Changes in Suicide and Non-Suicidal Self-Injury Ideation and the Moderating Role of Specific

Emotions over the Course of Dialectical Behavior Therapy

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Abstract

Objective: Dialectical Behavior Therapy (DBT) targets suicidal behavior and non-suicidal self-injury (NSSI). However, it remains unclear which *specific* suicidal ideation (SI) and NSSI ideation domains (i.e., frequency, worst intensity, average intensity, perceived likelihood of future ideation, and duration of ideation), if any, are impacted, and whether specific emotions moderate these effects and warrant targeting in DBT. Method: 73 individuals with borderline personality disorder (BPD), enrolled in a six-months of DBT, completed interviews of suicide and NSSI ideation and self-report measures of specific emotions at baseline, midtreatment, and posttreatment. Results: Generalized estimation equations revealed that all forms of suicidal ideation decreased over the course of DBT, but only NSSI ideation intensity decreased. Higher levels of shame/guilt predicted less, and higher fear predicted more, reduction in SI and NSSI ideation frequency. Higher shame/guilt also predicted more reduction in worst SI intensity. Higher sadness predicted greater reductions in SI intensity and duration, but less reductions in the perceived likelihood of future NSSI ideation. Conclusions: These findings suggest that DBT effectively reduces several forms of SI, but more work is required to target NSSI ideation. They also suggest that targeting shame/guilt may be important to reducing SI and NSSI ideation.

Keywords: Dialectical Behavior Therapy, suicide ideation, non-suicidal self-injury, treatment outcome

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Emotions over the Course of Dialectical Behavior Therapy

Dialectical Behavior Therapy (DBT; Linehan, 1993) has been established as an evidence-

based treatment for borderline personality disorder (BPD) and associated problems (e.g., DeCou,

Comtois, & Landes, 2019; Kliem, Kroger, & Kosfelder, 2010; Lynch, Trost, Salsman, &

Linehan, 2007). Many well-controlled studies (see DeCou, et al., 2019) have documented its

effects on reducing life-threatening behavior, specifically suicide attempts and episodes of

nonsuicidal self-injury (NSSI; self-injury without intent to die). However, fewer studies have

examined the effects of DBT on covert behaviors, namely suicidal ideation (i.e., SI) and NSSI

ideation (i.e., sometimes referred to as "urges" to NSSI or suicide). Although frequently

neglected in the treatment research literature, these ideation variables are of importance due to

their prominence as a major risk factor for suicidal and NSSI behavior (Ammerman, Olino,

Coccaro, & McCloskey, 2017; Andrewes, Hulbert, Cotton, Betts, & Chanen, 2017; Brown,

Beck, Steer, & Grisham, 2000; Louzon, Bossarte, McCarthy, & Katz, 2016; Nock, Prinstein, &

Sterba, 2009; Turner, Baglole, Chapman, & Gratz, 2019). It is important for studies to

investigate the effects of DBT on ideation variables as well as potential moderators of these

outcomes, in order to more fully understand the breadth of DBT's efficacy with respect to life-

threatening behavior.

Given the complexity of the BPD diagnosis and its associated problems, DBT follows a

structured target hierarchy for treatment planning. Specifically, "life threatening behaviors" are

the primary target, such that if they are present, they are given the highest priority in treatment.

As a category, life threatening behaviors covers a broad terrain of behavior that include overt

behaviors such as suicide attempts and self-injurious behaviors as well as other behaviors that are

known to increase the risk of suicide: suicide crisis behaviors (e.g., credible suicide threats, suicide planning and preparation), suicide-related expectancies and beliefs (e.g., "all my problems will disappear if I die"), suicide-related affect (e.g., feeling relief when fantasizing about suicide), and SI and NSSI ideation (e.g., urges to suicide or NSSI, fantasies about either, etc.; Linehan, 1993)[1].

However, despite the broad focus of the life-threatening behavior category, most research on the efficacy of DBT has focused on reductions in the number of suicide attempts and NSSI incidents in treatment (e.g., Carter, Wilcox, Lewin, Conrad, & Bendit, 2010; Harned, Korslund, & Linehan, 2014; McMain, Guimond, Barnhart, Habinski, & Streiner, 2017; Pistorello, Fruzzetti, MacLane, Gallop, & Iverson, 2012; see De Cou, Comtois, & Landes, 2019 and Kliem et al., 2010 for meta-analysis and reviews). Although this research is necessary, it is not comprehensive for many reasons. First, although important to study, suicide attempts and NSSI behaviors have low base rates, even in samples recruited for suicidal behavior (e.g., Pistorello et al., 2012). Thus, reductions in mean number of attempts and behaviors does not always have practical implications. Second, given the association between ideation and action, omitting ideation variables results in a lack of information regarding one of the most salient risk factors for overt behavior. Indeed, it is possible that individuals who exhibit reductions in NSSI and suicidal behavior but persistence of ideation variables are likely to exhibit a recurrence of those behaviors later on, outside of the periods of time measured in treatment outcome studies. Third, regardless of the risk that SI and NSSI ideation pose for the future engagement in life-threatening behavior, they are also clear markers of substantive distress and therefore worthy of treatment in their own right (Jobes & Joiner, 2019). A fuller understanding of how DBT treats the range of

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[1] Note: the life-threatening behavior category also includes homicidal behaviors and urges. However, these are not the focus of the current study.

life-threatening behavior, including ideation, is necessary in order to gauge the broader impact of DBT on these outcomes as well as to identify areas that are potentially in need of improvement.

The limited research on ideation variables in DBT has yielded mixed results. A recent meta-analysis of self-directed violence outcomes in DBT (De Cou et al., 2019) demonstrated that the treatment is effective at reducing suicidal behaviors and crisis intervention utilization but found that there was no significant effect of DBT for SI in the 10 studies in which it was measured. However, this meta-analysis only included studies of DBT that had treatment-as-usual or waitlist control conditions, i.e., it did not include studies with active control conditions or uncontrolled studies. There were also no reports of measures on urges to NSSI or NSSI ideation. Thus, the broader effects of DBT on ideation variables remain understudied or unknown.

