

**Psychometric Properties of the Emotion Reactivity Scale in
Community Screening Assessments**

Stephen Byrne¹

Bridget A. Makol¹

Lauren M. Keeley¹

Andres De Los Reyes¹

¹University of Maryland, College Park

Number of Tables: 4

Number of Figures: 0

Author Notes

Stephen Byrne, Bridget A. Makol, Lauren M. Keeley, Andres De Los Reyes, Comprehensive Assessment and Intervention Program, Department of Psychology, University of Maryland, College Park, MD.

Correspondence regarding this manuscript should be addressed to Andres De Los Reyes, Comprehensive Assessment and Intervention Program, Department of Psychology, University of Maryland, Biology/Psychology Building, Room 3123H, College Park, MD 20742; Office: 301-405-7049; Fax: 301-314-9566; E-mail: adlr@umd.edu

CITATION

Byrne, S., Makol, B.A., Keeley, L.M., & De Los Reyes, A. (2019). Psychometric

properties of the Emotion Reactivity Scale in community screening assessments. *Journal of Psychopathology and Behavioral Assessment*, 41, 730-740. doi: 10.1007/s10862-019-

09749-8

Abstract

Among individuals experiencing internalizing psychopathology, high levels of emotion reactivity—the degree to which they experience emotions strongly or intensely, over extended periods of time, and as elicited by a variety of stimuli—increase risk for self-injurious thoughts and behaviors. Researchers developed the Emotion Reactivity Scale (ERS) to assess emotion reactivity, with psychometric support for the measure largely restricted to at-risk clinical populations. We know little of the psychometric properties of the ERS when administered as a screening measure in community assessments. In a study of the psychometric properties of the ERS in a non-clinical assessment of adults, we recruited 105 participants ($M_{\text{age}}=44.6$; 82.9% female) as part of a larger study of adolescent social anxiety and family relationships. Participants completed the ERS, self-report measures of various psychosocial domains, and an impromptu speech task, before and during which they self-reported their arousal. Scores taken from the ERS demonstrated strong internal consistency and demonstrated facets of validity: (a) positive relations with measures of internalizing psychopathology and parent-adolescent conflict, and negative relations with a measure of quality of life (convergent validity); (b) relations with self-reported anxiety and safety-seeking behaviors, over-and-above self-reported depressive symptoms (incremental validity); and (c) relation with self-reported state arousal during the impromptu speech task, over-and-above self-reported arousal at baseline (criterion-related validity). These findings support the psychometric properties of the ERS when administered in non-clinic assessments of adults. As such, they have important implications for screening assessments designed to identify adults who display the potential for self-injurious thoughts and behaviors.

Keywords: Emotion Reactivity Scale; emotion reactivity; assessment; community sample; psychometric properties

Psychometric Properties of the Emotion Reactivity Scale in Community Screening Assessments

Emotion reactivity is an important psychological construct in research on self-injurious thoughts and behaviors (SITB) and their relation to internalizing psychopathology (e.g., depression, anxiety, borderline personality disorder [BPD]) (Compare, Zarbo, Shonin, Van Gordon, & Marconi, 2014; Evans et al., 2016; Glenn, Blumenthal, Klonsky, & Hajcak, 2011; Klonsky, Victor, & Saffer, 2014; Nock, 2009; Nock, Wedig, Holmberg & Hooley, 2008). SITBs include non-suicidal self-injury (NSSI), suicide ideation, and suicide attempts. Nock and colleagues (2008) define emotion reactivity as the degree to which an individual experiences emotions a) strongly or intensely (*emotional arousal/intensity*), b) over long periods of time (*emotion persistence*), and c) as elicited by a wide variety of stimuli (*emotion sensitivity*). Relatively high emotion reactivity predisposes individuals to difficulties regulating their emotions, and as such, emotion reactivity and similar constructs (e.g., emotional vulnerability or emotional cascade model) play a significant role in conceptual models regarding emotions, internalizing psychopathology, and SITB (e.g., Arbuthnott, Lewis & Bailey, 2015; Linehan, 1993; Selby, Anestis, & Joiner, 2008).

Before the advent of research on emotion reactivity, researchers encountered difficulty when explaining the progression from clinically significant internalizing problems to SITB. One issue in particular is that not all individuals who display internalizing psychopathology also display SITB (Klonsky et al., 2014; Nock, 2009; Nock et al., 2008, 2013). Recent work suggests that emotion reactivity may help explain the pathway through which the presence of internalizing psychopathology poses increased risk for SITB (Bresin, Bender, & Joiner, 2010; Glenn et al., 2011; Jacobson & Gould, 2007; Klonsky et al., 2014; Najmi, Wegner, & Nock, 2007; Nock, 2009;

Nock et al., 2008). Specifically, individuals may engage in SITB to manage or cope with maladaptive emotions, or otherwise suppress the emotional impact of stressors in their environment (Najmi, et al., 2007; Nock, 2009; Nock et al., 2008). In fact, biological vulnerabilities to stress, as well as exposure to stressful life events, may predispose an individual to heightened emotion reactivity (Nock, 2009; Nock et al., 2008, 2013; Shapero & Steinberg, 2013). In turn, greater emotion reactivity promotes a bidirectional cycle or feedback loop between such reactivity and internalizing psychopathology, the combination of which increases risk for SITB (Bresin et al., 2010; Klonsky et al., 2014; Najmi et al., 2007; Nock, 2009; Shapero & Steinberg, 2013). Emotion reactivity acts as a mediator in the relation between internalizing psychopathology and SITB (Najmi et al., 2007; Nock et al., 2008). Furthermore, emotion reactivity heightens an individual's arousal to aversive stimuli, making it a reinforcer for SITB as a functional response to the resulting stress (Evans et al., 2016; Nock, 2009; Shapero & Steinberg, 2013). Over time, this cycle of distressing emotional reactions to internalizing psychopathology increases in intensity, frequency, and pervasiveness, thus creating the perception among distressed individuals that engaging in SITB is a viable emotion regulation strategy.

Research on pain perception during SITB supports these ideas. Physical pain dampens the impact of emotional pain, and reductions in pain perception are a function of emotion reactivity (Franklin, Aaron, Arthur, Shorkey & Prinstein, 2012). Specifically, individuals reporting higher emotion reactivity see greater reductions in emotional pain following experiences with physical pain, whereas individuals who report lower emotion reactivity see lower reductions in emotional pain following experiences with physical pain (Bresin et al., 2010). Consequently, among individuals who experience higher emotion reactivity, SITBs are more rewarding as a perceived distress relief strategy, relative to those individuals who experience lower emotion reactivity. The

effectiveness of emotion-focused therapeutic models (e.g., dialectical behavior therapy [DBT], mindfulness-based cognitive therapy [MBCT], emotion-focused therapy [EFT]) in reducing SITB also supports the crucial role of emotion reactivity in SITB (Compare et al., 2014; Deckersbach et al., 2011; Glenn et al., 2011; Linehan, 1993; Jacobson & Gould, 2007; Miller & Smith, 2008). In particular, treatments that focus on teaching emotion management strategies and decreasing emotion reactivity tend to be the most successful techniques for reducing SITB.

