

RUNNING head: ROLE OF INTERPERSONAL PROBLEMS IN NSSI

EXAMINING THE ROLE OF INTERPERSONAL PROBLEMS IN NONSUICIDAL SELF-
INJURY IN ADOLESCENTS AND YOUNG ADULTS

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Abstract

Interpersonal problems are implicated as a risk factor for engaging in suicide-related behavior (e.g., Perkins & Hartless, 2001; Prinstein et al., 2000) and associated with deficits in social problem solving among self-injuring individuals (Nock & Mendes, 2008). Perceived interpersonal problems among adolescents are also linked to decreased likelihood of using emotion regulation skills during times of stress, posing a risk for NSSI (Prinstein, 2008). As past research has mostly focused on exploring interpersonal problems as they relate to suicidal ideation and behavior, there is a need for further research exploring interpersonal problems in relation to NSSI thoughts and behaviors. Additionally, few studies have utilized Ecological Momentary Assessment (EMA) data to collect information more accurately in real-time as opposed to retrospective reporting. The current study explored the relationship between interpersonal problems and NSSI as well as the role of emotion dysregulation in this relationship using EMA reporting. Data was collected from 47 adolescents and young adults aged 15-21 who reported recent engagement in NSSI. Baseline measures included: the Inventory of Interpersonal Problems, Short Version (IIP-32; Barkham et al., 1996) and Difficulties with Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). Over a two-week period, participants completed five prompted survey entries daily as well as self-initiated entries following NSSI behavior. Each entry assessed NSSI thoughts and behaviors and the functions of NSSI behavior at each entry. Results indicated baseline interpersonal problems predicted NSSI thoughts and NSSI behaviors. Interpersonal problems also predicted social reinforcement-motivated NSSI behaviors, and specifically social negative reinforcement-motivated NSSI. Contrary to hypotheses, emotion dysregulation did not moderate the relationship between baseline or EMA interpersonal problems and NSSI behavior. Explicating the association between interpersonal

problems and NSSI as well as identifying social functions of NSSI can be helpful in determining what mechanisms to address in the treatment of adolescents and young adults.

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Introduction

Nonsuicidal Self-Injurious Behaviors

Nonsuicidal self-injury (NSSI) is identified as a behavioral construct distinct from suicidal behavior. Throughout existing literature, which has expanded over the last 10-20 years, NSSI is predominantly described as an act of deliberate destruction of one's own body tissue without any suicidal intent, and for reasons not socially sanctioned (Favazza, 1996; Nock, 2010; Nock & Favazza, 2009). NSSI presents in many forms, with common methods of engagement including scratching, cutting, burning, and banging parts of one's body (Klonsky, 2007). This clinical phenomenon is prevalent across all ages of individuals and has been rising among the general population, though especially so in adolescents and young adults. Lifetime prevalence rates of NSSI have been estimated at about 4%-28% in adults (Briere & Gil, 1998) and as high as between 13% and 45% in adolescents (e.g., Muehlenkamp, Claes, Havertape, & Plener, 2012; Zetterqvist et al., 2013). It is also noteworthy that individuals ages 18-25 have been estimated to be the group at highest risk for engaging in NSSI (Rodham & Hawton, 2009).

Nonsuicidal Self-Injurious Thoughts

Self-harm ideation is of import as well, given it often naturally serves as a precipitant to engaging in self-harm behaviors or may lead to increased negative cognitions. Findings from a study conducted with a community sample of 424 adolescents found that 42% endorsed having had self-harm ideation, with around 10% of the sample reporting having preoccupation with these thoughts (Laye-Gindhu & Schonert-Reichl, 2005). Additionally, adolescents with thoughts of self-harm may not seek out help, with one study citing 40% of a large sample of 6,020 adolescents had not talked to or sought out help from anyone (Evans, Hawton & Rodham, 2004). This may be explained by findings that half of adolescents with thoughts of self-harm do not

recognize they need help (Saunders et al., 1994) and 25% of adolescents who actually engage in self-injury do not believe they have a serious problem. (Evans, Hawton & Rodham, 2004).

Although some studies examining self-harm have looked at premeditation or thoughts about self-harming before engaging in the behavior (Rodham et al., 2004), there is generally a paucity of literature specifically examining self-harm ideation or NSSI thoughts. This further strengthens the need for more research exploring the area of NSSI thoughts in addition to NSSI behaviors.