In addition to the lack of studies on NSSI ideation made clear by the DeCou and colleagues (2019) meta-analysis, their research also highlighted another problem with including SI as an outcome variable. Specifically, the measurement of SI varies considerably from study to study and even a clear definition of what is meant by SI is not always provided. Several studies (e.g., Feigenbaum et al., 2012; Goldstein et al., 2015; Goodman et al., 2016; Linehan et al., 2006; McCauley et al., 2018; Pasieczny & Connor, 2011) measure SI using measures that provide global composite estimates of SI such as the Beck Scale for Suicide Ideation (BSSI; Beck, Kovacs, & Weissman, 1979; Beck, Steer, & Ranieri, 1988) or the Suicidal Ideation Questionnaire (Reynolds, 1987). These total scores treat ideation as a global construct that is measured by degree. For example, a score of 3 on the BSSI is considered lower SI, and therefore a better outcome, than a score of 15. However, in practical terms, it is not clear what a difference in scores actually indicates. Ideation variables can vary based on whether they are referring to the frequency of ideation, its intensity (on average or at its worst points), its duration, and the

perceived likelihood of future NSSI or suicidal behavior. These components may be meaningfully distinct, but it remains unclear which specific components of SI are effectively reduced in DBT, and which are not. The present study therefore examines which *specific* components of SI and NSSI ideation (i.e., frequency of thoughts; average and worst intensity of thoughts; duration of thoughts; and perception of likelihood that will attempt suicide in the future) change over the course of DBT. Such granular information is pertinent to identifying which specific ideation variables are modified in DBT, and which require more clinical and empirical attention.

**The moderating role of emotion on ideation.** It is also critically important to investigate whether any variables moderate the extent to which ideation variables change over the course of DBT. Several prominent theories suggest that both NSSI and suicidal behavior function to regulate negative emotion (Baumeister, 1990; Holden, Kerr, Mendonca, & Velamoor, 1998; Klonsky, 2007; Linehan, 1993; Shneidman, 1998). Accordingly, multiple studies clearly document that both NSSI and suicidal behavior occur following rises in negative emotion (Brown, Comtois, & Linehan, 2002; Bryan, Rudd, & Wertenberger, 2013), and that these emotions decrease following engagement in NSSI and suicidal behavior (Armey, Crowther, & Miller, 2011; Brain, Haines, & Williams, 1998; Bryan et al., 2013; Kamphuis, Ruyling, & Reijntjes, 2007; Klonsky, 2007; Nock, Prinstein, & Sterba, 2009; Welch, Linehan, Sylvers, Chittams, & Rizvi, 2008). These studies therefore suggest that targeting negative emotion is pertinent to reducing ideation variables.

Accordingly, DBT centrally emphasizes training individuals in skills to down-regulate negative emotional states (Linehan, 1993; Linehan, 2015). Studies show that improvements in individual's use of skills to regulate emotions are correlated with, or mediate, DBT treatment

gains (Axelrod, Perepletchikova, Holtzman, & Sinha, 2011; Barnicot, Gonzalez, McCabe, & Priebe, 2016; Neacsiu, Eberle, Kramer, Wiesmann, & Linehan, 2014; Neacsiu, Rizvi, & Linehan, 2010; Probst et al., 2018; Stepp, Epler, Jahng, & Trull, 2008). If SI and NSSI ideation is prompted by the experience of negative emotion, it is plausible that frequent and high levels of negative emotion obstruct reductions in ideation variables over time. However, no research to our knowledge has examined whether negative emotion moderates changes in ideation variables over the course of DBT.

Furthermore, it remains unclear which *specific* negative emotional states, if any, moderate changes in ideation variables. Indeed, the vast majority of research on the relationship between emotion and SI has focused on the construct of emotion (dys)regulation more broadly. There is very little empirical research on the role that specific emotions may exert on SI and NSSI ideation. Correlational studies suggest that guilt and shame (e.g., Bryan, Morrow, Etienne, & Ray-Sannerud, 2013) and anger/irritability (e.g., Connor et al., 2004; Hawkins & Cougle, 2013) are related to the presence of SI, even after controlling for depression. Importantly, experience of inappropriate anger is one of the criteria for borderline personality disorder, the population studied in this study and for whom, heightened suicide risk has been documented (Soloff, Lynch, & Kelley, 2002). To our knowledge, the present study is the first to examine which specific emotions are associated with reduced (or increased) changes in ideation variables over the course of DBT. Identifying which specific emotions obstruct reductions in ideation variables is pertinent to understanding the variables that must be targeted to successfully address SI and NSSI ideation in treatment.

**Aims and Hypothesis**

The primary aim of the present study was to investigate SI and NSSI ideation variables as DBT treatment outcomes on a more granular level. Specifically, we investigated which *specific* SI and NSSI ideation variables (i.e., frequency, average and worst intensity, perceived likelihood of future behavior, and duration) change over the course of DBT in a sample of individuals with borderline personality disorder. Given their classification in DBT as "life-threatening behavior" and therefore their heavy emphasis in as a top target of treatment, we hypothesized that all of these variables would reduce over time in DBT treatment.

We also aimed to investigate whether specific emotions moderate changes in SI and NSSI ideation outcomes. We hypothesized that, based on prior research, higher levels of shame, guilt, and anger would predict less reduction in SI and NSSI ideation over the course of DBT. Given a dearth of research in this area, we considered the impact of fear and sadness on changes in ideation variables to be exploratory.

## Method

### Participants

Participants were 73 individuals enrolled in a DBT research and training clinic. Inclusion criteria required that study participants: 1) be age 18 or older, 2) agree to take part in research assessments, videotaping/audio recording, 3) agree to pay for treatment sessions, 4) maintain residence within commuting distance of the clinic (<45mins), 5) agree to discontinue other forms of therapy, and 6) meet diagnostic criteria for BPD. A subgroup of participants (*n*=16) were recruited for a smaller substudy and required to meet additional inclusion criteria: two or more instances of NSSI or attempted suicide within the last 5 years with one instance occurring in the last six months; and willingness to utilize a mobile device installed with the DBT-based application (see Rizvi, Hughes, & Thomas, 2016). Exclusion criteria for the current study were

as follows: 1) clients requiring mental health services not available through this clinic (e.g. schizophrenia, life-threatening anorexia nervosa), 2) non-English speaking, 3) IQ score of less than 70, 4) inability to understand research consent forms, and 5) being court-ordered to participate in treatment. All participants provided written informed consent for inclusion in the study. The 73 individuals in this substudy were enrolled between April 2013 and June 2018. Individuals enrolled prior to April 2013 were excluded because the primary suicidal outcome measure (see below) was not administered during that time. Of the 73 participants included in the study, 70 completed all three time points and 3 completed two assessments. In addition, 20% (n=14) of participants dropped out of treatment (i.e., by not attending four individual or group sessions consecutively). At baseline, 94.5% (n = 69) and 76.7% (n = 56) reported having had SI or NSSI ideation in their lifetime, respectively, 63% (n = 46) had a lifetime suicide attempt, and 83.6% (n = 61) had engaged in NSSI at some point in their lifetime. Nearly three-quarters of the sample (72.60%; n = 54) reported taking psychotropic medications. Table 1 displays demographic and comorbidity information.

