious and growing public health challenge in its own right. This public health crisis highlights a need to identify risk factors to improve prevention of both NSSI and suicide.

Impulsivity, Urgency, and Self-Harm

Trait impulsivity has long been studied as a risk factor for both suicide attempts and NSSI, however, literature reviews highlight conflicting results across studies suggesting the need for greater specificity (Brezo et al., 2006; Hamza et al., 2015). One plausible explanation for these mixed findings is that impulsivity is an umbrella term capturing multiple distinct traits. A growing body of work supports distinguishing one form of impulsivity—impulsivity in the context of heightened emotion—from other forms of impulsivity, such as difficulties with planning and perseverance (Carver et al., 2013; Whiteside & Lynam, 2001). Negative urgency (often referred to as urgency) is defined as the tendency to act impulsively during negative emotion states (Whiteside & Lynam, 2001).
Urgency, rather than impulsivity broadly, has been consistently tied to both NSSI and suicide outcomes. Urgency is significantly correlated with suicidal ideation, past suicide attempts, and self-rated likelihood of future attempts across community and clinical samples (Anestis et al., 2012; Berg et al., 2015;

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Lynam et al., 2011; Klonsky & May, 2010; Johnson et al., 2017), and significantly predicted suicide attempts over a 15-year period (Kasen et al., 2011) In regard to NSSI, a meta-analysis found a mean difference in urgency of medium effect size (d = 0.53) between NSSI and non-injury groups, but only small effect sizes for other impulsivity scales (Hamza et al., 2015). In longitudinal research, urgency predicted the onset of NSSI over a 9-month period (Riley et al., 2015). Given urgency relates to a range of psychopathologies (Carver & Johnson, 2017), its role in self-harm is likely best explained by urgency's interactions with other risk factors. For example, urgency appears to amplify the effects of other suicide risk factors, including acquired capacity, lack of belonging, and perceived burdensomeness (Anestis & Joiner, 2011).

Shame and Self-Harm

Multiple laboratory studies validate that urgency scores predict increases in symptoms and decreases in cognitive control in the face of high emotion (Carver & Johnson, 2018). In an ecological momentary assessment study, the interaction of urgency with negative emotions was significant, such that among those with higher urgency, negative emotions were more robustly tied to increases in urges for NSSI (Bresin et al., 2013). Drawing on this, we consider whether one specific emotion—shame—may act as an affective trigger to self-harm (both NSSI and suicide attempts) for those high in urgency. Shame is an emotion evoked by evaluations of the self as unacceptable, flawed, inferior, or deficient (Tangney & Dearing, 2002; Tracy & Robins, 2007) and by concerns that these aspects of the self will be apparent to others (Lewis, 2003). Heightened shame-proneness, the tendency to experience shame, includes both heightened judgment towards the self in response to events, and global negative evaluations of the self (Goss et al., 1994).

Theoretical and empirical interest in the relationship between shame and suicide spans multiple decades (Lester, 1997). Empirical research links shame-proneness to suicidal ideation (Bryan et al., 2013; Cameron et al., 2019; Hastings et al., 2000; Kolves et al., 2011; Lester, 1998) and suicide attempts (Tangney & Dearing, 2002), as well as perceived burdensomeness (Arditte et al., 2016; Rogers et al., 2017), a key factor in the interpersonal theory of suicide (Van Orden et al., 2010). Among inpatient veterans reporting recent suicidal ideation or attempts, those randomized to a shame-induction condition reported an increase in suicidal urges compared to those assigned to a passive control condition (r = 0.39; Cameron et al., 2020).

Beyond suicide attempts, shame cross-sectionally and prospectively relates to NSSI (see Sheehy et al., 2019 for meta-analysis), and correlates with both the presence and frequency of NSSI (Taylor et al., 2019; Wielgus et al., 2019). A meta-analysis showed medium-to-large effect sizes for the association of NSSI history to internal (self-criticism and negative self-evaluation; d = 1.71) and external (concern that others view the self negatively; d = 0.51) shame (Gilbert, 1998; Sheehy et al., 2019). In one longitudinal study of women with borderline personality disorder, nonverbal displays of shame (i.e., averted eye gaze and lowered head) during discussions of previous NSSI predicted higher risk of NSSI and less time to recurrence (Brown et al., 2009).

It has been suggested that shame may motivate NSSI as self-punishment (de Hooge et al., 2011; Lickel et al., 2014). Shame may act as a trigger for NSSI, insofar as NSSI is a means to regulate shame. For example, in a laboratory study, induction of pain reduced acute feelings of shame, with effects specific to shame as compared to other negative emotions (Schoenleber et al., 2014). In ecological momentary assessment research, NSSI was followed by reduced shame (Armey et al., 2011).

Individuals who engage in NSSI also experience shame as a consequence of, not just a precursor to, self-harm behavior (Burke et al., 2017; Laye-Gindhu & Schonert-Reichl, 2005). In this way, shame may play a role in both initial NSSI engagement and NSSI frequency.

The Current Study

Our aim was to test an integrative model of urgency, shame, and self-harm. Specifically, we hypothesized that urgency would amplify the effects of shame-proneness on NSSI and suicide attempts. One previous study reported a significant interaction effect in which greater urgency amplified the effect of heightened shame on greater frequency of NSSI among college students (Wielgus et al., 2019). To our knowledge, however, our study is novel in considering both NSSI and suicide attempts. Further, we consider the construct replicability of our findings across two community samples. Using logistic and negative binomial regressions, we examine the binary presence versus absence of NSSI and suicide attempt histories, as well as their frequency.

Method

Both studies were approved by the ethics board of the university before data collection began. All potential participants completed informed consent before taking part in the study.

Participants & Procedure

Sample 1. Participants were recruited through the Amazon Mechanical Turk (MTurk) website to complete a Qualtrics survey. MTurk is an online service that allows individuals to complete tasks in exchange for compensation. MTurk is a commonly used platform in psychology research, and – with appropriate precautions – collected data has been shown to be of good quality (Buhrmester et al., 2018). The platform provides a feasible way to accrue samples with rare mental health concerns, such as NSSI and suicide attempts. The study was available to English-speaking users 18 years or older located in the US. Those who consented to a brief screener (N = 1,306) completed items about demographics and history of NSSI and suicide attempts, for which they were compensated $0.25. Respondents who endorsed lifetime NSSI (five or more days in one year) or at least one lifetime suicide attempt, and a control group (50 participants who endorsed history of neither), were invited to continue to a longer survey for an additional $3.75 payment. Given higher prevalence of NSSI compared to suicide attempts, we continued to invite only those with past suicide attempts after recruiting 100 participants with NSSI. The screener and full survey together took an average of 35 minutes and included other measures not relevant to this investigation (Sandel et al., 2020). Of those who accepted the full survey invitation (N = 217), 25 were excluded from analyses (22 left most items blank; 7 answered most catch items incorrectly, such as "choose 'not at all' for this response"). Therefore, analyses included 192 participants (57 with a history of NSSI and no suicide attempt, 42 with a history of suicide attempt and no NSSI, 44 with a history of both, and 49 with neither).

Sample 2. Participants were recruited through flyers in the community and online advertisements as part of a larger two-site study exploring effortful control and reward sensitivity across diverse psychopathologies, from which 225 participants completed measures needed for the present models. Participants were eligible for the larger study if they were ages 18-55 and were experiencing at least moderate functional impairment due to mental health symptoms (Sheehan Disability Scale score 5+; Williams, 2000), receiving mental disability benefits, or seeking or receiving mental health treatment. Exclusion criteria, assessed via phone interview, included SCID-5 diagnoses of lifetime psychosis or mania, or past 6 month diagnoses of alcohol or substance use disorder; head trauma with lasting effects or loss of consciousness >5 minutes; diminished cognitive abilities (Orientation Memory Concentration unweighted test score < 7); neurological disorders; daily use of antipsychotic medication, marijuana, or other sedating medications; inability to independently complete study measures due to language or vision problems; medical conditions or treatments that could interfere with psychiatric diagnosis (e.g., untreated endocrine disorders, HIV, syphilis, interferon treatment); electroshock treatment in the past 12 months; and (for most participants at site A) MRI safety or feasibility contraindications (e.g., ferrous metal in body, pregnancy, seizure disorders).