Despite the importance of emotion reactivity in research on SITB and psychopathology, researchers historically lacked psychometrically sound instruments for assessing the construct. In fact, emotion-focused measures used in research on SITB have primarily assessed emotion regulation, with comparatively little research assessing emotion reactivity (Compare et al., 2014; Davis et al., 2014; Franklin et al., 2012; Linehan 1993; Nock et al., 2008; Selby et al., 2008). To address this gap, Nock and colleagues (2008) developed the Emotion Reactivity Scale (ERS), a 21-item self-report measure designed to assess an individual's levels of emotion reactivity. The ERS assesses three facets of emotion reactivity: sensitivity (8 items; example item: "I tend to get emotional very easily"), arousal/intensity (10 items; example item: "When I experience emotions, I feel them very strongly/intensely"), and persistence (3 items; example item: "When I am angry/upset, it takes me much longer than most people to calm down"). Response options range from 0 (*Not at all like me*) to 4 (*Completely like me*), with higher scores indicating greater emotion reactivity.

Preliminary evidence supports interpreting scores from the ERS as reliable and valid indices of emotion reactivity. Using a mixed clinical/community sample of adolescents and young adults, Nock and colleagues (2008) leveraged explanatory factor analysis to identify the structure of the ERS, which yielded the three factors described previously. In this study, total scores taken

from the ERS ($\alpha=0.94$) and scores taken from its sensitivity, arousal/intensity, and persistence subscales (α 's=.88, .86, and .81, respectively) all exhibited strong internal consistency. Strong internal consistency estimates also manifest in diverse community samples of adolescents and clinical samples of adults with bipolar disorder and a history of SITB (Bresin et al., 2010; Deckersbach et al., 2011; Evans et al., 2016; Franklin et al., 2012; Shapero, Abramson, & Alloy, 2016). Research also supports the convergent validity of scores taken from the ERS. In clinical and community samples of adolescents and young adults, the ERS relates to measures of SITB, internalizing psychopathology (e.g., depressive and anxiety symptoms), temperament (e.g., behavioral inhibition, negative affect, aggression), stress (e.g., social stress, negative life events), physiology (e.g., cortisol recovery following a social stressor task), and coping (Evans et al., 2016; Najmi et al., 2007; Nock, 2009; Nock et al., 2008, 2013; Shapero et al., 2016). Scores taken from the ERS also display evidence of criterion-related validity, in that they: (a) significantly distinguish individuals diagnosed with mood, anxiety, or eating disorders from individuals who do not meet criteria for these diagnoses; (b) significantly distinguish individuals with a history of NSSI, suicidal ideation, and suicide attempts from those without a history of SITB; and (c) are sensitive to treatment response (Deckersbach et al., 2011; Glenn et al., 2011; Nock et al., 2008).

Overall, the ERS represents a promising tool for assessing emotion reactivity and its use in research on factors that mediate and/or reinforce SITB. Considering the promise of the ERS for advancing work on emotion reactivity, researchers should extend the literature on its psychometric properties to populations that might benefit from its use. In fact, the majority of studies on the psychometric properties of the ERS test the measure within samples of adolescents and relatively severe psychiatric populations (e.g., Deckersbach et al., 2011; Franklin et al., 2012; Najmi, et al., 2007; Nock et al., 2008). We have a poor understanding of the psychometric properties of the ERS

when administered to individuals in non-clinic, community settings. In particular, adults in the community would benefit from a screening tool designed to signal concerns with emotion reactivity, for use in prospective studies of SITB and efforts aimed at SITB prevention. Indeed, if the ERS displays psychometric properties consistent with prior work on its use in clinical populations, then the measure could serve as a useful tool for identifying individuals who have yet to display risks for SITB, but nonetheless display the potential for SITB and thus might benefit from preventative care.

Current Study

The purpose of this study is to extend the literature on evidence-based assessments of emotion reactivity. In a sample of adults who varied in their risk for psychopathology (i.e., adults recruited for a non-clinic study as well as adults who sought out a clinical evaluation for their adolescent), we tested four hypotheses. First, we expected ERS scores to demonstrate relatively high internal consistency estimates (i.e., α 's $>.80$; Nunnally & Bernstein, 1994). Second, we expected ERS scores to exhibit evidence supporting the measure's convergent validity, and significant associations with established measures of depression, anxiety, safety behaviors, parent-adolescent conflict, and quality of life in particular. Third, in support of incremental validity, we expected ERS scores to explain significant variance in measures of internalizing psychopathology and impairment (i.e., social anxiety, safety behaviors, parent-adolescent conflict, and quality of life), over-and-above an established measure of depressive symptoms. Fourth, in support of criterion-related validity, we expected ERS scores to significantly predict arousal-related reactivity to an emotion-provoking social stressor task, namely an impromptu speech task.

Method

Participants

Participants included 105 adults recruited from Washington D.C., Maryland, and Northern Virginia as part of a larger study conducted with families at a mid-Atlantic university. The families contacting the lab responded to one of two advertisements. One targeted parents for an evaluation to screen for social anxiety concerns displayed by their adolescent child (i.e., clinic-referred group), and the other described a family study on interactions between parents and adolescents (i.e., community control group). After completing the assessment, parents of the clinic-referred adolescents received assessment feedback, and, when appropriate, were offered referrals to diagnostic and treatment services for social anxiety. Parents of community control adolescents did not receive either feedback or referrals.

To be eligible, the study required participants to: (a) be fluent in English, (b) understand the consent and interview processes, and (c) have an adolescent child aged 14-15 currently living in the home who did not have a history of learning or developmental disabilities, and (d) have not received cognitive behavioral therapy in the past three months. The total sample included 37 clinic-referred families and 68 community control families. Participants included 87 adult females and 18 adult males with a mean age in years of 44.58 ($SD = 7.52$ years). Participants identified their racial/ethnic backgrounds as Black or African American (57.1%); White, Caucasian American, or European (33.3%); Hispanic or Latino/a (Spanish) (6.7%); Asia American or Asian (2.9%); American Indian (2.9%); and “Other” (5.7%). The percentages sum to larger than 100% because participants had the option to select multiple racial/ethnic backgrounds. Additionally, some participants marked “Other” to identify racial backgrounds that were not provided on our demographics list (e.g., Caribbean). Participants also reported on

weekly household income using a 10-point Likert scale in \$100 increments (e.g. \$101-200 per week). According to their reports, participants reported weekly household incomes of \$500 or less (28.6%), between \$501 and \$900 (23.8%), or \$901 or more (47.6%). Participants reported their marital status as currently married (43.8%), never married (23.8%), divorced or separated from a significant other (26.6%), living with a significant other (4.8%), or widowed (1.0%). They reported that their highest level of education completed included less than high school (3.8%), high school or equivalent (15.3%), some college (19.0%), associate's or vocational degree (11.5%), bachelor's degree (19.0%), master's degree (21.0%), or advanced degree (10.5%). Our participants' demographic information closely reflects the ethnic/racial and socioeconomic data from the geographic region sampled (U.S. Census Bureau, 2016).