Importance of Research on Nonsuicidal Self-Injury

Self-injurious thoughts and behaviors are particularly concerning to clinicians due to the adverse and potentially fatal consequences they are associated with, including a significantly increased risk for suicide attempts (Andover et al., 2012; Wilkinson et al., 2011). Although there are numerous risk factors associated with an individual having a higher capability for suicide, NSSI is notably a stronger predictor of attempted suicide than depression, hopelessness, Borderline Personality Disorder (BPD) symptomatology, and even history of suicide attempt (Andover & Gibb, 2010; Wilkinson et al., 2011). NSSI is also a transdiagnostic behavior rather than symptomatic of just one disorder, as exemplified by its pervasiveness across various psychological disorders such as major depressive disorder, BPD, and generalized anxiety disorder (see Nitkowski & Petermann, 2011, for review). Accordingly, NSSI is additionally under consideration as a new disorder distinct from other psychiatric conditions as well as suicidal behavior (Selby, Kranzler, Fehling & Panza, 2015). Given the prevalence and serious risks associated with NSSI, it has become of great import to better understand determinants of these thoughts and behaviors in order to assist clinicians and researchers with prevention and intervention.

Interpersonal Problems and Nonsuicidal Self-Injury

A number of theories implicate the role of interpersonal problems in the development and maintenance of NSSI behaviors. One theory, coined the cognitive vulnerability–stress model (Guerry & Prinstein, 2010), suggests that individuals engaging in NSSI are more likely to make negative attributions when faced with interpersonal stressors, leading to greater emotional arousal and engagement in maladaptive coping strategies to alleviate distress. In this way, interpersonal problems are often one of the precipitants to engaging in NSSI. Growing research supports this idea of interpersonal problems, or perceived interpersonal problems, as a risk factor for suicidal ideation (Prinstein et al., 2000) and engaging in suicide-related behavior (e.g., Perkins & Hartless, 2001). For instance, Prinstein and colleagues (2000) found that higher levels of perceived peer rejection and lower perceived close friendships or supports were directly linked to more severe suicidal ideation. In specific regards to NSSI, Muehlenkamp, Brausch, Quigley, & Whitlock (2013) found that young adults engaging in NSSI reported lower perceived social supports than those without a history of NSSI. Poorer quality of relationships between caregivers as well as peers is another consistently reported finding attested by individuals engaging in NSSI (Claes et al., 2010; Hilt, Nock, Lloyd-Richardson, & Prinstein, 2008). In sum, there is a link in the literature between increased interpersonal problems and individuals who engage in self-injurious behaviors. However, it continues to be difficult to find studies associating interpersonal problems with NSSI distinctly, versus with suicidal ideation or behavior.

Individuals engaging in NSSI have also been shown to have deficits in adequate skills necessary for social functioning. Claes and colleagues (2010) found that those who engage in NSSI self-reported a lack of sufficient social skills in comparison with peers who do not engage

in NSSI. NSSI is also associated with deficits in social problem solving in adolescents, though deficits were more related to selecting adaptive solutions versus difficulty generating more solutions (Nock & Mendes, 2008). This exemplifies that youth may be using self-injurious behaviors to solve problems not due to lack of adaptive social functioning strategies, but potentially due to trouble choosing and implementing known strategies in the moment that are more effective.

There has been much research conducted on the multiple functions of NSSI to help researchers and clinicians better understand what drives individuals to hurt themselves. The Four Function Model of NSSI (FFM; Nock & Prinstein, 2004) suggests that NSSI is maintained by four different kinds of functional reinforcement processes: automatic negative reinforcement (ANR), automatic positive reinforcement (APR), social negative reinforcement (SNR), and social positive reinforcement (SPR). The automatic functions are described as intrapersonal, with ANR-motivated NSSI serving to decrease negative thoughts or affect and APR-motivated NSSI serving to create or induce positive thoughts or emotions. The two social functions thus propose that interpersonal functions perpetuate NSSI, with SNR-motivated NSSI serving to remove interpersonal demands or escape social conflict and SPR-motivated NSSI serving to increase attention, access to resources, or help-seeking behavior (Bentley, Nock & Barlow, 2014).