Eligible participants attended an in-person session which included a SCID-5 diagnostic interview and self-report measures related to childhood adversity, NSSI, suicide ideation and attempts. NSSI and suicide attempt history were verified by interview. After the in-person session, participants completed self-report measures online via Qualtrics, including scales measuring urgency and shame. They also completed other behavioral, self-report, and (for some) neuroimaging measures, not used in current analyses. Six participants were excluded from analyses for failing over 50% of the attention checks (e.g., "Please answer 'I disagree a little' for item 39") distributed throughout the survey. The final sample included 225 participants (178 at site A; 47 at site B).

Measures

In each sample, participants completed self-reports of gender, age, education level, race, and ethnicity. Demographic information, descriptive information on key variables, and information about the severity of suicidality and NSSI in each sample is reported in Table 1.

Suicide Attempts. Participants in both samples completed the 15-item self-rated Columbia-Suicide Severity Rating Scale, a commonly used and well-validated survey of suicidal ideation and behavior (Posner et al., 2009). The item "How many times have you made a suicide attempt in your lifetime?" assessed the number of lifetime suicide attempts.

NSSI. The Deliberate Self-Harm Inventory assesses 17 common forms of NSSI, and has adequate construct, convergent and discriminant validity, and test-retest reliability (DSHI; Gratz, 2001). Participants are instructed as follows: "Please include only instances of self-harm where the behavior was intentional (on purpose). Do not include instances where you hurt yourself accidentally (i.e., you tripped and banged your head on accident). Do not include times where you intended to kill yourself (had suicidal intent)." Items cover types of NSSI such as "cutting your wrist, arms, or other area(s) of your body" and "burning yourself with a lighter or a match." In Sample 1, participants were asked to identify the year in which they most frequently engaged in NSSI, and then to record the number of days they engaged in NSSI in that year (maximum annual frequency). In Sample 2,

Table 1. Descriptive Statistics

Variable	Sample 1 (*N* = 192)	Sample 2 (*N* = 225)
Gender Female, *N* (%)	124 (64.6%)	158 (70.2%)
Non-binary		5 (2.2%)
Age *M (SD)*	34.75 (11.34)	28.32 (9.04)
Education degree level, years, *N* (%)		
Some or no high school, <12	4 (2.1%)	2 (0.9%)
High school diploma or GED, 12	23 (12.0%)	8 (3.6%)
Some college, 12.5-15.5	73 (38.0%)	76 (33.8%)
College or university degree, 16	69 (35.9%)	64 (28.4%)
Some graduate school or degree, >16	20 (10.4%)	46 (20.4%)
Other certification or training	3 (1.6%)	
Race & Ethnicity *N* (%)		
White	141 (73.4%)	101 (44.9%)
Black/African American	15 (7.8%)	24 (10.7%)
Asian	13 (6.8%)	44 (19.7%)
Native American	1 (<1%)	1 (<1%)
Middle Eastern	1 (<1%)	
Native Hawaiian/Pacific Islander		3 (1.3%)
Other/Multiple races	5 (2.6%)	38 (16.9%)
Unreported/declined to state	10 (5.2%)	4 (1.8%)
Hispanic/Latinx	7 (3.6%)	54 (24.0%)
NSSI and suicide attempts	*N* (%)	*N* (%)
Presence of NSSI	101 (52.6%)	58 (25.8%)
Presence of suicide attempt	86 (44.8%)	43 (19.1%)
Presence of past year NSSI	45 (23.4%)	30 (13.3%)
Presence of past year suicide attempt	7 (3.6%)	13 (5.8%)
	M (SD), range	*M (SD), range*
NSSI frequency among full sample[a]	27.32 (68.26), 0-365	31.35 (60.41), 0-3025
NSSI frequency among those with NSSI[a]	51.94 (87.23), 1-365	121.6 (208.2), 2-3025
Suicide attempt frequency among full sample	1.02 (1.84), 0-10	0.52 (0.92), 0-15
Suicide attempt frequency among those with attempt history	2.28 (2.17), 1-10	2.7 (2.4), 1-15
Measures	*M (SD), skew, kurtosis*	*M (SD), skew, kurtosis*
Adverse Childhood Experiences Questionnaire	3.26 (2.59), 0.48, -0.79	
Risky Families Questionnaire		31.91 (12.08), 0.56, 0.36
Experience of Shame Scale	65.09 (21.27), -0.06, -1.02	
Other as Shamer Scale	28.65 (16.21), 0.13, -0.59	15.14 (8.42), 0.04, 0.51
Negative Urgency	3.09 (1.15), -0.15, 0.82	2.97 (1.07), -0.02, 0.81
SCID-5 diagnoses		*N* (%)
Lifetime Major Depressive Episode		166 (73.8%)
Panic Disorder, Social Anxiety Disorder, and/or Generalized Anxiety Disorder		151 (67.1%)
Past Alcohol and/or Substance Use Disorder		69 (30.7%)
Obsessive Compulsive Disorder		35 (15.6%)
Any SCID-5 diagnosis		209 (92.9%)

Note. [a]amax annual frequency in Sample 1, lifetime frequency in Sample 2

participants were asked how many times in their lives they engaged in each type of NSSI; the sum across methods quantified lifetime frequency.

Shame.

Sample 1. Shame was assessed using the Experience of Shame Scale (ESS; Andrews et al., 2002) and the Other as Shamer Scale (OAS; Goss et al., 1994). The ESS is a 25-item self-rated questionnaire that assesses internal shame, including shame about one's character, behavior, and body (e.g., "Have you felt ashamed of your ability to do things?" and "Have you wanted to hide or conceal your body or any part of it?"). Participants respond on a scale ranging from 1 = not at all to 4 = very much, and items are summed (total score range 25-100). The OAS is a 17-item self-report scale designed to assess external or other-oriented shame (self-ratings of how negatively others evaluate them, e.g., "I think that other people look down on me" and "Other people see me as small and insignificant"). Participants respond to each item on a scale from 0 = Never to 4 = Almost Always. The total score is calculated by summing items. Internal consistency was excellent for both scales (alpha = .97 for ESS, .92 for OAS). Because the ESS and OAS were strongly correlated ($r = 0.74$, $p < 0.001$) and correlated to similar degrees with NSSI and suicide outcome variables (r's = 0.20-0.27, p's < 0.001), a composite shame score was computed by averaging standardized

Table 2. Intercorrelations of Model Variables (Sample 1 N = 192; Sample 2 N = 225)

	Sample 1							Sample 2				
Variable	1	2	3	4	5	6	7	1	2	3	4	5
1. Gender												
2.Childhood adversity	.18*							.03				
3. Shame	.06	.19**						.21**	.24***			
4.Negative Urgency	.13	.17*	.49***					.05	.06	.32***		
5. NSSI history (binary)	.15*	.20**	.28***	.41***				.11	.15*	.29***	.18**	
6.Suicide attempt history (binary)	.23**	.30***	.19**	.14	-.03			.03	.16*	.14*	.06	.39***
7.NSSI frequency	.17*	.17*	.24***	.27***	.38***	.02						
8.Suicide attempt frequency	.18*	.24***	.20**	.26***	.15*	.62***	-.01					
1. Gender												
2.Childhood adversity	.18*							.03				
3. Shame	.06	.19**						.21**	.24***			
4.Negative Urgency	.13	.17*	.49***					.05	.06	.32***		
5. NSSI history (binary)	.15*	.20**	.28***	.41***				.11	.15*	.29***	.18**	
6.Suicide attempt history (binary)	.23**	.30***	.19**	.14	-.03			.03	.16*	.14*	.06	.39***
7.NSSI frequency	.17*	.17*	.24***	.27***	.38***	.02						
8.Suicide attempt frequency	.18*	.24***	.20**	.26***	.15*	.62***	-.01					

scores on the two scales. Higher scores reflect greater trait shame.