Our unique sampling approach provides an optimal sample in which to address our aims. In using a sample of parents recruited as part of a larger study of adolescent social anxiety and family relationships, we sought to create a sample that varied continuously in levels of emotion reactivity (i.e., range of relatively low to relatively high emotion reactivity concerns). A large body of work supports that parent and adolescent functioning, as well as family functioning (e.g., parent-adolescent conflict), correlate highly (Granic & Patterson, 2006). That is, parent functioning impacts adolescent functioning and vice versa, and shared genetic and environmental factors contribute to associations between parent, adolescent, and family functioning (Burt, 2009; Caspi, Taylor, Moffitt, & Plomin, 2000). For this reason, similar to the range in psychosocial functioning observed among adolescents (e.g., De Los Reyes et al., 2019; Deros et al., 2018; Thomas, Daruwala, Goepel, & De Los Reyes, 2012), we expected our sample to display large variability in participant functioning, including levels of emotion reactivity. The use of a diverse sample to address the psychometric properties of a measure of emotion reactivity is consistent

with previous psychometric research (e.g. Glenn et al., 2019; Keeley et al., 2018; Qasmieh et al., 2018), while attempting to broaden literature on individual differences in displays of psychosocial functioning. In addition, this approach is consistent with research initiatives focused on dimensional models of psychopathology (Insel et al., 2010) and recent research supporting the enhanced reliability and validity of dimensional approaches, as opposed to discrete approaches to measuring psychopathology (Markon, Chmielewski, & Miller, 2011).

Procedure

The Institutional Review Board at the large mid-Atlantic university where the team conducted this assessment approved all study procedures. The researchers recruited participants through a combination of online advertisements (Craigslist and laboratory websites), public transportation flyers (community and university busing services), local advertising boards (town community centers, barbershops, and restaurants), and offices of local mental health clinicians. Prospective participants completed an initial eligibility screening over the phone prior to scheduling their assessment in the laboratory. Participants provided informed consent prior to participating in study assessments.

Participants completed counterbalanced sets of self-report measures on computers using Qualtrics Survey data collection software. Participants also engaged in an impromptu speech task, in which they had to prepare a short speech into a camera for an unseen audience in another room. Participants self-reported on their arousal before and during the speech task. Although all 105 participants in our study completed survey measures, 2 participants declined to give a speech and thus tests of criterion-related validity were based on 103 participants. Upon completing the assessment, families received \$100 in compensation (\$50 to the parent/\$50 to the adolescent).

Measures

We administered an assessment battery of self-report surveys to assess relevant psychological domains examined in this study. As previously described, we also collected demographic information through this survey format.

Emotion reactivity. We assessed emotion reactivity using the previously described ERS (Nock et al., 2008).

Depressive symptoms. We assessed depressive symptoms using a modified version of the Beck Depression Inventory-II (BDI-II; Beck et al., 1996; Dozois et al., 1998). The BDI-II is a 21-item measure with items rated on a 4-point Likert scale ranging from 0 to 3. Total scores range from 0 to 63, with higher scores indicating higher levels of depressive symptoms. We excluded item 9, which assessed suicidal thoughts and behaviors, and item 21, which asks about a loss of interest in sex. These items inquired about uniquely mature and sensitive information, and participants previously declined to consent to answering them. Excluding those two questions is consistent with prior research (Lipton et al., 2014; Rausch et al., 2017; Thomas et al., 2012). To ensure comparability with scoring for the full measure, we pro-rated items 9 and 21 for participants based on their individual mean score for the 19 remaining items, maintaining the original measure's score range of 0 to 63.

Social anxiety symptoms. We assessed social anxiety concerns using the Social Interaction Anxiety Survey (SIAS; Mattick & Clarke, 1998). The SIAS is a 20-item self-report measure that examines anxiety concerns that may arise during any direct social engagement (sample item: "I feel tense if I am alone with just one other person."). Items rate on a 5-point Likert scale ranging from 0 (*Not at all characteristic or true of me*) to 4 (*Extremely characteristic or true of me*). Total scores range from 0 to 80, with higher scores reflecting

higher levels of social anxiety. Previous research supports the measure's strong internal consistency and validity (Rodebaugh, Woods, Heimberg, Liebowitz, & Schneier, 2006).

Safety-seeking behaviors. We measured engagement in safety-seeking behaviors during social situations using the Subtle Avoidance Frequency Scale (SAFE; Cuming et al., 2009). The SAFE is a 32-item measure with item responses along a 5-point Likert scale ranging from 1 (*Never*) to 5 (*Always*). On the SAFE, participants endorse the frequency with which they engage in specified behaviors (sample item: "Wear clothing or makeup to hide blushing"). Previous research supports the construct validity of the SAFE among adults (Cuming et al., 2009).

Parent-adolescent conflict. To assess parent-adolescent conflict, participants completed the Issues Checklist (ICT; Prinz, Foster, Kent, & O'Leary, 1979). Participants reported on topics on which they disagreed with their adolescent in the past four weeks. We modified our ICT for the purpose of time, reducing participant burden and putting particular focus on topics that parents and adolescents typically encounter at home (i.e., chores, friends, and homework). This approach is consistent with prior research (Adams & Laursen, 2001; De Los Reyes et al., 2012; Fuligni, 1998; Ehrlich, Cassidy, & Dykas, 2011; Smetana & Gaines, 1999; Steinberg, 1987; Treutler & Epkins, 2003). This modified ICT used 16 of the 44 topics. Items used are available through request from the corresponding author. Items were also modified to be answered along a 5-point Likert scale from 1 (*Do not disagree*) to 5 (*Disagree much*). Participants answered the survey based on the adolescent with whom they came to the assessment. Total scores range from 16 to 80. Prior work supports the validity of scores taken from this version of the ICT (De Los Reyes et al., 2012; Ehrlich et al., 2011; Rausch et al., 2017).

Quality of life. We assessed quality of life using the Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LES-Q-SF; Endicott, Nee, Harrison & Blumenthal,

1993), a 16-item self-report inventory that measures an individual's general quality of life. The Q-LES-Q-SF rated items on a 5-Point scale ranging from 1 (*Very poor*) to 5 (*Very good*) based on perceived quality of life in the past week. Question items cover 16 life domains, including economic status, living/housing situation, and work. Higher scores indicate a higher quality of life. The Q-LES-Q-SF has been found to exhibit strong reliability and validity (Ritscner, Kurs, Gibel, Ratner, & Endicott, 2005).