**Measures**

Participants in the larger study completed a full battery of measures (see Rizvi et al., 2017, for description). Of relevance to this study are diagnostic measures that confirmed eligibility and determined the presence of comorbid disorders and two self-report measures.

**Diagnostic interviews.** At the baseline assessment timepoint, Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; DSM-IV-TR; APA, 2000) psychological diagnoses were determined using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I-TR; First, Spitzer, Gibbon & Williams, 2002) or the Structured Clinical Interview for DSM-5 (SCID-5; First, Williams, Karg & Spitzer, 2015). Additionally, BPD diagnoses were

determined using the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II; First, Gibbon, Spitzer, Williams & Benjamin, 1997). During the course of the study, the study team began using the SCID-5 such that 45 individuals were assessed with the SCID-I and 28 were assessed with the SCID-5. Diagnostic comorbidities of the sample are presented in Table 1.

       **The Self-Injurious Thoughts and Behaviors Interview (SITBI;** Nock, Holmberg, Photos, & Michel, 2007). The SITBI is a structured interview containing modules that assess SI, suicide plans, suicide gestures, suicide attempts, and NSSI. The SITBI has excellent psychometric properties, with interrater reliability coefficients in in the range of 1.0 and strong test-retest reliability over six months (Nock et al., 2007). Furthermore, the SITBI correlates highly and in expected directions with other SI measures such as the Beck Scale for Suicide Ideation (Beck et al., 1988). The SITBI was administered at baseline (lifetime history) and then at mid-treatment and post-treatment to gather information since the last assessment point. The SITBI asks similar questions about SI and NSSI ideation separately. The separate number of times that participants had thoughts of killing themselves and of "purposely hurting yourself without wanting to die" in the past week were estimated (i.e., SI and NSSI ideation frequency). It also asks participants to rate the intensity of both the SI and NSSI ideation on average and at its worst point from 0 (low) to 4 (severe, i.e., average and worst point intensity). As well, the SITBI asks participants to indicate their perceived likelihood of engaging in NSSI or suicidal behavior in the future from 0 (little) to 4 (very much, i.e., perceived likelihood). Finally, the SITBI asks participants to indicate the duration of time they spent thinking about NSSI or suicidal behavior: 0 seconds, 1-60 seconds, 2-15 minutes, 16-60 minutes, less than 1 day, 1-2 days, more than 2 days, and wide range. Responses that indicated thinking about NSSI or suicide for a "wide range" were excluded from analyses.

**Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson &**

**Clark, 1994).** The PANAS-X contains a list of 60 emotions and asks participants to rate the

extent to which individuals have felt them in the past few weeks on a scale from 1 ("very slightly

or not at all") to 5 ("extremely"). The measure has 11 specific emotion subscales. For the present

study, we utilized the hostility/anger (angry, hostile, irritable, scornful, disgusted, loathing), fear

(afraid, scared, frightened, nervous, jittery, shakey), shame/guilt (guilty, ashamed, blameworthy,

angry at self, disgusted with self, dissatisfied with self), and sadness (sad, blue, downhearted,

alone, lonely) subscales. Notably, shame and guilt are collapsed in this measure. The convergent

and discriminant validity of the PANAS-X scales are well established (Watson & Clark, 1994)

and correlate highly with other emotion measures such as the Profile of Mood States (McNair et

al., 1992; Watson & Clark, 1994). Previous research has suggested that these scales can be used

to validly measure long-term individual differences in affect (Watson & Clark, 1994). The

PANAS-X was administered at the three timepoints. Cronbach alphas for the subscales used in

the present study ranged from .81 to .94 across time points.

**Procedure**

More details about the procedures of the larger study can be found in Rizvi et al. (2017).

All procedures were approved by the university's IRB. Of relevance to this study, eligible

participants completed a baseline intake assessment which included the measures listed here as

part of a larger inventory of interview and self-report measures. After the intake, participants

were offered six months of comprehensive DBT which included weekly individual therapy,

weekly skills training groups, and phone coaching. DBT was administered by graduate student

clinicians under the supervision of a DBT expert (first author). Participants were assessed with

the same measures at pre-treatment, mid-treatment (3 months) and post-treatment (6 months).

**Data Analytic Strategy**

Generalized Estimating Equations (GEE; Burton, Gurrin, & Sly, 1998; Diggle, Heagerty, Liang, & Zeger, 2002; Hubbard et al., 2010) in SPSS version 25 was used for study analyses because it allows for the examinations of repeated measures with several different types of distributions and is robust to covariance structure misspecification due to its semi-parametric nature. GEE models were run with the following distinct outcomes: past week SI frequency, past week NSSI ideation frequency, worst intensity of SI, worst intensity of NSSI ideation, average intensity of SI, average intensity of NSSI ideation, the perceived likelihood of SI in the future, the perceived likelihood of NSSI ideation in the future, the duration of SI, and the duration of NSSI ideation. GEE models were first run with only time point (pre-, mid-, or post-treatment) as a predictor to examine their general change over time. These models were subsequently re-run with time point, sadness, shame/guilt, anger, and fear entered as time-variant, continuous predictors. Time point $\times$ sadness, time point $\times$ shame/guilt, time point $\times$ anger, and time point $\times$ fear interactions were also entered. For each model, exchangeable, autoregressive, and unstructured covariance structures were examined and the one with the lowest Quasi Likelihood under Independence Model Criterion (QIC) was selected as the final model. Emotion predictors were grand-mean centered. The frequency count variables were highly positively skewed (skew statistics ranged from 6.19 to 8.58) and zero-inflated. Negative binomial distributions were therefore selected for the past week SI frequency and NSSI ideation frequency variables in order to account for their skewed and over-dispersed distributions. Other variables displayed more normal distributions (skew statistics ranged from -1.46 to .91) and analyses involving these variables were modeled as such. Responses for the SI and NSSI ideation duration variables that endorsed wide ranges in duration were excluded from analyses. In order to examine the

magnitude of effect of DBT on ideation variables over time, we computed pre- to post-treatment repeated measures Cohen's d effect sizes using Wiseheart's (2014) effect size calculator, which accounts for the correlation between the pre-treatment and post-treatment scores over time based on Morris and DeShon's (2002) work. In alignment with Cohen's (1977) recommendations, effect sizes of $d = .20$, .50, and .80 were considered small, medium, and large, respectively.