Sample 2. Shame was assessed using the validated Other as Shamer 2 Scale (OAS-2; Matos et al., 2015). The OAS-2 is a shorter form of the OAS, shown to be highly correlated with the OAS (r = .91). It includes eight items from the original scale with the same five-point ratings, summed to calculate a total score. Internal consistency was excellent (alpha = .95).

Urgency. Participants in both samples completed the Negative Urgency subscale of the UPPS-P Impulsive Behavior scale, which examines impulsive behavior and speech in response to negative emotions (Whiteside & Lynam, 2001). The subscale score is a mean of 12 items. Sample items include: "When I am upset I often act without thinking" and "I often get involved in things I later wish I could get out of." Response options ranged from 1 = I disagree a lot to 5 = I agree a lot. The Negative Urgency scale has been associated with occurrence of suicide attempts when adjusting for suicidal ideation, psychiatric diagnoses and symptoms, and other forms of impulsivity (Auerbach et al., 2016). Internal consistency was good to excellent in each sample (alpha = .83 in Sample 1, .93 in Sample 2).

Childhood Adversity.

Sample 1. The Adverse Childhood Experience (ACE) Questionnaire is a widely used scale based on the ACE study, which examined the link between childhood adverse experiences and adult outcomes (Felitti et al., 1998). It is designed to assess childhood stress and trauma experienced before age 18, including experiencing physical and sexual abuse, witnessing domestic violence, and being exposed to serious household dysfunction. The scale is composed of 10 yes/no items, yielding total scores that reflect the number of ACEs experienced.

Sample 2. The Risky Families (RF) Questionnaire was adapted from the ACE questionnaire and similarly assesses adverse experiences faced in one's home during childhood (Taylor et al., 2004). The scale is composed of 13 items, covering the frequency of adverse experiences on a scale of 1 = Not at all to 5 = Very often. Sample items include "Would you say the

Table 3. Multivariate models predicting NSSI outcomes

	Binary (Sample 1, N = 106)		*Frequency (Sample 1, N = 192)*		*Binary (Sample 2, N = 225)*	
	OR	*95% CI*	*IRR*	*95% CI*	*OR*	*95% CI*
Gender	1.54	(0.61, 4.00)	1.97	(0.90, 4.18)		
Childhood adversity	1.15	(0.96, 1.39)	1.13	(0.96, 1.33)	1.02	(0.99, 1.05)
Shame	2.03*	(1.19, 3.61)	1.06	(0.66, 1.71)	1.79**	(1.25, 2.61)
Urgency	2.38**	(1.38, 4.39)	2.69***	(1.50, 4.76)	1.20	(0.85, 1.71)
Shame*Urgency	1.11	(0.64, 1.94)	0.75	(0.50, 1.15)	1.30	(0.92, 1.81)

Note. OR = odds ratio; *IRR* = incidence rate ratio; *CI* = 95% confidence interval; * indicates $p < .05$, ** indicates $p < .01$, *** indicates $p < .001$.

household you grew up in was chaotic and disorganized?" and "How often would you say there was quarrelling, arguing, or shouting between a parent and you?" Item responses are summed for a total score, with higher scores corresponding to greater risk.

DSM-5 Diagnoses.

Sample 2. The Structured Clinical Interview for DSM-5 (SCID-5; First, 2015) is a widely used semi-structured interview to assess psychological disorders. By phone, interviewers administered modules to rule out lifetime primary psychosis or mania, and alcohol or substance use disorder within the past 6 months. In person, diagnostic ambiguities from the phone screen were re-assessed, and participants completed the full SCID to document the frequency of mental health concerns in this sample.

Interviewers completed didactive and interactive training and showed adequate inter-rater reliability before administering the SCID-5 to study participants. Throughout the study, reliability meetings were held to protect against rater drift. The average kappa (between each rater and gold standard diagnostic score) was 0.82.

Functional and Cognitive Impairment.

Sample 2. The Sheehan Disability Scale (Leon et al., 1997) is a well-validated interview designed to assess functional impairment in work/school, social life, and family life. Potential participants were asked to select the worst month in the past six months in terms of their mental health symptoms. They then were asked to rate the interference of these symptoms on a scale of 0-10 in each domain using verbal anchors of no (0), mild (1-3), moderate (4-6), severe (7-9), or very severe interference (10).

The Orientation Memory Concentration Test (Katzman et al., 1983) is a validated six-item measure of cognitive impairment. Total scores reflect the number of errors (range 0-12).

Analysis

Analyses were conducted in R version 4.1.2 (R Core Team, 2021). Negative binomial regressions were estimated with the MASS package (Venables & Ripley, 2002) and interaction plots were generated with interActive (McCabe et al., 2018).

In each sample, we ran two parallel logistic regressions to predict: 1) the presence of NSSI history and 2) the presence of suicide attempt history, based on levels of shame, urgency, and the interaction of shame and urgency. The logistic regressions used a logit link function, in which the outcome (Y) is the natural log of the probability of behavior occurrence on a 0-1 scale. Estimates are presented as odds ratios (OR) below.