Impromptu Speech Task

In addition to completing survey measures, participants completed an impromptu speech task (Beidel, Rao, Scharfstein, Wong, & Alfano, 2010). A trained laboratory staff member explained to the participant that they would begin a five minute speech about any or all of three predetermined topics (i.e., "What are the qualities of a good United States President?", "Should all states adopt mandatory no smoking in public places laws?", "What should be the legal drinking age and/or penalties for drunk driving?"). The staff member then informed the participant that they had three minutes to prepare notes for the speech before presenting into a camera for a small audience in another room. After the three minutes of preparation, the staff member collected the participant's notes and informed them that they could begin speaking for five minutes.

Self-reported arousal. Before and during the speech task, participants completed the Self-Assessment Manikin (SAM; Lang, 1980). The SAM is a five-level pictorial scale illustrating gradients of arousal. Participants can choose from 1 (depicted by a close-eyed and relaxed figure) to 5 (depicted by a wide-eyed and nervous figure). Participants completed a baseline SAM at the beginning of the task, and a SAM for how they felt during the speech. After each rating, the participant placed their SAM into an envelope to keep the ratings confidential.

Participants reported an average SAM score of 1.44 ($SD=0.62$) at baseline, and 2.85 ($SD=1.05$) during the speech task. This represents a large-magnitude and significant baseline-to-task increase in SAM scores, $t(102) = 14.14$; $p < .001$; $d = 1.63$. These task-related changes in emotional arousal support our use of the speech task as a paradigm for testing the criterion-related validity of scores taken from the ERS.

Data Analytic Plan

We followed a five-step plan to execute our planned analyses. First, we conducted preliminary analyses to determine if our data met basic assumptions of parametric statistical tests (i.e., skewness/kurtosis within ± 2.0). Second, we tested the internal consistency of scores taken from the ERS by computing Cronbach's α estimates for the ERS total score and the Sensitivity, Arousal/Intensity, and Persistence subscales. Third, we tested the convergent validity of the ERS total and subscale scores by computing bivariate correlations among the ERS scores and BDI-II, SIAS, SAFE, ICT, and Q-LES-Q-SF scores.

Consistent with prior work (Bresin et al., 2010; Evans et al., 2016; Glenn et al., 2011), for the fourth and fifth steps of our data-analytic plan, we used only the ERS total scores. The high correlation among ERS subscales supports exclusive use of the total ERS scores (Nock et al., 2008), and doing so also reduces risk for Type 1 error. Fourth, we tested the incremental validity of the ERS using a series of hierarchical linear regressions. In four separate regression analyses, we examined whether the ERS total score explained variance in self-reported social anxiety symptoms (SIAS), safety behaviors (SAFE), parent-adolescent conflict (ICT), and quality of life (Q-LES-Q-SF), over-and-above the explanatory value of self-reported depressive symptoms (BDI-II). Across regressions, we entered self-reported mental health and functioning as criterion variables. In these models, we entered the BDI-II total score in the first step as an independent

variable (i.e., allowing us to statistically account for the variance attributable to self-reported depressive symptoms), and the ERS total score in the second step as an independent variable.

Fifth, we tested the criterion-related validity of the ERS by examining the relation between ERS total scores and participants' state arousal within social interactions. We constructed a hierarchical regression model with self-reported arousal during the speech task as the criterion variable (i.e., speech task SAM). We entered baseline SAM scores in the first step as the independent variable (i.e., to statistically account for participants' self-perceived resting arousal), and the ERS total score in the second step as an independent variable.

For all tests described in our analytic plan, we inferred statistical significance of findings relative to a p value cutoff of $<.05$. We inferred magnitudes of effect sizes based on Cohen's (1988) effect size conventions for the effect size d (i.e., small = .30, medium = .50, large = .80) and r (i.e., small = .10, medium = .30, large = .50).

Results

Preliminary Analyses

In Table 1, we report means, standard deviations, and internal consistency estimates for all survey measures. We conducted preliminary analyses on survey and self-reported arousal measures for deviations from normality. All measures exhibited appropriate levels of skewness and kurtosis except BDI-II reports, which exhibited significant deviations from normality. Thus, we applied a square root transformation to BDI-II reports, which reduced skewness and kurtosis to acceptable levels. We used the transformed BDI-II reports in all analyses and report the means and standard deviations for both raw and transformed scores in Table 1.

Internal Consistency

We computed Cronbach's α estimates to test the internal consistencies of the ERS total and subscale scores (Table 1). Consistent with our hypotheses, we observed excellent internal consistency for the ERS total score, and good internal consistency for the Sensitivity, Arousal/Intensity, and Persistence subscales.

Convergent Validity

To assess the convergent validity of the ERS, we computed bivariate correlations among the ERS total and subscale scores and the BDI-II, SIAS, SAFE, ICT, and Q-LES-Q-SF (Table 2). Overall and consistent with our hypotheses, the ERS total and subscale scores exhibited significant positive correlations with measures of social anxiety, safety behaviors, depression, and parent-adolescent conflict, and significant negative correlations with a measure of quality of life. However, the ERS Arousal/Intensity subscale did not exhibit significant correlations with measures of parent-adolescent conflict and quality of life.

Incremental Validity: Links to Self-Report Measures of Social Anxiety, Safety Behaviors, Parent-Adolescent Conflict, and Quality of Life

We conducted four hierarchical regression models to test the incremental validity of the ERS (Table 3). Consistent with our hypotheses, increased ERS scores significantly related to increased SIAS and SAFE scores, over-and-above the variance explained by BDI-II scores. These effects were in the small-to-moderate range. However, increased ERS scores did not significantly relate to ICT or Q-LES-Q-SF scores, over-and-above the variance explained by BDI-II scores.

Criterion-Related Validity: Links to Self-Reported State Arousal within Social Interactions

We conducted a hierarchical regression model to examine the relation between the ERS total score and participants' state arousal during the speech task (Table 4). In the first step of the regression model, self-reported arousal at resting baseline explained significant variance in self-reported arousal during the speech task. In the second step of the regression model, ERS total scores explained significant variance in self-reported arousal during the speech task, over-and-above the variance explained by self-reported arousal at resting baseline. This effect was in the small-to-moderate range.

Discussion**Main Findings**

This study advanced the literature on assessment of emotion reactivity by testing the psychometric properties of the ERS among a community sample of adults. We made four findings. First, consistent with our hypotheses and prior work with other populations (e.g., Bresin et al., 2010; Franklin et al., 2012; Nock et al., 2008; Shapero et al., 2016), we observed strong internal consistency estimates for the ERS total and subscale scores. Second, we observed support for the convergent validity of scores taken from the ERS. Specifically, scores taken from the ERS demonstrated significant positive correlations with survey measures of depressive symptoms, social anxiety, safety behaviors, and parent-adolescent conflict, and a significant negative correlation with a survey measure of quality of life. With few exceptions, these patterns of significant correlations extended to the ERS subscale scores.