## Results

Means and standard deviations for all study variables across time points are presented in Table 2.

**Changes in Suicidal and NSSI Ideation Over the Course of Treatment**

Table 3 displays GEE results for models examining change in primary variables over DBT. There were statistically significant reductions in past week SI frequency ($d = .38$), worst SI intensity ($d = 1.07$), average SI intensity ($d = .56$), the perceived likelihood of future SI ($d = .56$), and the duration of SI ($d = .79$). There were also statistically significant reductions in worst NSSI ideation intensity ($d = .59$) and average NSSI ideation intensity ($d = .38$). However, past week NSSI ideation frequency, the perceived likelihood of future NSSI ideation, and the duration of NSSI ideation did not exhibit statistically significant changes, over the course of DBT.

**Specific Emotions Predicting Changes Suicidal and NSSI Ideation**

Table 4 displays GEE results for models examining the influence of specific emotions on changes in outcome variables over DBT.

**SI and NSSI Ideation Frequency.** There were significant time point × shame/guilt interactions predicting both SI and NSSI ideation frequency such that higher levels of shame/guilt across treatment predicted less reductions in these variables. Further, there were significant time point × fear interactions predicting both SI and NSSI ideation frequency such that higher fear across treatment predicted *greater* reductions in SI and NSSI ideation frequency.

**SI and NSSI Ideation Worst Intensity.** There was a statistically significant time point ×
sadness interaction predicting the worst SI intensity such that higher sadness across treatment
predicted greater reductions in the worst SI intensity. There was also a significant time point ×
shame/guilt interaction such that higher shame/guilt across treatment predicted less reduction in
the worst SI intensity. There were no statistically significant main effects of specific emotion or
interactions with time point predicting changes in worst NSSI ideation intensity.

**SI and NSSI Ideation Average Intensity.** There was a statistically significant main
effect of shame/guilt predicting average SI intensity, such that higher shame/guilt predicted
lower average intensity. There were no other statistically significant main effects of specific
emotion or interactions with time point predicting changes in average SI or NSSI ideation
intensity.

**Likelihood of future SI and NSSI Ideation.** There were no statistically significant main
effects of specific emotion or time point × specific emotion interactions predicting the perceived
likelihood of future SI. There was a statistically significant time point × sadness interaction
predicting the perceived likelihood of future NSSI ideation such that higher sadness across
treatment predicted less reduction in the perceived likelihood of future NSSI ideation. There
were no other statistically significant main effects or interactions with time point predicting the
perceived likelihood of future NSSI ideation.

**Duration of SI and NSSI ideation.** There was a statistically significant time point ×
sadness interaction predicting the duration of SI such that higher sadness across treatment
predicted greater reductions in SI duration over time. There were no other statistically significant
main effects of specific emotion or interactions with time point predicting changes in the SI or
NSSI ideation duration.

**Discussion**

This study investigated changes in SI and NSSI ideation over the course of a six-month comprehensive DBT program. Specifically, we examined whether these constructs changed as measured by several aspects of ideation, rather than relying on a global score that lacks specificity. A secondary aim was to determine whether the experience of specific emotions moderated the treatment effect of DBT on these variables. A number of important results emerged from this research that have implications for treatment provision and future research.

First, consistent with hypotheses, SI variables all significantly decreased over the course of treatment, with effect sizes ranging from small (past week SI frequency) to large (worst SI intensity). SI is monitored on a daily basis and reviewed with the therapist each week via the DBT diary card. It is considered a high-level target of treatment, and thus, it is expected to decrease over the course of DBT. However, prior studies on changes in SI over the course of DBT have provided inconsistent results (DeCou et al., 2019). As mentioned earlier, these studies have relied on SI as a global construct, measured in different ways across studies. It is also possible that prior studies that have examined changes in SI over the course of DBT have used inconsistent measures of SI that are not sensitive to change over the course of treatment. Results from this study and others suggest that there is a need for more consistent measurements across studies so that direct comparisons can be made.

With regard to NSSI ideation, two variables representing NSSI ideation intensity decreased over the course of six months of DBT. These included worst NSSI ideation intensity and average ideation intensity. However, the aspects of NSSI ideation that did not change significantly over time include past week frequency, duration of ideation, and the perceived likelihood of future NSSI ideation. These findings suggest that, although DBT may decrease the

intensity of NSSI ideation, their occurrence, duration, and the perceptions of their occurrence in the future remain unchanged. Such discrepant effects on ideation variables underscore the importance of assessing distinct domains of ideation, rather than one global construct. There are several possible explanations for why DBT resulted in changes in NSSI ideation intensity variables, but not other specific NSSI ideation variables. First, given that a history of NSSI behavior was more common in our sample than a history of suicidal behavior, and that the potential consequences of suicide attempts are more severe, it is possible that individuals engaged in NSSI behavior more quickly than that of suicidal behavior, therefore ideating less or for shorter periods of time. Related, given the lower severity of the consequences associated with NSSI relative to suicidal behavior, individuals with BPD may be less attentive towards, and thus less able to identify and report on, NSSI ideation compared to SI. Such possibilities could result in a more restricted range on some NSSI ideation variables, thereby blocking the ability to discern changes in them and resulting in the appearance of null findings.

Alternatively, it is possible that DBT is uniquely strong at decreasing the intensity of NSSI ideation, but not some of its other domains. In DBT, clients are taught many skills to address challenging internal and external states. However, the majority of DBT skills focused on internal experiences teach clients to downregulate experiences that are already present (i.e., reduce their intensity). Significantly smaller portions of DBT skills emphasize the prevention of the occurrence of a particular emotion or internal state in the first place (Linehan, 2015). Therefore, it is possible that the skills taught in the treatment are particularly well suited to decreasing the intensity of ideation once it occurs, but not preventing its occurrence (i.e., frequency) and therefore the likelihood of its re-occurrence (i.e., perception of likelihood of future NSSI). However, in this case, it is unclear why this effect would be present for NSSI

ideation but not SI. Future research is needed in order to replicate these findings and investigate potential mediators of these effects or lack thereof.