Building on this previous research, the social signaling hypothesis (Nock, 2008) sheds light on the SPR function of NSSI. It posits that individuals resort to NSSI when behaviors such as verbal communication of distress have not achieved the goal of effectively communicating with others. This may drive an individual to repeatedly engage in a more costly or intense behavior, such as NSSI, as it serves to communicate or connect with others when previous lower-level attempts at communication have failed. Alternatively, NSSI which functions as

social negative reinforcement has been identified as being used to avoid interpersonal demands or create a boundary between self and others, as endorsed by a sample of college students (Klonsky & Glenn, 2009).

Emotion Dysregulation

Emotion regulation is often conceptualized as the ability to: understand and accept one's emotions, control impulsive behaviors when experiencing negative emotions, and modulate emotions to meet goals (Gratz & Roemer, 2004). Thus, emotion dysregulation, or difficulties in regulating emotions, is defined as the absence of these qualities. Difficulty regulating emotions can consequently lead to dysregulation when one is confronted with conflict, such as interpersonal problems. Emotion dysregulation, as measured through low levels of distress tolerance, has been linked to two main interpersonal variables: higher levels of thwarted belongingness, or perceived lack of meaningful connections to others, and higher perceived burdensomeness, or feeling that one cannot make meaningful contributions to others (Anestis, Bagge, Tull & Joiner, 2011). Interpersonal problems such as perceived lack of family or peer support among adolescents are additionally linked to a decreased likelihood of using emotion regulation skills during times of stress, posing a risk for NSSI (Prinstein, 2008).

Emotion dysregulation is highly connected to the development and maintenance of NSSI. Theories have been developed to examine and improve understanding of processes clinicians have witnessed in patients who engage in self-injury. The Experiential Avoidance Model (EAM; Chapman, Gratz & Brown, 2006) posits that deliberate self-harm is chiefly maintained by negative reinforcement through the function of escape or avoidance of unwanted emotions. NSSI serves the function of relieving individuals of negative affect that is deemed difficult to tolerate,

and thus the behavior is highly reinforced. Additionally, there is a plethora of evidence-based support for affect regulation being the most commonly cited motivation for NSSI in adolescents and adults (see Klonsky, 2007 for review). Lastly, individuals who engage in NSSI often report a reduction in negative emotions after engagement in NSSI (e.g., Klonsky, 2009; Kumar, Pepe & Steer, 2004) and indicate they may engage in NSSI to distract from painful feelings (Briere & Gil, 1998).

Taking into account the aforementioned research, interpersonal conflict coupled with an inability to tolerate distress can be a destructive recipe for the use of maladaptive coping skills such as NSSI. This elucidates the potential association between interpersonal problems and emotion regulation deficits as precipitants to NSSI. It appears that interpersonal difficulties may serve as the “fuel” that initiates emotion dysregulation, which then leads to NSSI thoughts and subsequent NSSI behaviors in an effort to cope. As is seen in a clinical chain analysis conducted of a problem behavior, this flow of behaviors is illustrative of the sequence of events that may help to explain why some individuals engage in NSSI.

Current Study

To date, literature focusing on NSSI is largely based on retrospective self-report from participants, given the inability to monitor in naturalistic settings and the ethical reasons that NSSI behavior cannot be recreated in a laboratory setting. The EMA methodology utilized in the present study entailed participants assessing NSSI thoughts, behaviors, and functions of each NSSI episode multiple times daily, which improves ecological validity due to real-time recall (e.g., Hufford, 2007). Researchers have begun to undergo more studies utilizing EMA, such as exploring affect preceding and following NSSI (e.g., Kranzler et al., 2017; Muehlenkamp, 2009).

A study conducted by Turner, Cobb, Gratz & Chapman (2017) also investigated the effects of high levels of interpersonal conflict on NSSI behaviors tracked via a daily diary. Results supported that daily interpersonal conflict was associated with stronger same-day urges to engage in NSSI and higher likelihood of NSSI acts (Turner et al., 2017). However, there is generally limited research specifically looking at interpersonal factors influencing daily NSSI behaviors, and no studies to date specifically examining interpersonal factors in relation to NSSI episodes and functions reported from multiple daily assessments in the moment, with assessments encouraged immediately after engagement in NSSI.