Third, our study provided support for the ERS' incremental validity. Specifically, consistent with study hypotheses, the ERS total scores explained a significant portion of the variance in survey measures of anxiety and safety behaviors over-and-above variance explained

by scores taken from an established measure of depressive symptoms. Yet, ERS total scores did not explain a significant portion of the variance in survey measures of parent-adolescent conflict and quality of life over-and-above a survey measure of depression. From an incremental validity standpoint, these findings may indicate that scores taken from the ERS provide useful information in relation to constructs that are proximally related to reactivity to one's social environment, such as social anxiety and safety behaviors. Inherent in both constructs is a reaction to anxiety-provoking social interactions (Cuming et al., 2009; Mattick & Clarke, 1998), and thus it logically follows that ERS scores should provide incremental value in predicting scores taken from measures of these constructs. In contrast, scores taken from the ERS may hold less incremental value in relation to constructs that are more proximal to depression-related impairments or life interferences, such as parent-adolescent conflict and quality of life (Endicott et al., 1993; Prinz et al., 1979). However, these interpretations are merely speculative and warrant further study.

Fourth, consistent with our hypotheses and in support of the ERS' criterion-related validity, ERS total scores explained a significant portion of the variance in self-reported arousal during a speech task over-and-above baseline arousal. This is an important finding, as it highlights the potential of the ERS to predict functioning within ecologically valid tasks known to elicit aversive emotional reactions. Indeed, that we observed these effects within a sample that was at relatively low risk for SITB further supports the ability of the ERS to provide clinically valuable information, even in non-clinic assessment or screening contexts. Overall, our findings support the use of the ERS when administered in non-clinic assessments of adults. As such, these findings have important implications for screening assessments for emotional reactivity among adults at low risk of displaying self-injurious thoughts and behaviors.

Clinical and Research Implications

Our study fills an important gap in research on the ERS. As previously mentioned, research examining the psychometric properties of the ERS has been largely limited to non-adult and clinical samples (Glenn et al., 2011; Najmi et al., 2007; Nock et al., 2008). To our knowledge, our study is the first to demonstrate that the ERS' psychometric properties generalize to a non-clinic sample of adults from the community. Similar to previous studies on youth and clinical populations (Compare et al., 2014; Evans et al., 2016), we found significant correlations between the ERS and measures of internalizing psychopathology. Thus, there is reason to suspect that the ERS can play an important role in prospective assessments of emotion reactivity, a construct with significant implications for later psychological functioning. Future research should use the ERS among longitudinal community samples of adults to investigate whether emotion reactivity mediates the relation between internalizing psychopathology and negative health outcomes (particularly SITB; Compare et al., 2014; Najmi et al., 2007; Nock et al., 2008). Such work could determine whether, consistent with what has been observed in youth and clinical populations, emotion reactivity predicts decreases in emotional distress following physical pain (Bresin et al., 2010; Franklin et al., 2012). Such behaviors reinforce the use of physical pain for coping with stress (Nock, 2009) while simultaneously allowing the self-injurer to overcome innate fears of pain and dying (Klonsky et al., 2014). Consequently, this suggests that scores taken from the ERS could contribute unique information in assessment batteries of internalizing psychopathology.

Moreover, the ERS also accounted for variance in self-reported arousal during a stressful task over-and-above baseline arousal, suggesting an association between emotion reactivity and how individuals perform under stress. There is relatively little research on emotion reactivity during stress-inducing tasks (Shapero et al., 2016), so our finding can set the foundation for

further studies testing emotion reactivity within controlled laboratory paradigms. In particular, future research could use the ERS with community samples of adults to explore the potential mediating and reinforcing roles of emotion reactivity that have been previously demonstrated in clinical and youth populations.

Limitations

Our study displayed several limitations that warrant comment. The first limitation involves our exclusive use of self-report measures. Across our validity indices and the ERS, we collected self-report data on all constructs, thus raising the possibility that at least some of the effects we observed might reflect shared method variance. This highlights the need for future research to replicate and extend our findings regarding the ERS with studies that use validity indices that incorporate multiple modalities, including behavioral tasks and physiological measures.

The second limitation is the difficulty of differentiating between the constructs of elevated emotion reactivity and emotion dysregulation. While the two constructs are conceptually separable, Davis and colleagues (2014) argue that not enough effort has been put towards measuring their separate effects. Their findings suggest that a poor ability to regulate emotions after a distressing event is the more worthwhile phenomenon to measure than how an individual reacts to begin with. This contention speaks to the pressing need to develop and refine reliable and valid tools for measuring emotion *reactivity* rather than the consequences of poor emotion *regulation*. It also poses a challenge for causative research, since there are ethical concerns in deliberately altering an individual's emotional responses. To account for the previous findings, however, our study would have benefitted from using an emotion regulation measure for comparison.

Another limitation involves the lack of defined clinical cutoffs within our study. Neither prior research nor our current assessment of the ERS' psychometric properties identified cut scores that reflect a clinical level of emotion reactivity and which scores can be considered normative or subclinical. Identifying those clinical cutoffs can improve the usability of the measure, particularly as it involves identifying more severe psychopathology. Future research on the psychometric properties of the ERS might benefit from using receiver operating characteristics (for a review, see Youngstrom, 2013) to detect cutoff points in individual responses. This can help improve the ERS' ability to distinguish respondents on relevant clinical indices (e.g., symptoms of psychopathology, initiation of self-harming behaviors).

Lastly, our administration of the BDI-II involved removing items that asked about suicidal thoughts and actions and sexual behaviors. We removed these questions due to concerns that parents would refuse to participate if they had to answer these questions about their adolescents and by extension, themselves. It is possible that our study may have observed different results had we not omitted those questions. Despite this adjustment to the scale, we still observed high internal consistency with the remaining 19 items. Additionally, we also pro-rated these items for the reports we collected from the sample, allowing us to continue measuring the BDI-II with the same range as the unadjusted survey. Consequently, we find it unlikely that the two removed items would have altered the internal consistency of the BDI-II in any way that would significantly alter our findings.

Concluding Comments

Our findings suggest that the ERS can reliably and validly assess internalizing psychopathology concerns in non-clinical adults from the community. These outcomes are consistent with support from previous research on emotion reactivity among adolescent and

clinical populations. These findings also support the incremental value of the ERS over-and-above measures of constructs commonly linked to SITB (e.g., depressive symptoms) and emotions (e.g., social anxiety, safety behaviors). Further, the results of this study demonstrated that high emotion reactivity predicts increases in reported arousal during stressful tasks. Our findings have important clinical and research implications, as they demonstrate the ERS' viability as a screening tool for future psychological impairments.

Conflict of Interest

The first, second, third, and fourth authors declare that they have no conflict of interest.

Compliance with Ethical Standards

Funding: Efforts by the second, third, and fourth authors were supported by a grant from the Institute of Education Sciences (R324A180032).

Experiment Participants: All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Maryland at College Park's Institutional Review Board and with the Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants in the study.

Author Contributions: First author: assisted in executing the study, assisted with data analyses, and wrote the paper. Second and third authors: assisted in executing the study, assisted with data analyses, and collaborated in editing the paper. Fourth author: designed the study, assisted in executing the study, assisted with data analyses, and collaborated in editing the paper.