Ours was the first study to examine a number of discrete emotions in order to weigh their moderating effect on changes in SI and NSSI ideation over the course of treatment. Specifically, we examined the relative effects of hostility/anger, fear, shame/guilt, and sadness on changes in all of the ideation variables. Results indicated differential findings based on the emotion. Individuals with higher levels of shame and guilt across treatment had less reduction in both SI and NSSI ideation frequency over the course of DBT. In contrast, individuals with higher levels of fear across treatment had *greater* reductions in SI and NSSI ideation frequency over the course of treatment. Perhaps shame/guilt uniquely obstruct treatment responses in the frequency and intensity of ideation, whereas fear facilitates reductions in frequency. It could be that the direction of focus that accompanies these emotions can explain this difference. Shame is prominent in BPD (Rizvi, Brown, Bohus, & Linehan, 2011) and focuses attention inwards on the self as bad whereas fear is often focused outwards in search for potential threat. The experience of shame may therefore be particularly likely to result in self-directed responses to emotions/problems (i.e., urges to engage in NSSI or suicide). Related, both shame and fear are associated with urges to avoid or hide. However, whereas fear is associated with urges to avoid or escape threatening stimuli, shame is associated with urges to hide or disappear (e.g., Tangney, 1995). The urge to hide oneself may increase proclivity towards suicide and SI because it is perceived to be a logical response (i.e., suicide can be seen as the ultimate form of hiding oneself/disappearing). Conversely, individuals higher in fear may also have greater apprehension about attempting suicide and its possible consequences (e.g., fear of death), which are known to

be protective factors against suicidal behavior (e.g., Muehlenkamp & Gutierrez, 2007) and therefore may also result in individuals dismissing or resisting SI.

It is also notable that main effects of shame/guilt suggested that, while individuals with higher shame/guilt exhibit comparable SI intensity at its worst point than others, their average SI intensity is lower. Interestingly, these findings do not suggest that people with high shame/guilt have consistently lower SI intensity, given that it is similar to others at its worst point. Perhaps these findings suggest that, in addition to having similar SI intensity at its worst point than others, individuals with high shame/guilt also have more frequent experiences of SI at lower intensity levels. More frequent SI in general may result in a collectively lower average of SI intensity, even though peak SI intensity is the similar regardless of guilt/shame levels. Although possible, future work should aim to disentangle the impact of shame and guilt on ideation frequency, variability, and intensity.

The emotion of sadness also displayed a moderation effect. Individuals with higher sadness across treatment had greater reductions in the worst SI intensity and SI duration, but they had less reductions in the perceived likelihood of future NSSI ideation. Perhaps sadness acts as a proxy for a specific "profile" of SI that is more amenable to DBT. Sadness is particularly overlapping with depression, a comorbidity that occurred in over half of our sample. Recurrent SI is also a diagnostic criterion of depression (American Psychiatric Association, 2013). Individuals higher in sadness may thus also have been elevated in depression and, consequently, in a range of SI variables. In this case, individuals with higher sadness may have exhibited elevations in SI variables at the beginning of treatment, and therefore simply regress towards the mean throughout treatment. Related, there is evidence that DBT can effectively reduce depression (Turner, 2000). DBT may therefore be particularly well equipped to reduce SI

variables in individuals whose ideation is precipitated by sadness or depression, given its effects on these controlling variables. However, it is unclear why sadness related to NSSI ideation displayed the opposite pattern. Given that sadness and depression entail negative outlooks on the future, it is possible that individuals higher in sadness were simply less optimistic about their potential to stop NSSI, thus reporting that their perceived likelihood of NSSI ideation in the future is higher. It is unclear whether the obstructed reduction in the perceived likelihood of NSSI ideation in the future is associated with an obstructed reduction in NSSI behavior, or merely reflects a subjective, pessimistic prediction. Future works should aim to disentangle these two effects in order to identify precisely how sadness obstructs behavioral NSSI outcomes if at all. It is also important to note that changes in specific emotions did not necessarily precede changes in ideation variables. Thus, whether these emotions actually obstruct or facilitate outcomes, rather than being simply associated with them, remains unclear and an important focus for future work.

Finally, results indicated no impact of specific emotions on average SI intensity and perceived likelihood of future SI, and no impact of specific emotions on the NSSI ideation variables of worst intensity, average intensity, and duration of ideation. There was no impact of anger on any variables. It is unclear why anger did not moderate the effects of ideation variables. One possible explanation may be related to the conflation of anger directed towards the self, and outwards towards others, in the anger variable examined. Indeed, it is possible that the directionality of anger may exert distinct or opposing effects on changes in ideation variables over the course of treatment such that externally directed anger may not influence ideation variables, given its outward focus on others. However, the self-focused nature of internally directed anger, like shame, may obstruct improvements in SI and NSSI ideation. Collapsing both

forms of anger into one composite may therefore mask potentially important effects based on the directionality of anger, and future researchers are therefore advised to disentangle this.

**Limitations and Future Directions**

There are several limitations to the current study that are worth noting and addressing future research. First, this study is hampered by a relatively small sample size and lack of adherence ratings to assess the degree to which the therapist were applying DBT to fidelity. However, despite this lack, our previous research has indicated that the graduate student therapists achieve outcomes similar to those of gold-standard RCTs of DBT that include adherence ratings (Rizvi et al., 2017). The lack of a treatment control group also limits our conclusions as to whether these effects are specific to DBT. In addition, the present study is limited in the extent to which temporal or causal patterns can be assessed. Although our results demonstrate associations between specific emotions and changes in ideation variables, they do not indicate whether changes in those emotions elicit or precede changes in ideation variables (e.g.., a lagged multi-level model). Such temporal precedence is essential in understanding the mechanisms through which outcomes change over time in treatment studies, but is difficult to examine in studies with so few time points such as that of the present work. Future researchers are therefore advised to examine temporal relationships between specific emotions and ideation variables by measuring both at several time points. Finally, the PANAS-X, the primary measure to assess emotions within this study, does not discriminate between shame and guilt, despite the body of research that supports their distinct cognitive components, expressions, and consequences (e.g., Tangney, 1995). Thus, it is unclear to what extent the findings here represent changes in shame versus guilt (or both) and more research is needed.