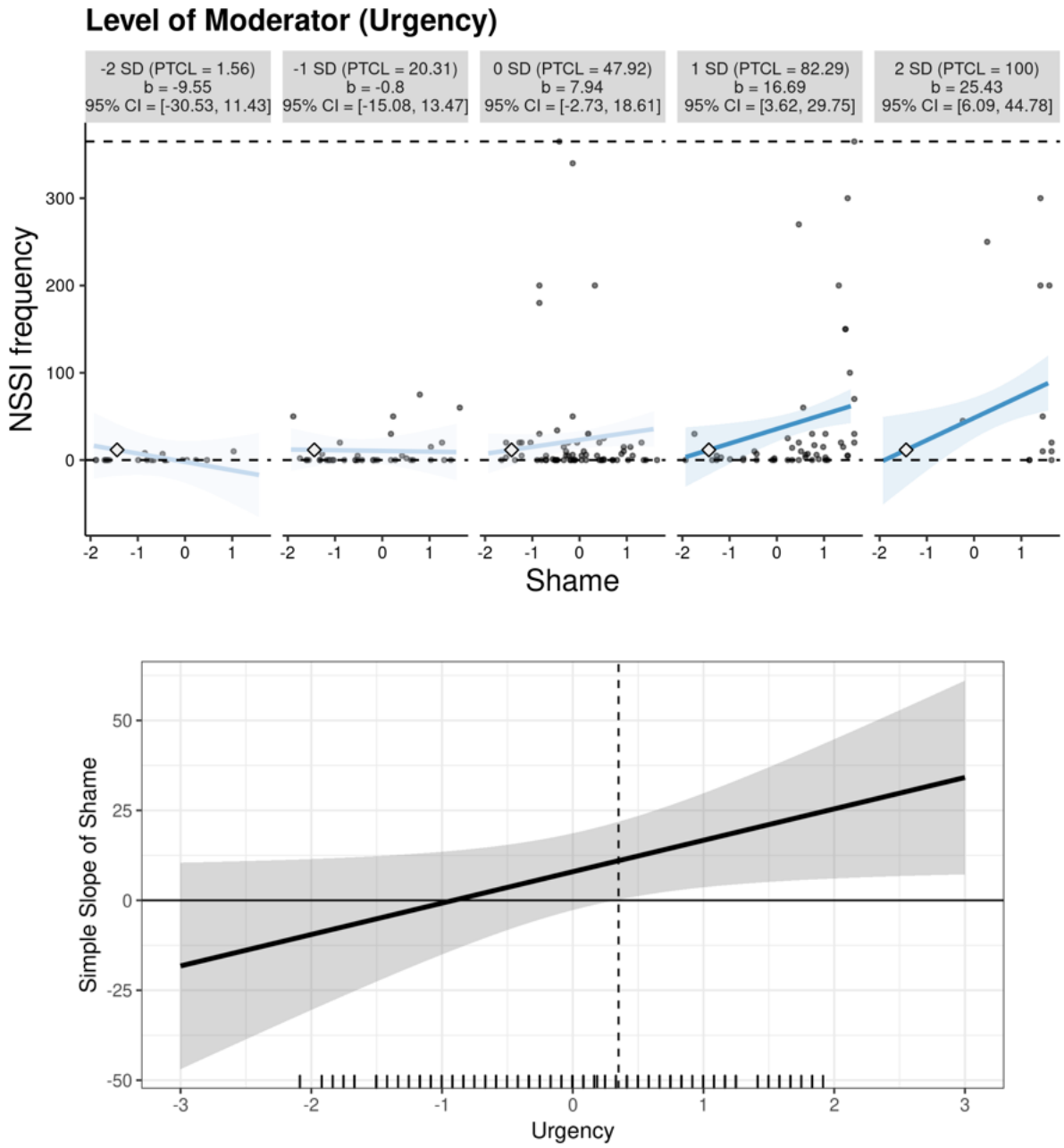
In Sample 1 (but not Sample 2), we were adequately powered to examine lifetime frequency of NSSI and suicide attempts (see Table 1 for details). Both NSSI and suicide attempt frequency scores were count data, with zeros for those who did not have a history of such behavior. Therefore, we ran two negative binomial regressions, which are well suited for over-dispersed count data. We examined the effects of shame, urgency, and their interaction on 1) the number of maximum annual days engaged in NSSI, and 2) the number of lifetime suicide attempts.

Research suggests that one cannot rely on traditional p-values to detect the presence of interactions in nonlinear models such as the logistic and negative binomial models estimated here (Ai & Norton, 2003; Halvorson et al., 2021). Therefore, we relied on visual tools and examined the significance of simple slopes at varying levels of shame and urgency in figures for each model (see McCabe et al., 2020). Marginal effects plots show cutoffs of values of shame and urgency for which the effect is significant based on confidence intervals (where confidence intervals do not include zero).

Results

Statistical assumptions concerning outliers, heteroscedasticity, and collinearity were evaluated for key variables. Distributions of NSSI and suicide attempt frequency approximated Poisson distributions; distributions of shame, urgency, and childhood

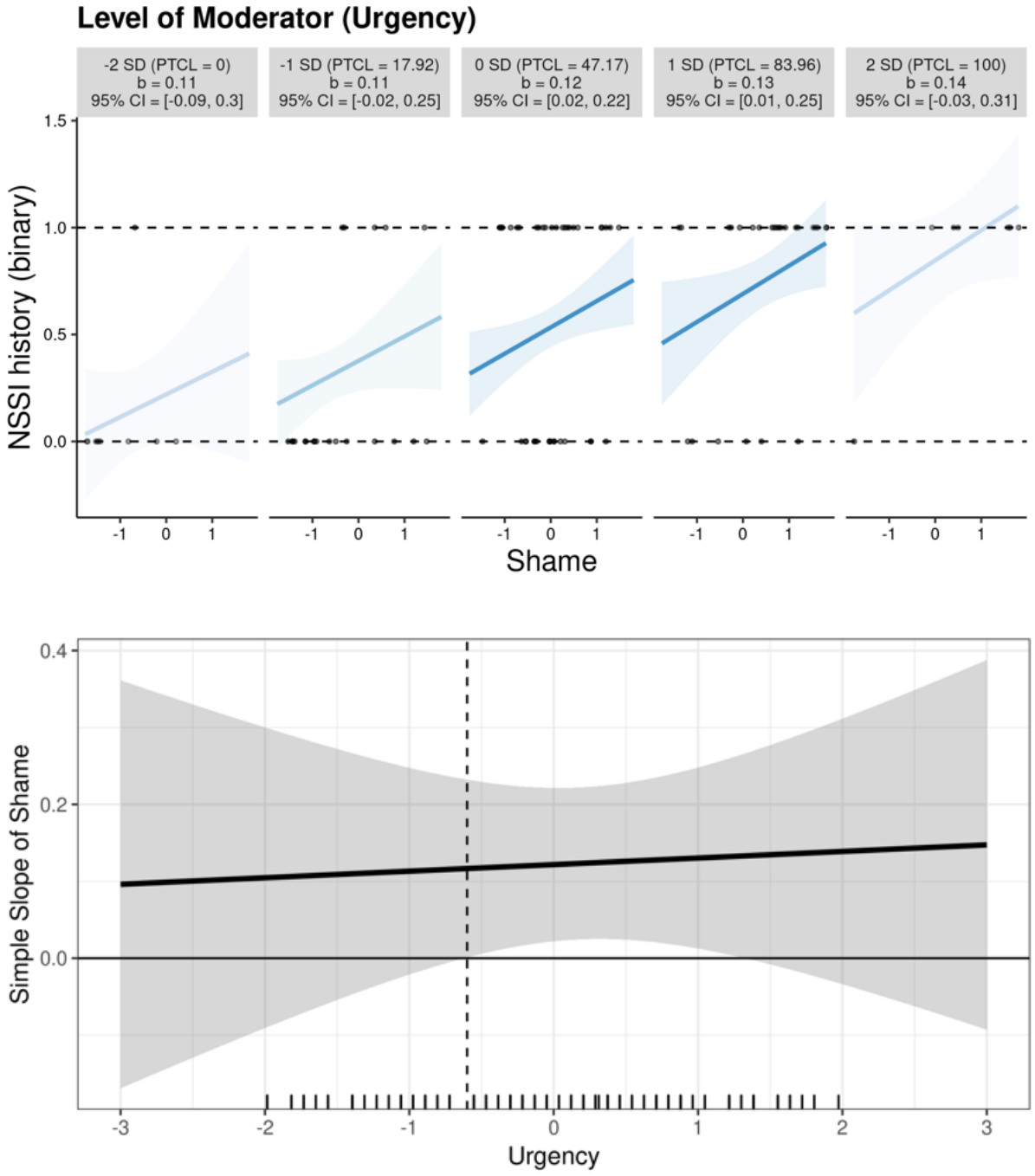
Figure 1. Plot of two-way interaction effect (shame X urgency) on NSSI frequency and corresponding marginal effects plot (Sample 1)



Note. Adjusted for covariates (see Table 3). The simple slope of shame on NSSI frequency is significant and positive when urgency is 0.35 standard deviations above the mean or greater. 38.02% of observations in urgency are within this region.

adversity approximated normality. Shame and impulsivity scores were standardized before analysis. Bivariate correlations are presented in Table 2. In Sample 1, NSSI and suicide attempt variables were significantly correlated with all independent variables, with one exception that binary suicide attempt history was not related to urgency. In Sample 2, shame was significantly correlated with NSSI and suicide attempt history, and urgency was significantly correlated only with NSSI history. Females and gender minorities, as well as victims of childhood trauma, are at elevated risk for self-harm (Horwitz et al., 2020; Miller et al., 2013; Nock et al., 2008), so we considered gender and childhood adversity as potential covariates. In bivariate correlations, childhood adversity was significantly correlated with NSSI and suicide attempt outcomes in both samples, and gender was only correlated with NSSI and suicide attempt outcomes in Sample 1.