References

- Adams, R., & Laursen, B. (2001). The organization and dynamics of adolescent conflict with parents and friends. *Journal of Marriage and Family*, *63*, 97-110. doi: 10.1111/j.1741-3737.2001.00097.x
- Arbuthnott, A.E., Lewis, S.P., & Bailey, H.N. (2015). Rumination and emotions in nonsuicidal self-injury and eating disorder behaviors: A preliminary test of the emotional cascade model. *Journal of Clinical Psychology*, *71*(1), 62-71. doi: 10.1002/jclp.22115
- Beck, A.T., Steer, R.A., & Brown, G.K. (1996). *Beck Depression Inventory—Second Edition manual*. San Antonio, TX: The Psychological Corporation.
- Beidel, D.C., Rao, P.A., Scharfstein, L., Wong, N., & Alfano, C.A. (2010). Social skills and social phobia: An investigation of DSM-IV subtypes. *Behaviour Research and Therapy*, *48*, 992-1001. doi: 10.1016/j.brat.2010.06.005
- Bresin, K., Bender, T.W., & Joiner, T.E. (2010). No pain, no change: Reductions in prior negative affect following physical pain. *Motivation and Emotion*, *34*(3), 280-287. doi: 10.1007/s11031-010-9168-7
- Burt, S.A. (2009). Rethinking environmental contributions to child and adolescent psychopathology: A meta-analysis of shared environmental influences. *Psychological Bulletin*, *135*(4), 608-637. doi: 10.1037/a0015702
- Caspi, A., Taylor, A., Moffitt, T. E., & Plomin, R. (2000). Neighborhood deprivation affects children's mental health: Environmental risks identified in a genetic design. *Psychological Science*, *11*(4), 338-342. doi: 10.1111/1467-9280.00267
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed). Mahwah, NJ: Erlbaum.

- Compare, A., Zabro, C., Shonin, E., Van Gordon, W., and Marconi, C. (2014). Emotional regulation and depression: A potential mediator between heart and mind. *Cardiovascular Psychiatry and Neurology*, 2014. doi: 10.1155/2014/324374
- Cuming, S., Rapee, R. M., Kemp, N., Abbott, M. J., Peters, L., & Gaston, J. E. (2009). A self-report measure of subtle avoidance and safety behaviors relevant to social anxiety: Development and psychometric properties. *Journal of Anxiety Disorders*, 23(7), 879-883. doi: 10.1016/j.janxdis.2009.05.002
- Davis, T.S., Mauss, I.B., Lumian, D., Troy, A.S., Shallcross, A.J., Zanolia, P., Ford, B.Q., & McRae, K. (2014). Emotional reactivity and emotion regulation among adults with a history of self-harm: Laboratory self-report and functional MRI evidence. *Journal of Abnormal Psychology*, 123(3), 499-509. doi: 10.1037/a0036962
- De Los Reyes, A., Aldao, A., Thomas, S. A., Daruwala, S., Swan, A. J., Van Wie, M., . . . Lechner, W.V. (2012). Adolescent self-reports of social anxiety: Can they disagree with objective psychophysiological measures and still be valid? *Journal of Psychopathology and Behavioral Assessment*, 34(3), 308-322. doi: 10.1007/s10862-012-9289-2
- De Los Reyes, A., Makol, B.A., Racz, S.J., Youngstrom E.A., Lerner, M.S., & Keeley, L.M. (2019). The Work and Social Adjustment Scale for Youth: A measure for assessing youth psychosocial impairment regardless of mental health status. *Journal of Child and Family Studies*, 28, 1-16. doi: 10.1007/s10826-018-1238-6
- Deckersbach, T., Hölzel, B.K., Eisner, L.R., Stange, J.P., Peckham, A.D., Dougherty, D.D., Rauch, S.L., Lazar, S., & Nierenberg, A.A. (2011). Mindfulness-based cognitive therapy for nonremitted patients with bipolar disorder. *CNS Neuroscience and Therapeutics*, 18(2), 133-141. doi: 10.1111/j.1755-5949.2011.00236.x

- Deros, D.E., Racz, S.J., Lipton, M.F., Augenstein, T.M., Karp, J.N., Keeley, L.M., . . . De Los Reyes, A. (2018). Multi-informant assessments of adolescent social anxiety: Adding clarity by leveraging reports from unfamiliar peer confederates. *Behavior Therapy, 49*(1), 84-98. doi: 10.1016/j.beth.2017.05.001
- Dozois, D. J., Dobson, K. S., & Ahnberg, J. L. (1998). A psychometric evaluation of the Beck Depression Inventory-II. *Psychological Assessment, 10*, 83-89. doi:10.1037/1040-3590.10.2.83.
- Ehrlich, K.B., Cassidy, J., & Dykas, M.J. (2011). Reporter discrepancies among parents, adolescents, and peers: Adolescent attachment and informant depressive symptoms as explanatory factors. *Child Development, 82*, 999-1012. doi:10.1111/j.1467-8624.2010.01530.x.
- Endicott, J., Nee, J., Harrison, W., & Blumenthal, R. (1993). Quality of life enjoyment and satisfaction questionnaire: A new measure. *Psychopharmacology Bulletin, 29*, 321-326. PMID: 8290681
- Evans, S.C., Blossom, J.B., Canter, K.S., Poppert-Cordts, K., Kanine, R., Garcia, A., & Roberts, M.C. (2016). Self-reported emotion reactivity among early-adolescent girls: Evidence for convergent and discriminant validity in an urban community sample. *Behavior Therapy, 47*(3), 299-311. doi: 10.1016/j.beth.2016.01.003
- Franklin, J.C., Aaron, R.V., Arthur, M.S., Shorkey, S.P., & Prinstein, M.J. (2012) Nonsuicidal self-injury and diminished pain perception: The role of emotional dysregulation. *Comprehensive Psychiatry, 53*(6), 691-700. doi: 10.1016/j.comppsy.2011.11.008