Recently, Jobes & Joiner (2019) wrote that "in our singular pursuit to prevent suicide deaths, we need to stop trivializing the obvious and vital importance of attending to suicidal ideation. We therefore assert that suicidal ideation must become an essential intervention target in and of itself" (p.229). In addition to identifying SI and NSSI ideation as important intervention targets, this study suggests that a nuanced approach to studying different facets of SI and NSSI ideation yields important information. Furthermore, this study, should its findings be replicated, highlights areas in which DBT appears to perform well (e.g., multiple facets of SI) as well as factors that may need more attention in treatment efforts (e.g., frequency of NSSI ideation).

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Table 1

Participant demographics and diagnostic comorbidities at baseline (n=73).

| Age | | M = 28.79 (SD=9.14) |
|---|---|---|
| Sex | | |
| | Male | 19.2% |
| | Female | 76.7% |
| | Other | 4.1% |
| Race/ethnicity | | |
| | Asian | 4.1% |
| | Black or African American | 5.5% |
| | White | 78.1% |
| | More than one race | 12.3% |
| Marital status | | |
| | Single | 71.2% |
| | Widowed | 1.4% |
| | Married/Living with partner | 17.8% |
| | Divorced/Separated | 9.5% |
| Highest level of formal education | | |
| | Some high school | 2.7% |
| | High school graduate | 8.2% |
| | Some college | 47.9% |
| | College graduate | 27.4% |
| | Some graduate or professional school beyond college | 6.8% |
| | Masters degree | 6.8% |
| Annual income | | |
| | $0-$9,000 | 33.8% |
| | $10,000-$19,000 | 13.8% |

|  |  |
|---|---|
| $20,000-$29,000 | 9.2% |
| $30,000-$39,000 | 7.7% |
| $40,000-$49,000 | 6.2% |
| $50,000-$59,000 | 4.6% |
| $70,000-$79,000 | 0% |
| $80,000-$89,000 | 1.5% |
| $90,000-$99,000 | 12.3% |
| $100,000+ | 10.8% |
| Current comorbid disorders | |
| Bipolar I Disorder | 4.1% |
| Bipolar II Disorder | 1.4% |
| Major depressive disorder | 53.5% |
| Persistent depressive disorder or dysthymic disorder | 21.1% |
| Alcohol use disorder | 11.0% |
| Substance use disorder | 11.0% |
| Panic disorder | 20.8% |
| Agoraphobia | 5.6% |
| Social anxiety disorder | 49.3% |
| Specific phobia | 17.8% |
| Generalized anxiety disorder | 61.1% |
| Obsessive compulsive disorder | 11.3% |
| Body dysmorphic disorder | 9.6% |
| Eating disorder | 15.1% |
| Posttraumatic stress disorder | 13.7% |

*Notes.* M = mean; SD = standard deviation; 45 participants received the SCID-IV-TR (First, Spitzer, Gibbon & Williams, 2002) and received the 29 participants received the SCID-5 (First, Williams, Karg & Spitzer, 2015). Estimates for most disorders are combined.

Table 2

*Means (and standard deviations) for all study variables*

|  | Baseline | 3 Months | 6 Months |
|---|---|---|---|
| Past week suicidal ideation frequency | 2.71 (6.25) | 1.04 (1.91) | .74 (1.74) |
| Past week NSSI ideation frequency | 2.22 (6.15) | .97 (1.80) | .92 (2.94) |
| Worst SI intensity | 3.71 (.57) | 2.86 (1.07) | 2.49 (1.16) |
| Worst NSSI intensity | 3.73 (.59) | 3.56 (.71) | 3.10 (1.02) |
| Average SI intensity | 2.39 (.88) | 1.77 (.95) | 1.72 (.99) |
| Average NSSI intensity | 2.65 (.82) | 2.17 (.74) | 2.17 (1.05) |
| Perceived likelihood of future SI | 2.99 (1.28) | 2.32 (1.41) | 2.13 (1.57) |
| Perceived likelihood of future NSSI ideation | 2.58 (1.59) | 2.26 (1.57) | 2.29 (1.61) |
| Sadness | 17.90 (4.68) | 15.52 (5.01) | 13.16 (5.58) |
| Shame/Guilt | 21.64 (6.72) | 19.04 (5.96) | 14.23 (7.04) |
| Anger | 18.42 (5.42) | 15.33 (5.62) | 12.89 (5.26) |
| Fear | 17.41 (5.61) | 16.45 (5.84) | 14.10 (5.78) |
| Duration of SI (% of category endorsed) |  |  |  |
|     1-60 seconds | 5.8% | 26.8% | 23.4% |
|     2-15 minutes | 15.9% | 16.1% | 19.1% |
|     16-60 minutes | 15.9% | 19.6% | 25.5% |
|     Less than 1 day | 29.0% | 21.4% | 25.5% |
|     1-2 days | 11.6% | 5.4% | 2.1% |
|     More than 2 days | 10.1% | 1.8% | 0% |
|     Wide range | 11.6% | 5.4% | 4.3% |

| Duration of NSSI ideation (% of category endorsed) | | | |
|---|---|---|---|
| 0 seconds | 0% | 0% | 0% |
| 1-60 seconds | 5.4% | 9.8% | 7.3% |
| 2-15 minutes | 21.4% | 24.4% | 24.4% |
| 16-60 minutes | 23.2% | 31.7% | 34.1% |
| Less than 1 day | 33.9% | 26.8% | 24.4% |
| 1-2 days | 7.1% | 0% | 0% |
| More than 2 days | 1.8% | 0% | 2.4% |
| Wide range | 7.1% | 7.3% | 7.3% |

*Note.* Frequency variables reflect the number of times SI or NSSI ideation occurred. Intensity variables ranged from 0 (low) to 4 (severe). Perceived likelihood variables ranged from 0 (little) to 4 (very much). Duration variables presented six time groupings that ranged from 0 ("0 seconds") to 6 ("more than 2 days"). Sadness variable ranges from 5 to 25 and all other emotion subscales range from 6 to 30.