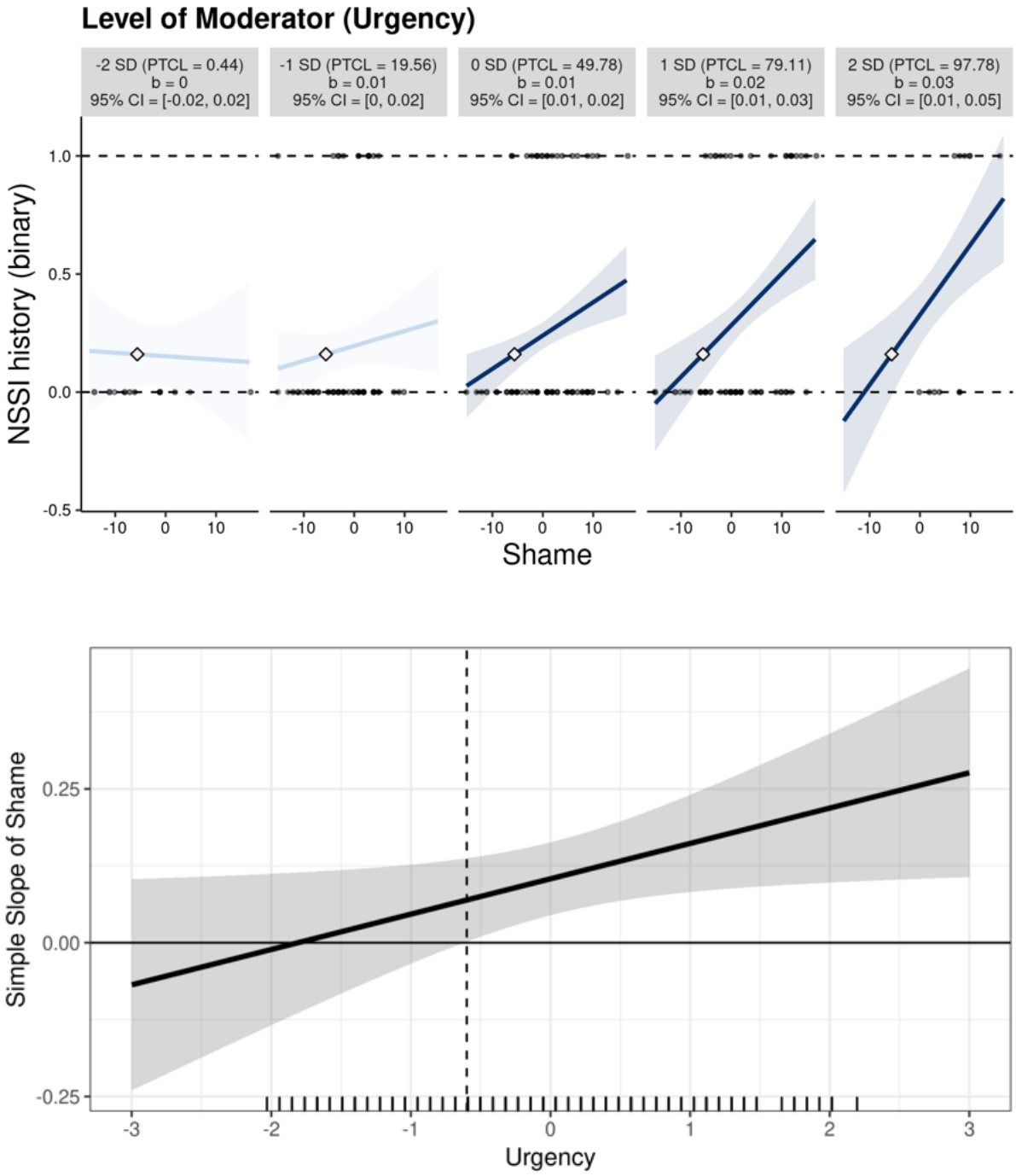
Figure 2. Plot of two-way interaction effect (shame X urgency) on NSSI history and corresponding marginal effects plot (Sample 1)



Note. Adjusted for covariates (see Table 3). The simple slope of shame on NSSI history is significant and positive when urgency is 0.6 standard deviations below the mean or greater. 73.58% of observations in urgency are within this region.

Therefore, we controlled for childhood adversity and gender in Sample 1 models and childhood adversity in Sample 2 models to examine the roles of shame and urgency above and beyond the roles of adversity and gender. While psychological disorders are tied to self-harm risk (e.g., Nock et al., 2008), we were interested in the interaction of shame and urgency as a transdiagnostic risk factor. Given this goal, the relatively small number of participants without mental health concerns, as well as the well-documented issues with statistical overcontrol (Miller & Chapman, 2001), we did not covary for specific diagnoses. Presence of NSSI history and suicide attempt history were only

Figure 3. Plot of two-way interaction effect (shame X urgency) on NSSI history and corresponding marginal effects plot (Sample 2)



Note. Adjusted for covariates (see Table 3). The simple slope of shame on NSSI history is significant and positive when urgency is 0.6 standard deviations below the mean or greater. 72.89% of observations in urgency are within this region.

correlated in Sample 2, likely because of our sampling strategy for Sample 1. In Sample 1, we oversampled for NSSI and suicide attempts, such that our analyses included 57 with a history of NSSI and no suicide attempt, 42 with a history of suicide attempt and no NSSI, 44 with a history of both, and 49 with neither history. Although this oversampling strategy afforded the opportunity to examine frequency of self-harm behaviors, it led to the consequence that, for binary models, the comparison group of individuals with no NSSI included individuals who reported a suicide attempt history, and the comparison group of

Table 4. Multivariate models predicting suicide attempt outcomes

	Binary (Sample 1, N = 91)		*Frequency (Sample 1, N = 192)*		*Binary (Sample 2, N = 225)*	
	OR	*95% CI*	*IRR*	*95% CI*	*OR*	*95% CI*
Gender	2.92	(1.03, 9.00)	1.60	(0.96, 2.68)		
Childhood adversity	1.32*	(1.08, 1.65)	1.14**	(1.04, 1.25)	1.03	(1.00, 1.07)
Shame	2.82**	(1.56, 5.59)	1.13	(0.87, 1.47)	1.29	(0.88, 1.91)
Urgency	1.01	(0.56, 1.79)	1.35*	(1.04, 1.75)	0.98	(0.67, 1.42)
Shame*Urgency	1.24	(0.71, 2.32)	1.05	(0.84, 1.31)	1.40*	(1.01, 1.95)

Note. OR = odds ratio; *IRR* = incidence rate ratio; *CI* = 95% confidence interval; * indicates $p < .05$, ** indicates $p < .01$, *** indicates $p < .001$.

individuals with no suicide attempts included individuals with NSSI history. Due to concern of inflated levels of shame and urgency in the control comparison group (which included participants with the other self-harm outcome) for the binary analyses, we ran logistic regressions with restricted versions of Sample 1: participants with suicide attempt history were excluded from the logistic regression predicting NSSI history, and participants with NSSI history were excluded from the logistic regression predicting attempt history, so as to more carefully examine the distinct roles of NSSI versus suicide attempt history.

NSSI Models

Sample 1. In a logistic regression, adjusting for gender and childhood adversity, shame and urgency were significantly related to greater likelihood of NSSI history, as shown in Table 3. For each standard deviation increase in shame, risk of NSSI was more than two-fold higher; the same was true with urgency. In the negative binomial model, focused on frequency of NSSI, urgency was associated with more days engaged in NSSI during the worst lifetime year.