- Fuligni, A.J. (1998). Authority, autonomy, and parent–adolescent conflict and cohesion: A study of adolescents from Mexican, Chinese, Filipino, and European backgrounds. *Developmental Psychology, 34*, 782-792. doi:10.1037/0012-1649.34.4.782.
- Glenn, C.R., Blumenthal, T.D., Klonsky E.D., & Hajcak, G. (2011). Emotional reactivity in non-suicidal self-injury: Divergence between self-report and startle measure. *International Journal of Psychophysiology, 80*(2), 166-170. doi: 10.1016/j.ijpsycho.2011.02.016.
- Glenn, L.E., Keeley, L.M., Szollos, S., Okuno, H., Wang, X., Rausch, E., . . . De Los Reyes, A. (2019). Trained observers' ratings of adolescents' social anxiety and social skills within controlled, cross-contextual social interactions with unfamiliar peer confederates. *Journal of Psychopathology and Behavioral Assessment*. Advance online publication. doi: 10.1007/s10862-018-9676-4
- Granic, I., & Patterson, G. R. (2006). Toward a comprehensive model of antisocial development: A dynamic systems approach. *Psychological Review, 113*(1), 101-131. doi: 10.1037/0033-295X.113.1.101
- Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D. S., Quinn, K., . . . Wang, P. (2010). Research domain criteria (RDoC): toward a new classification framework for research on mental disorders. *The American Journal of Psychiatry, 167*(7), 748-751. doi: 10.1176/appi.ajp.2010.09091379
- Jacobson, C.M. & Gould, M. (2007). The epidemiology and phenomenology of non-suicidal self-injurious behavior among adolescents: A critical review of the literature. *Archives of Suicide Research, 11*(2), 129-147. doi: 10.1080/13811110701247602
- Keeley, L.M., Makol, B.A., Qasmieh, N., Deros, D.E., Karp, J.N., Lipton, M.F., . . . De Los

- Reyes, A. (2018). Validity of adolescent and parent reports on the Six-Item ADHD Self-Report Scale (ASRS-6) in clinical assessments of adolescent social anxiety. *Journal of Child and Family Studies, 27*, 1041-1053. doi: 10.1007/s10826-017-0950-y
- Klonsky, E.D., Victor, S.E., & Saffer, B.Y. (2014). Nonsuicidal self-injury: What we know, and what we need to know. *Canadian Journal of Psychiatry, 59*(11), 565-568. doi: 10.1177/070674371405901101
- Lang, P. J. (1980). Behavioral treatment and bio-behavioral assessment: Computer applications. In J.B. Sidowski, J. H. Johnson, & T. A. Williams (Eds.), *Technology in mental health care delivery systems* (pp. 119–137). Norwood, NJ: Ablex.
- Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York: The Guilford Press.
- Lipton, M. F., Augenstein, T. M., Weeks, J. W., & De Los Reyes, A. (2014). A multi-informant approach to assessing fear of positive evaluation in socially anxious adolescents. *Journal of Child and Family Studies, 23*, 1247-1257. doi: 10.1007/s10826-013-9785-3
- Markon, K.E., Chmielewski, M., & Miller, C.J. (2011). The reliability and validity of discrete and continuous measures of psychopathology: A quantitative review. *Psychological Bulletin, 137*(5), 856-879. doi: 10.1037/a0023678
- Mattick, R.P., & Clarke, J.C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy, 36*(4), 455-470. doi: 10.1016/S0005-7967(97)10031-6
- Miller, A.L. & Smith, H.L. (2008). Adolescent non-suicidal self-injurious behavior: The latest epidemic to assess and treat. *Applied and Preventive Psychology, 12*(4), 178-188. doi: 10.1016/j.appsy.2008.05.003

- Najmi, S., Wegner, D.M., & Nock, M.K. (2007). Thought suppression and self-injurious thoughts and behaviors. *Behavior Research and Therapy*, *45*(8), 1957-1965. doi: 10.1016/j.brat.2006.09.014
- Nock, M.K. (2009). Why do people hurt themselves? New insights into the nature and functions of self-injury. *Current Directions in Psychological Science*, *18*(2), 78-83. doi: 10.1111/j.1467-8721.2009.01613.x
- Nock, M.K., Deming, C.A., Fullerton, C.S., Gilman, S.E., Goldenberg, M., Kessler, R.C., McCarroll, J.E., McLaughlin, K.A., Peterson, C., Schoenbaum, M., Stanley, B., & Ursano, R.J. (2013). Suicide among soldiers: A review of psychological risk and protective factors. *Psychiatry: Interpersonal and Biological Processes*, *76*(2), 97-125. doi: 10.1521/psyc.2013.76.2.97
- Nock, M.K., Wedig, M.M., Homberg, E.B., & Hooley, J.M. (2008). The Emotion Reactivity Scale: Development, evaluation, and relation to self-injurious thoughts and behaviors. *Behavior Therapy*, *39*(2), 107-116. doi: 10.1016/j.beth.2007.05.005
- Nunnally, J.C., & Bernstein, I.H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.
- Prinz, R. J., Foster, S.L., Kent, R.N., & O'Leary, K.D. (1979). Multivariate assessment of conflict in distressed and nondistressed mother-adolescent dyads. *Journal of Applied Behavior Analysis*, *12*, 691-700. doi: 10.1901/jaba.1979.12-691
- Qasmieh, N., Makol, B.A., Augenstein, T.M., Lipton, M.F., Deros, D.E., Karp, J., . . . De Los Reyes, A. (2018). A multi-informant approach to assessing safety behaviors among adolescents: Psychometric properties of the Subtle Avoidance Frequency Examination. *Journal of Child and Family Studies*, *27*, 1830-1843. doi: 10.1007/s10826-018-1040-5

- Rausch, E., Racz, S.J., Augenstein, T.M., Keeley, L., Lipton, M.F., Szollos, S., . . . & De Los Reyes, A. (2017). A multi-informant approach to measuring depressive symptoms in clinical assessments of adolescent social anxiety using the Beck Depression Inventory-II: Convergent, incremental, and criterion-related validity. *Child and Youth Care Forum, 46*, 661-683. doi: 10.1007/s10566-017-9403-4
- Ritscner, M., Kurs, R., Gibel, A., Ratner, Y., & Endicott, J., (2005). Validity of an abbreviated quality of life enjoyment and satisfaction questionnaire (Q-LES-Q-18) for schizophrenia, schizoaffective, and mood disorder patients. *Quality of Life Research, 14*, 1693-1703. doi: 10.1007/s11136-005-2816-9.
- Rodebaugh, T.L., Woods, C.M., Heimberg, R.G., Liebowitz, M.R., & Schneier, F.R. (2006). The factor structure and screening utility of the social interaction anxiety scale. *Psychological Assessment, 18* (2), 231-237. doi: 10.1037/1040-3590.18.2.231
- Selby, E.A., Anestis, M.D., & Joiner, T.E. (2008). Understanding the relationship between emotional and behavioral dysregulation: Emotional cascades. *Behavior Research and Therapy, 46*, 593-611. doi: 10.1016/j.brat.2008.02.002
- Shapero, B.G., Abramson L.Y., & Alloy, L.B. (2016). Emotional reactivity and Internalizing Symptoms: Moderating Role of Emotion Regulation. *Cognitive Therapy and Research, 40*(30), 328-340. doi: 10.1007/s10608-015-9722-4
- Shapero, B.G., & Steinberg, L. (2013). Emotional reactivity and exposure to household stress in childhood predict psychological problems in adolescence. *Journal of Youth and Adolescence, 42*(10), 1573-1582. doi: 10.1007/s10964-013-9954-0
- Smetana, J., & Gaines, C. (1999). Adolescent-parent conflict in middle-class African American families. *Child Development, 70*, 1447-1463. doi: 10.1111/1467-8624.00105