The link between difficulty modulating affect and engagement in the maladaptive emotion regulation strategy of NSSI is clear. The association between interpersonal problems and NSSI has also been explicated, both in theory and through retrospective reporting. This leads to the following questions: how are emotion dysregulation traits and daily interpersonal problems related to daily NSSI thoughts and behavior, and what is the nature of that relationship? Elucidating the role of emotion regulation and interpersonal problems within the context of NSSI can be helpful in determining what mechanisms to address in the treatment of adolescents and young adults (e.g., emotion regulation strategies to target high distress following an interpersonal conflict). The current study seeks to expand on interpersonal problems' role in the ecological experience of NSSI thoughts and behaviors in adolescents and young adults. Based on previous research supporting this link, it is hypothesized that higher interpersonal problems reported at baseline will predict a higher frequency of NSSI thoughts and NSSI behaviors. Further, this study will explore if there is a higher frequency of interpersonal problems associated with NSSI behavior episodes with the specific self-reported functions of SNR and SPR. Lastly, this study seeks to explore the relationship of interpersonal problems and emotional dysregulation in the

context of NSSI, specifically examining whether higher difficulties regulating emotions will moderate the relationship between higher interpersonal problems and higher frequency of NSSI behaviors.

Method

Participants

The present study examined Ecological Momentary Assessment (EMA) data that were collected in real-time from a community-based sample of 47 adolescents and young adults (15-21 years old; $M=19.07$, $SD = 1.77$) in New Jersey and New York City. The current project is a secondary data analysis of data collected from 2014-2015 in the initial study conducted by Kranzler and colleagues (Kranzler et al., 2017). Inclusion criteria for the study required that participants reported engaging in at least two NSSI behaviors in the preceding two weeks. Participants were recruited either through seeking referrals from local treatment centers, through an adolescent depression and suicide treatment program at an urban hospital in New York City, or through distributed flyers and advertisements posted throughout the New Brunswick, NJ area. Exclusion criteria included Non-English speaking individuals (as study materials and procedure instructions were only available in English), participants determined to be at imminent risk for suicide during baseline assessment, or those with a diagnosis of a psychotic disorder, life-threatening anorexia, schizophrenia spectrum disorder, or developmental delays. Written informed consent was obtained from study participants, including both parental consent and adolescent assent with participants under the age of 18.

Of the 47 participants included in the study, 68.1% ($N=32$) identified as female, 29.8% ($N=14$) as male, and 1 participant (2.1%) identified as “other” gender identification. The sample consisted of self-identified White (38.3%; $N=18$), Asian (19.1%; $N=9$), Hispanic/Latino (17.0%;

N=8), Black/African-American (14.9%; N=7), and Multi-Racial (10.6%; N=5) participants. In regards to sexual orientation, 66.0% (N=31) identified as heterosexual, 17.0% (N=8) as bisexual, 6.4% (N=3) as gay/lesbian, 6.4% (N=3) as other (e.g., pansexual), and 4.3% (N=2) did not wish to provide their sexual orientation.

Procedure

A pre-screening process was conducted by study personnel via phone to determine if subjects were eligible to participate based on the exclusion criteria. Participants who met the eligibility criteria were scheduled for an in-person baseline assessment. During the 2-hour baseline visit, participants were consented and administered semi-structured clinical interviews by a trained clinical psychology graduate student supervised by a licensed clinical psychologist. Participants also completed a series of self-report measures and were trained in “*Track it!*”, the study smartphone app used to track EMA data in the moment. Participants were provided with a study smart phone to use for the duration of the study. Over a two-week period, participants completed five prompted surveys daily as well as self-initiated entries following the occurrence of NSSI thoughts or behaviors. Each entry assessed a variety of variables including if the participant had NSSI thoughts or engaged in NSSI behaviors, affect preceding and following engagement in NSSI, the function of each episode of NSSI behavior (participants could cite multiple functions), and interpersonal problems (IPs) experienced since the last entry. A description of the administered measures to be used in the current data analysis is as follows.

Measures

Demographics: At the start of the study, participants filled out information regarding their self-identified demographics, including: age, gender identity, sexual orientation, race/ethnicity, and socio-economic status. Specifically, the variables of gender and age were used as covariates in analyses.

Beck Depression Inventory II (BDI- II; Beck et al., 1996): The BDI II is a 21-item assessment measure of clinical depression that can be completed via self-report. Items are scored using a Likert scale (0-3), with total scores ranging from 0-63 and higher scores indicating higher severity of depression. The BDI-II is an upgraded version of the original BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), a widely administered instrument to measure depression. The BDI-II has demonstrated high internal consistency (Beck et al., 1996; Dozois, Dobson & Ahnberg, 1998) and adequate validity. As compared to the BDI, both instruments have been shown to demonstrate high internal reliability and are significantly correlated, supporting the BDI-II's convergent validity (Dozois, Dobson & Ahnberg, 1998). This measure was analyzed as a covariate representing depressive symptoms.