While the interaction term of shame and urgency was not significant in either the binary or count model of NSSI, an examination of simple slopes suggests that the interaction of shame and urgency differs across different levels of these variables. Specifically, Figure 1 below reveals that for those high in urgency (0.35 standard deviations above the mean or greater), having greater levels of both shame and urgency was associated with more frequent NSSI. This interaction is also seen for the binary NSSI outcome (see Figure 2), where the slope of shame on NSSI history is significant and positive when urgency is near the sample mean (0.6 standard deviations below the mean) or greater.

Sample 2. In Sample 2, greater shame was significantly related to presence (versus absence) of lifetime NSSI. For each standard deviation increase in shame, there was a 79% increased likelihood of NSSI engagement. In a near exact replication of the Sample 1 binary model, likelihood of NSSI history is increased when urgency is 0.6 standard deviations below the mean or greater (see Figure 3).

Suicide Attempt Models

Sample 1. Childhood adversity and shame were each associated with an increased likelihood of having attempted suicide at least once (see Table 4). In the count model, variance in the total number of suicide attempts was significantly explained by both childhood adversity and urgency.

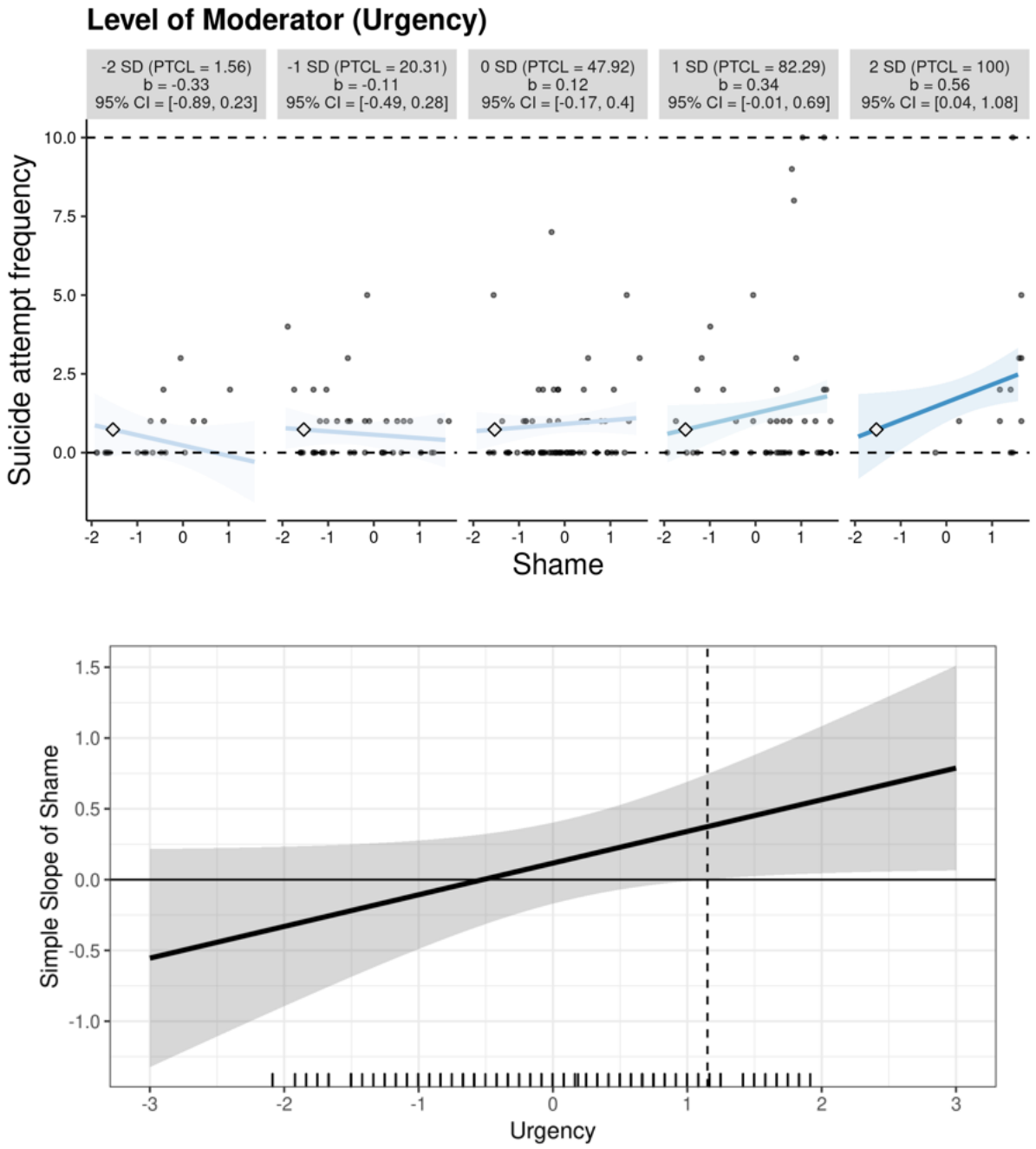
An examination of simple slopes revealed that (similar to NSSI) the interaction of shame and urgency is significant specifically at high levels of urgency. That is, shame relates to an increased number of total lifetime suicide attempts when urgency is 1.15 standard deviations above the mean or greater (see Figure 4). Examining the binary presence of attempt history in this sample (Figure 5), shame is related to greater likelihood of an attempt for a wider range of urgency levels (1.2 standard deviations below the mean or greater).

Sample 2. In Sample 2, no main effects explained significant variance in binary suicide attempt history. Simple slopes reveal that shame relates to an increased likelihood of suicide attempt history specifically for those with high levels of urgency. That is, the interaction of shame and urgency is significant when urgency is above the mean (see Figure 6).

Discussion

Suicide and NSSI are urgent public health concerns, and further research is needed to clarify risk factors. Urgency has previously been found to relate to suicide attempts and NSSI in cross-sectional and longitudinal work. This study expands on that work by considering whether shame might be a potent affective correlate of self-harm specifically among those with high urgency. One previous study found the interaction of shame and urgency was related to more frequent NSSI (Wielgus et al., 2019). To our knowledge, however, the current study is the first to examine the interaction of urgency and shame across both NSSI and suicide attempts. Our goal was to examine the effects of these variables and