- Steinberg, L. (1987). Impact of puberty on family relations: Effects of pubertal status and pubertal timing. *Developmental Psychology, 23*, 451-460. doi: 10.1037/0012-1649.23.3.451
- Thomas, S.A., Daruwala, S.E., Goepel, K.A., & De Los Reyes, A. (2012). Using the Subtle Avoidance Frequency Examination examination in adolescent social anxiety assessments. *Child and Youth Care Forum, 41*, 547-559. doi: 10.1007/s10566-012-9181-y
- Treutler, C.M., & Epkins, C.C. (2003). Are discrepancies among child, mother, and father reports on children's behavior related to parents' psychological symptoms and aspects of parent-child relationships? *Journal of Abnormal Child Psychology, 31*, 13-27. doi: 10.1023/A:1021765114434
- U.S. Census Bureau. (2016). *State and county quickfacts: Washington, DC*.
<http://www.census.gov/quickfacts/table/PST045215/11,00>
- Youngstrom, E.A. (2013). A primer on receiver operating characteristic analysis and diagnostic efficiency statistics for pediatric psychology: We are ready to ROC. *Journal of Pediatric Psychology, 39*(2), 204-221. doi: 10.1093/jpepsy/jst062

Table 1

*Means (M), Standard Deviations (SD), and Internal Consistency (α)
Estimates of Survey Measures (N=105)*

| Variable | M | SD | α |
|---------------------------------|----------|-----------|----------------------------|
| ERS, Total Score | 27.73 | 16.37 | 0.94 |
| ERS, Sensitivity Subscale | 12.00 | 7.94 | 0.88 |
| ERS, Arousal/Intensity Subscale | 10.23 | 6.25 | 0.88 |
| ERS, Persistence Subscale | 5.50 | 3.63 | 0.81 |
| BDI-II, Raw | 9.21 | 8.72 | 0.92 |
| BDI-II, Square Root | 2.64 | 1.51 | - |
| SIAS | 18.01 | 13.02 | 0.93 |
| SAFE | 58.90 | 15.89 | 0.91 |
| ICT | 33.50 | 12.16 | 0.89 |
| Q-LES-Q-SF | 51.04 | 8.44 | 0.87 |

Note. **ERS** = Emotion Reactivity Scale; **BDI-II** = Beck Depression Inventory-II; **SIAS** = Social Interaction Anxiety Scale; **SAFE** = Subtle Avoidance Frequency Examination; **ICT** = Issues Checklist; **Q-LES-Q-SF** = Quality of Life Enjoyment and Satisfaction Questionnaire Short Form.

Table 2

Correlations among Survey Measures (N=105)

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|--------|--------|--------|--------|--------|--------|--------|---------|
| 1 ERS , Total Score | | .96*** | .92*** | .84*** | .49*** | .40*** | .42*** | .24* | -.24* |
| 2 ERS , Sensitivity Subscale | | | .80*** | .75*** | .44*** | .39*** | .41*** | .25* | -.23* |
| 3 ERS , Arousal/Intensity Subscale | | | | .67*** | .41*** | .33** | .35*** | .16 | -.15 |
| 4 ERS , Persistence Subscale | | | | | .52*** | .40*** | .39*** | .28** | -.34*** |
| 5 BDI-II | | | | | | .39*** | .44*** | .34*** | -.67*** |
| 6 SIAS | | | | | | | .66*** | .12 | -.26** |
| 7 SAFE | | | | | | | | .25** | -.29** |
| 8 ICT | | | | | | | | | -.30** |
| 9 Q-LES-Q-SF | | | | | | | | | |

Note. **ERS** = Emotion Reactivity Scale; **BDI-II** = Beck Depression Inventory-II; **SIAS** = Social Interaction Anxiety Scale; **SAFE** = Subtle Avoidance Frequency Examination; **ICT** = Issues Checklist; **Q-LES-Q-SF** = Quality of Life Enjoyment and Satisfaction Questionnaire Short Form. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3

Hierarchical Regressions Examining the Incremental Validity of the ERS (N=105)

| Criterion Variable: Social Anxiety | | | | | Criterion Variable: Parent-Adolescent Conflict | | | | |
|--------------------------------------|--------------|---------|------------|---------|--|--------------|---------|------------|---------|
| Dependent Variable: SIAS | | | | | Dependent Variable: ICT | | | | |
| Variable | ΔR^2 | Total R | B(SeB) | β | Variable | ΔR^2 | Total R | B(SeB) | β |
| Step 1 | .15*** | .39 | | | Step 1 | .11*** | .34 | | |
| BDI-II | | | 3.37(.78) | .39*** | BDI-II | | | 2.71(.75) | .34*** |
| Step 2 | .06** | .46 | | | Step 2 | .01 | .35 | | |
| BDI-II | | | 2.22(.87) | .26* | BDI-II | | | 2.31(.86) | .29** |
| ERS | | | .22(.08) | .27** | ERS | | | .08(.08) | .10 |
| Criterion Variable: Safety Behaviors | | | | | Criterion Variable: Quality of Life | | | | |
| Dependent Variable: SAFE | | | | | Dependent Variable: Q-LES-Q-SF | | | | |
| Variable | ΔR^2 | Total R | B(SeB) | β | Variable | ΔR^2 | Total R | B(SeB) | β |
| Step 1 | .20*** | .44 | | | Step 1 | .45*** | .67 | | |
| BDI-II | | | 4.64(.93) | .44*** | BDI-II | | | -3.73(.41) | -.67*** |
| Step 2 | .06** | .50 | | | Step 2 | .01 | .67 | | |
| BDI-II | | | 3.27(1.03) | .31** | BDI-II | | | -4.02(.47) | -.72*** |
| ERS | | | .26(.10) | .27** | ERS | | | .06(.04) | .11 |

Note. **ERS** = Emotion Reactivity Scale; **BDI-II** = Beck Depression Inventory-II; **SIAS** = Social Interaction Anxiety Scale; **SAFE** = Subtle Avoidance Frequency Examination, **ICT** = Issues Checklist; **Q-LES-Q-SF** = Quality of Life Enjoyment and Satisfaction Questionnaire Short Form. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4

Hierarchical Regression Examining the Incremental Validity of the ERS in Predicting Self-Reported Arousal During the Speech Task (N=103)

| Criterion Variable: Self-Reported Arousal During Speech Task | | | | |
|---|--------------|----------------|---------------|---------|
| DV: SAM, During Speech | | | | |
| Variable | ΔR^2 | Total R | b(SEb) | β |
| Step 1 | .14*** | .38 | | |
| SAM , Baseline | | | .64(.16) | .38*** |
| Step 2 | .05* | .44 | | |
| SAM , Baseline | | | .58(.15) | .34*** |
| ERS | | | .02(.01) | .22* |

Note. **ERS** = Emotion Reactivity Scale; **SAM** = Self Assessment Manakin; 2 participants declined to give a speech and thus analyses were based on 103 participants; * $p < .05$; ** $p < .01$; *** $p < .001$.