Table 3

*Generalized estimating equations analyses examining changes in ideation variables over DBT*

| | B | SE | $\chi^2$ | df | p-value | Cohen's d |
|---|---|---|---|---|---|---|
| **Past week suicidal ideation frequency** | | | | | | .38 |
| **Intercept** | **1.98** | **.52** | **17.23** | **1** | **<.001** | |
| Drop out | -.49 | .49 | 1.00 | 1 | .32 | |
| **Time point** | **-.65** | **.21** | **10.11** | **1** | **.001** | |
| Past week NSSI ideation frequency | | | | | | .20 |
| **Intercept** | **1.77** | **.72** | **6.15** | **1** | **.01** | |
| **Drop out** | **-.90** | **.46** | **3.77** | **1** | **.05** | |
| Time point | -.43 | .26 | 2.68 | 1 | .10 | |
| Worst SI intensity | | | | | | 1.07 |
| **Intercept** | **4.55** | **.21** | **984.05** | **1** | **<.001** | |
| Drop out | -.40 | .22 | 3.27 | 1 | .07 | |
| **Time point** | **-.59** | **.09** | **49.16** | **1** | **<.001** | |
| Worst NSSI ideation intensity | | | | | | .59 |
| **Intercept** | **4.26** | **.17** | **803.78** | **1** | **<.001** | |
| **Drop out** | **-.28** | **.14** | **3.83** | **1** | **.05** | |
| **Time point** | **-.30** | **.08** | **14.27** | **1** | **<.001** | |
| Average SI intensity | | | | | | .56 |
| **Intercept** | **3.01** | **.21** | **275.68** | **1** | **<.001** | |
| **Drop out** | **-.49** | **.20** | **5.78** | **1** | **.02** | |
| **Time point** | **-.32** | **.09** | **14.05** | **1** | **<.001** | |
| Average NSSI intensity | | | | | | .38 |
| **Intercept** | **3.32** | **.24** | **241.23** | **1** | **<.001** | |
| **Drop out** | **-.63** | **.20** | **10.10** | **1** | **.001** | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Time point** | **-.22** | **.10** | **5.41** | **1** | **.02** | |
| Perceived likelihood of future SI | | | | | | .56 |
| **Intercept** | **3.41** | **.34** | **211.87** | **1** | **<.001** | |
| Drop out | -.09 | .33 | .07 | 1 | .79 | |
| **Time point** | **-.45** | **.10** | **19.67** | **1** | **<.001** | |
| Perceived likelihood of future NSSI ideation | | | | | | .22 |
| **Intercept** | **2.50** | **.45** | **84.69** | **1** | **<.001** | |
| Drop out | .12 | .47 | .07 | 1 | .79 | |
| Time point | -.15 | .09 | 2.89 | 1 | .09 | |
| Duration of SI | | | | | | .79 |
| **Intercept** | **4.30** | **.38** | **233.24** | **1** | **<.001** | |
| Drop out | -.45 | .38 | 1.39 | 1 | .24 | |
| **Time point** | **-.47** | **.10** | **24.99** | **1** | **<.001** | |
| Duration of NSSI ideation | | | | | | .11 |
| **Intercept** | **3.39** | **.36** | **189.08** | **1** | **<.001** | |
| Drop out | -.15 | .33 | .22 | 1 | .64 | |
| Time point | -.14 | .08 | 2.81 | 1 | .09 | |

*Note.* Significant main effects are bolded. Cohen's d scores reflect pre to post-treatment change.

Table 4

*Generalized estimating equations analyses examining changes in ideation variables over DBT,*

*as moderated by specific emotions*

| | B | SE | $\chi^2$ | df | p-value |
|---|---|---|---|---|---|
| Past week suicidal ideation frequency | | | | | |
| **Intercept** | **1.80** | **1.01** | **3.71** | **1** | **.05** |
| Drop out | -.73 | .59 | 1.51 | 1 | .22 |
| **Time point** | **-.64** | **.25** | **6.51** | **1** | **.01** |
| Sadness | .02 | .08 | .05 | 1 | .83 |
| Shame/Guilt | -.07 | .08 | .82 | 1 | .37 |
| Anger | -.12 | .06 | 3.53 | 1 | .06 |
| **Fear** | **.30** | **.08** | **15.94** | **1** | **<.001** |
| Time point × sadness | -.03 | .05 | .41 | 1 | .52 |
| **Time point × shame/guilt** | **.11** | **.04** | **9.05** | **1** | **.003** |
| Time point × anger | .05 | .03 | 2.74 | 1 | .10 |
| **Time point × fear** | **-.17** | **.04** | **17.67** | **1** | **<.001** |
| Past week NSSI ideation frequency | | | | | |
| **Intercept** | **1.24** | **.51** | **4.78** | **1** | **.03** |
| Drop out | -.71 | .38 | 3.41 | 1 | .07 |
| **Time point** | **-.44** | **.19** | **5.29** | **1** | **.02** |
| Sadness | -.10 | .11 | .76 | 1 | .38 |
| Shame/Guilt | -.09 | .08 | 1.41 | 1 | .24 |
| Anger | .08 | .07 | 1.03 | 1 | .31 |
| **Fear** | **.22** | **.11** | **4.24** | **1** | **.04** |
| Time point × sadness | -.01 | .05 | .02 | 1 | .88 |
| **Time point × shame/guilt** | **.15** | **.04** | **12.31** | **1** | **<.001** |