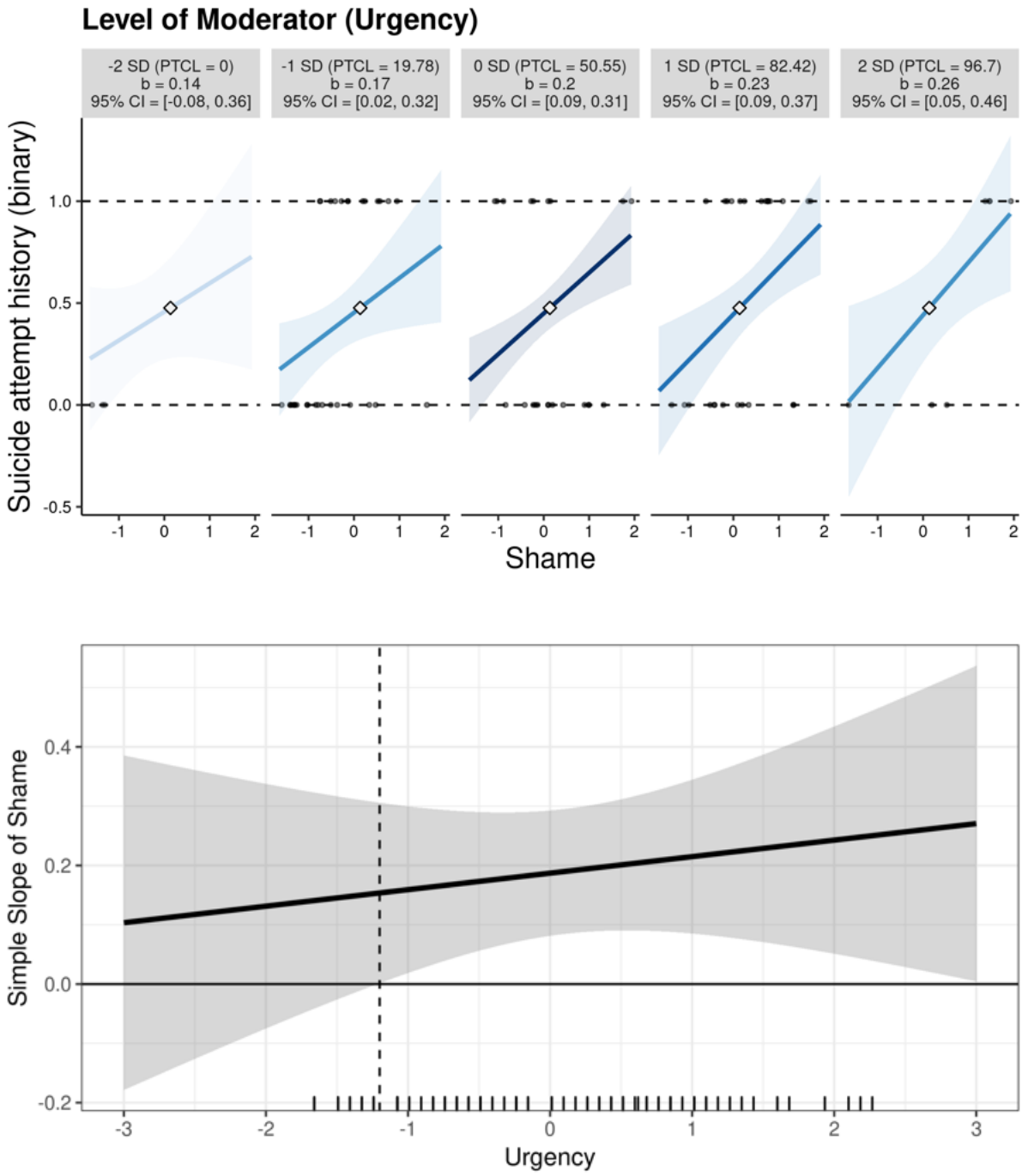
Figure 4. Plot of two-way interaction effect (shame X urgency) on frequency of suicide attempts and corresponding marginal effects plot (Sample 1)



Note. Adjusted for covariates (see Table 4). The simple slope of shame on lifetime suicide attempts is significant and positive when urgency is 1.15 standard deviations above the mean or greater. 15.1% of observations in urgency are within this region.

their interaction, and to distinguish effects on initiation versus maintenance of both NSSI and suicide attempts, using both logistic and negative binomial multivariate models. We examined effects across two samples to probe for construct replicability. As predicted, gender and our measures of early adversity played some role across NSSI and suicide attempt models. We focus discussion on main effects of shame and urgency and the interaction effect of the two. The interaction of shame and urgency appears to be related to self-harm outcomes particularly at high levels of urgency, across NSSI history and frequency, and suicide attempt

Figure 5. Plot of two-way interaction effect (shame X urgency) on suicide attempt history and corresponding marginal effects plot (Sample 1)



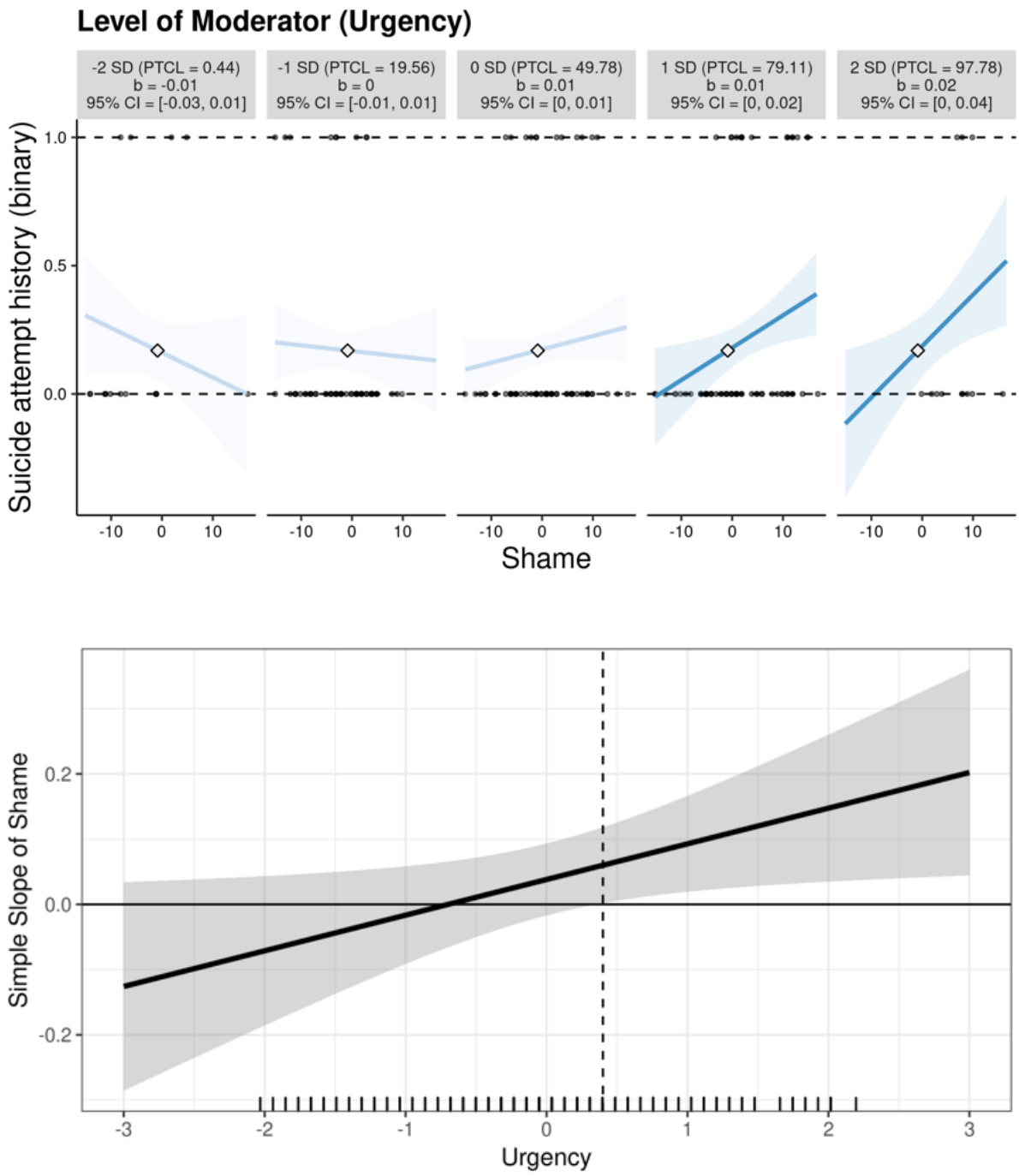
Note. Adjusted for covariates (see Table 4). The simple slope of shame on attempt history is significant and positive when urgency is 1.2 standard deviations below the mean or greater. 86.81% of observations in urgency are within this region.

history and frequency. To be conservative, our multivariate analyses considered the effects of shame and urgency above and beyond gender and early adversity.

NSSI History & Frequency

Greater trait shame was significantly related to presence of NSSI history and NSSI frequency in bivariate analyses across both samples. Further, shame explained significant variance in NSSI history in logistic regressions across both samples. The binary effect aligns with previous studies which have shown

Figure 6. Plot of two-way interaction effect (shame X urgency) on suicide attempt history and corresponding marginal effects plot (Sample 2)



Note. Adjusted for covariates (see Table 4). The simple slope of shame on suicide attempt history is significant and positive when urgency is 0.4 standard deviations above the mean or greater. 36% of observations in urgency are within this region.

that trait shame distinguishes those who engage in NSSI from those who do not with medium-to-large effect sizes (Sheehy et al., 2019). Regarding frequency, NSSI leads to temporary decreases in negative affect for many people. Thus, people with greater tendencies toward shame may turn to NSSI more frequently.

Greater urgency was significantly related to increased likelihood of NSSI engagement and more frequent NSSI in Sample 1, but not to likelihood of NSSI engagement in Sample 2. Whereas previous large-scale studies found that urgency predicted the onset of NSSI longitudinally (OR = 1.58; Riley et al.,

2015), and that urgency related to more frequent NSSI (cf. Ammerman et al., 2018), we only saw the main effect of urgency on NSSI in Sample 1. A key difference in the recruitment of the two samples may help explain the lack of replication: Sample 1 was recruited specifically for NSSI and suicide attempt history, while Sample 2 was a community sample recruited for a variety of mental health concerns other than self-harm, and may be high in urgency, a transdiagnostic risk factor, despite having no NSSI history. There were also fewer participants with NSSI histories in Sample 2 compared to Sample 1. Further, the measures of NSSI frequency were different across samples (Sample 1 was asked about days of NSSI in the worst lifetime year, whereas Sample 2 was asked for a total lifetime frequency) thus the non-replication may be related to measurement.

Whereas we originally hypothesized the interaction term of shame and urgency would be significantly associated with NSSI in multivariable models, as was reported in one college sample (Wielgus et al., 2019), we later learned that p-value estimation of interaction terms in nonlinear models is not considered reliable (Ai & Norton, 2003), and so we examined simple slopes at quantities of interest of shame and urgency to consider interactions (McCabe et al., 2021). This more nuanced examination revealed that the interaction of shame and urgency may be related to NSSI outcomes specifically for those with high levels of urgency. In Sample 1, having greater levels of both shame and urgency was associated with more frequent NSSI, but only for those high in urgency. In both samples, a similar pattern appeared for the binary NSSI outcome: The interaction of shame and urgency related to more likely NSSI engagement, if urgency was close to the sample mean or greater. Overall, these data are consistent with the idea that NSSI potentially reflects an impulsive response to shame among individuals who are high in urgency; however, this process warrants further study (e.g., using time series designs).

Suicide Attempts

Current findings indicate different contributions to an initial suicide attempt compared to recurrent attempts. Heightened urgency had a significant main effect on number of lifetime suicide attempts, however counter to previous longitudinal research (Kasen et al., 2011), urgency was not related to binary presence of attempt history. Heightened shame was related to a significantly greater likelihood of attempt history in Sample 1, but not Sample 2. Further replication of the main effects of shame and urgency is needed given the discrepant findings across samples.

Across both samples, an examination of the interaction of shame and urgency revealed that shame was related to an increased likelihood of suicide attempt history for those with above average urgency levels (in Sample 1, the effect was also present for those 1 SD below average urgency). This pattern is seen again when examining suicide attempt frequency in Sample 1. An examination of the simple slope of shame on suicide attempts at specific urgency levels reveals the interaction's importance for a small percentage of the sample—those with the highest levels of urgency (greater than 1 SD above the sample mean). That is, for those high in urgency, the combined effect of heightened shame and heightened urgency may be important for risk of both initial and repeated suicide attempts. Therefore, findings may support the idea that specifically for those with high urgency levels, shame and urgency together elevate risk for suicide attempts.

Limitations

This study had several important limitations. First, we relied on self-report measures, which rely on individuals' accurate recall and reporting; further work would do well to consider measurement of emotions and behaviors closer in time to the participant's experiences, such as through ecological momentary assessment (EMA). Second, the variables under consideration in this study by no means exhaust the possible contributors to NSSI or suicide attempts. Broader understanding of different emotions and self-harm triggers such as interpersonal events in the context of urgency would be helpful. Perhaps of most importance, there are several drawbacks to the cross-sectional design we used. Of particular concern is the fact that for most participants, the self-harm behaviors happened years before the study, but we assessed current levels of shame and impulsivity, despite clear evidence that shame and urgency shift over time (Littlefield et al., 2016; Mascolo & Fischer, 1995). Indeed, previous longitudinal work has shown that urgency changes shift over time in tandem with propensities toward NSSI (You et al., 2016) and with the presence of suicidal behaviors (Millner et al., 2020). Further longitudinal research is needed to assess whether shame triggers NSSI in the context of urgency, or is merely the consequence of impulsivity and NSSI. Lastly, this study was a construct replication (neither measures nor samples characteristics are exactly parallel across studies); while we find the generalizability of most findings to be intriguing, we are limited in our ability to assess whether any non-replications are related to measurement or sample differences.

Implications and Future Directions

The proposed interaction of shame and urgency appears related to greater risk and frequency of NSSI and suicide attempts when examining simple slopes,

across the six models tested. This finding is consistent with the idea of shame as a potential "trigger" for self-harm for those with particularly high urgency.

If longitudinal work supports a temporal structure to this relationship, there could be important treatment implications. For example, this profile would suggest the merit of treatments that bolster distress tolerance and emotion regulation skills, such as dialectical behavior therapy (DBT; Linehan, 1993). If shame is shown to precede self-harm in longitudinal work, the efficacy of shame-reduction therapeutic techniques (e.g., compassion focused therapy; Gilbert, 2014) in reducing self-harm should be examined. This study also highlights the importance of development and testing of treatments that target urgency. In one study, community participants who took part in treatment to target urgency showed reduced urgency and self-harm behaviors (Johnson, Zisser, et al., 2020), including a subsample treated for bipolar disorder (Johnson, Sandel, et al., 2020). Mechanism-targeting treatments of this kind may indirectly reduce NSSI and suicide attempts.

Notwithstanding limitations, the current study has notable strengths. To our knowledge, it is the first to jointly examine the interaction of trait shame and impulsive responses to emotions within both NSSI and suicide attempts. Across two studies, the interaction of shame and urgency was related to NSSI, which replicates previous work (Wielgus et al., 2019). We extended past work to suicide attempt outcomes, where shame was related to an increased likelihood of suicide attempts and more frequent attempts, specifically when urgency was high. These effects were present after controlling for childhood adversity, which is tied to shame, urgency, and self-harm risk (Miller et al., 2013; Nock et al., 2008). The present study offers initial support for our conceptualization of NSSI and suicide in which an emotion such as shame may trigger self-harm, particularly for those who experience heightened urgency. Future NSSI and suicide research should consider the emotion of shame within the emotion-triggering-behavior framework tested in the present study, but using real-time measurement, such as EMA. Another extension of the current findings would be to examine how other specific emotion states work in tandem with (negative or positive) urgency to predict a variety of clinically relevant behaviors. It is our hope that further research on shame and impulsivity may elucidate improved treatment targets and ultimately help prevent self-harm-related suffering and death.

Additional Information

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Conflict of Interest
The authors have no known conflict of interest to disclose.

Ethical Approval
Studies were approved by the University of California, Berkeley Committee for the Protection of Human Subjects prior to data collection (Study 1 Protocol Number 2015-08-7865, Approved 12/18/2019; Study 2 Protocol Number 2016-05-8748, Approved 6/6/2016).

Data Availability
Data is available at https://osf.io/crqgp/.

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