| Time point × anger | -.05 | .04 | 2.23 | 1 | .14 |
|---|---|---|---|---|---|
| **Time point × fear** | **-.12** | **.05** | **6.01** | **1** | **.01** |
| Worst SI intensity | | | | | |
| **Intercept** | **4.26** | **.24** | **752.26** | **1** | **<.001** |
| **Drop out** | **-.21** | **.25** | **.68** | **1** | **.41** |
| **Time point** | **-.52** | **.08** | **41.92** | **1** | **<.001** |
| **Sadness** | **.11** | **.03** | **11.38** | **1** | **.001** |
| **Shame/Guilt** | **-.08** | **.03** | **7.50** | **1** | **.01** |
| Anger | -.004 | .03 | .01 | 1 | .91 |
| Fear | .01 | .03 | .08 | 1 | .78 |
| **Time point × sadness** | **-.05** | **.02** | **7.62** | **1** | **.01** |
| **Time point × shame/guilt** | **.04** | **.02** | **4.63** | **1** | **.03** |
| Time point × anger | .02 | .02 | .87 | 1 | .35 |
| Time point × fear | -.01 | .02 | .54 | 1 | .46 |
| Worst NSSI ideation intensity | | | | | |
| **Intercept** | **4.01** | **.18** | **593.92** | **1** | **<.001** |
| Drop out | -.08 | .14 | .33 | 1 | .56 |
| **Time point** | **-.24** | **.08** | **8.24** | **1** | **.004** |
| Sadness | -.01 | .05 | .06 | 1 | .81 |
| Shame/Guilt | -.004 | .05 | .01 | 1 | .94 |
| Anger | .01 | .05 | .04 | 1 | .84 |
| Fear | .01 | .04 | .13 | 1 | .72 |
| Time point × sadness | -.002 | .03 | .01 | 1 | .93 |
| Time point × shame/guilt | .01 | .03 | .03 | 1 | .86 |
| Time point × anger | .02 | .03 | .57 | 1 | .45 |
| Time point × fear | -.02 | .02 | .59 | 1 | .44 |
| Average SI intensity | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Intercept** | **2.95** | **.25** | **219.72** | **1** | **<.001** |
| Drop out | -.19 | .23 | .70 | 1 | .40 |
| **Time point** | **-.39** | **.09** | **17.69** | **1** | **.001** |
| Sadness | .01 | .04 | .04 | 1 | .85 |
| **Shame/Guilt** | **-.09** | **.03** | **8.92** | **1** | **.003** |
| Anger | .04 | .04 | .94 | 1 | .33 |
| Fear | -.03 | .03 | .81 | 1 | .37 |
| Time point × sadness | .002 | .02 | .01 | 1 | .91 |
| Time point × shame/guilt | .03 | .02 | 3.63 | 1 | .06 |
| Time point × anger | -.02 | .02 | .99 | 1 | .32 |
| Time point × fear | .01 | .02 | .52 | 1 | .47 |
| Average NSSI intensity | | | | | |
| **Intercept** | **3.19** | **.28** | **158.17** | **1** | **<.001** |
| **Drop out** | **-.63** | **.24** | **6.62** | **1** | **.01** |
| Time point | -.16 | .11 | 1.90 | 1 | .17 |
| Sadness | .03 | .06 | .25 | 1 | .62 |
| Shame/Guilt | .02 | .04 | .34 | 1 | .56 |
| Anger | .001 | .05 | .001 | 1 | .98 |
| Fear | .01 | .04 | .12 | 1 | .73 |
| Time point × sadness | -.01 | .03 | .06 | 1 | .81 |
| Time point × shame/guilt | -.02 | .02 | .72 | 1 | .40 |
| Time point × anger | .01 | .02 | .28 | 1 | .60 |
| Time point × fear | -.01 | .02 | .06 | 1 | .81 |
| Perceived likelihood of future SI | | | | | |
| **Intercept** | **2.60** | **.37** | **109.40** | **1** | **<.001** |
| Drop out | .21 | .35 | .35 | 1 | .55 |
| Time point | -.16 | .10 | 3.01 | 1 | .08 |

| | | | | | |
|---|---|---|---|---|---|
| Sadness | .11 | .06 | 3.31 | 1 | .07 |
| Shame/Guilt | -.02 | .05 | .20 | 1 | .66 |
| Anger | .03 | .05 | .26 | 1 | .61 |
| Fear | .03 | .04 | .61 | 1 | .44 |
| Time point × sadness | -.04 | .03 | 1.29 | 1 | .26 |
| Time point × shame/guilt | .03 | .02 | 1.49 | 1 | .22 |
| Time point × anger | .01 | .03 | .06 | 1 | .81 |
| Time point × fear | -.03 | .02 | 1.67 | 1 | .20 |
| Perceived likelihood of future NSSI ideation | | | | | |
| **Intercept** | **2.28** | **.49** | **46.73** | **1** | **<.001** |
| Drop out | .27 | .44 | .38 | 1 | .54 |
| Time point | -.10 | .14 | .60 | 1 | .44 |
| **Sadness** | **-.11** | **.05** | **4.13** | **1** | **.04** |
| Shame/Guilt | .06 | .04 | 2.40 | 1 | .12 |
| Anger | .02 | .04 | .19 | 1 | .66 |
| Fear | -.02 | .05 | .17 | 1 | .68 |
| **Time point × sadness** | **.06** | **.02** | **7.12** | **1** | **.01** |
| Time point × shame/guilt | -.03 | .02 | 1.34 | 1 | .25 |
| Time point × anger | -.01 | .02 | .10 | 1 | .75 |
| Time point × fear | .02 | .03 | .29 | 1 | .59 |
| Duration of SI | | | | | |
| **Intercept** | **4.07** | **.42** | **185.60** | **1** | **<.001** |
| Drop out | -.39 | .42 | .87 | 1 | .35 |
| **Time point** | **-.45** | **.10** | **18.75** | **1** | **<.001** |
| **Sadness** | **.11** | **.05** | **4.29** | **1** | **.04** |
| Shame/Guilt | -.02 | .05 | .18 | 1 | .68 |
| Anger | .09 | .05 | 3.22 | 1 | .07 |

| | | | | | |
|---|---|---|---|---|---|
| Fear | -.08 | .05 | 2.83 | 1 | .09 |
| **Time point × sadness** | **-.06** | **.02** | **7.38** | **1** | **.01** |
| Time point × shame/guilt | .03 | .02 | 1.32 | 1 | .25 |
| Time point × anger | -.04 | .03 | 2.53 | 1 | .11 |
| Time point × fear | .02 | .02 | .96 | 1 | .33 |
| Duration of NSSI | | | | | |
| **Intercept** | **3.36** | **.38** | **167.40** | **1** | **<.001** |
| Drop out | -.14 | .35 | .15 | 1 | .70 |
| Time point | -.16 | .09 | 3.07 | 1 | .08 |
| Sadness | .07 | .06 | 1.36 | 1 | .24 |
| Shame/Guilt | .04 | .04 | 1.51 | 1 | .28 |
| Anger | -.03 | .06 | .29 | 1 | .59 |
| Fear | -.04 | .05 | .58 | 1 | .45 |
| Time point × sadness | -.02 | .03 | .30 | 1 | .58 |
| Time point × shame/guilt | -.04 | .02 | 2.24 | 1 | .13 |
| Time point × anger | .02 | .03 | .79 | 1 | .37 |
| Time point × fear | .004 | .02 | .04 | 1 | .84 |

*Note.* Significant main effects and interactions are bolded