Inventory of Interpersonal Problems, Short Version (IIP-32; Barkham et al., 1996): The IIP-32 is a 32-item self-report measure serving as the short version of the original IIP (Horowitz et al., 1988), which was created to measure difficulties in interpersonal relationships. Items are scored using a Likert scale (0-4) with possible total scores ranging from 0-128. The 8 subscales of interpersonal problems assessed in the IIP-32 are: sociability (hard to socialize), assertiveness (difficulty being assertive and firm), aggression (being overly aggressive), openness (difficulties

opening up to others), caring (being too caring to others versus oneself), supportiveness (difficulties in being supportive to others), involvement (hard to be involved with other people or commit), and dependency (too dependent on other people). Scales can be grouped by traits in excess (caring, dependent, aggressive, and open) and traits demonstrating deficits (assertive, sociable, supportive, involved). Good reliability analyses and generally good alpha levels were demonstrated across scales. The IIP-32 satisfactorily meets requirements for a standard outcome measure (Barkham, 1996).

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004): The DERS is a 36-item self-report questionnaire examining difficulties in regulating emotions generally, and on six different subscales: nonacceptance of negative emotions, inability to engage in goal-directed behaviors when experiencing negative emotions, difficulties controlling impulsive behaviors when experiencing negative emotions, limited access to emotion regulation strategies perceived as effective, lack of emotional awareness, and lack of emotional clarity. Items are scored using a Likert scale (1-5) with possible total scores of emotion dysregulation ranging from 36-180. Of note, the DERS has established adequate construct and predictive validity as well as good test-retest reliability (Gratz & Roemer, 2004).

EMA Assessment: Ecological Momentary Assessment (EMA) data was self-reported by participants in the moment over the 2-week monitoring period through the *Track it!* app. This study focused on data regarding NSSI thoughts, behaviors, and functions of NSSI episodes reported. Variables collected during EMA were aggregated across the two-week monitoring period to represent sum variables for number of NSSI thoughts, number of NSSI behaviors

(counted as each episode of NSSI behavior reported), number of social reinforcement-motivated NSSI behavior episodes, number of SPR-motivated NSSI behavior episodes, and number of SNR-motivated NSSI behavior episodes.

NSSI thoughts were rated by participants answering “yes” or “no” to having “any thoughts or urges to self-injure” since the last entry. If participants answered yes, they were prompted to rate how intense the thoughts were (on a scale of 1-10, with 10 being the most intense) and how long the thoughts lasted (less than 5 seconds, 5-60 seconds, 1-30 minutes, 30-60 minutes, 1-5 hours, 5 or more hours). NSSI behaviors were assessed by participants answering “yes” or “no” to the question, “since the last entry, have you self-injured?” If yes, participants were asked to report how many times they engaged in self-injury, to check off the methods they used (e.g., cutting, biting, scratching, etc.), and how long the self-injury behavior lasted (using the same scale as used for duration of NSSI thoughts). Participants’ responses could be quantified as either NSSI frequency (how many times they engaged in NSSI overall) or as NSSI episodes, where each individual action of NSSI which occurred since the last entry counted as one episode regardless of how many behaviors occurred during that episode. The NSSI episode count was selected as the primary outcome for analyses, as it was expected that interpersonal concerns would influence episodes of NSSI more than the number of NSSI behaviors at each episode. However, NSSI frequency was also included in analyses, when applicable, to look at NSSI behaviors in both ways.

The 17 functions of NSSI listed in the app were classified into different categories of ANR-, APR-, SNR-, or SPR- motivated functions. Participants were instructed to select all functions that were reasons they self-injured in the last episode of NSSI. SNR-motivated functions included: to avoid doing something unpleasant, to avoid punishment or paying the

consequences, and to make others realize they're putting too much pressure on you. SPR-motivated NSSI included: to try to fit in with other people who are also doing it, to get attention from others, to get other people to act differently towards you, and to let others know you are in emotional pain.

Interpersonal problems assessment conducted during EMA assessment involved asking participants to check off any interpersonal problems they had experienced since the last entry. The checklist included the following external interpersonal conflicts that occurred: fought with a friend or family member, fought with a stranger or acquaintance, got criticized, got teased or bullied, learned about people talking about you behind your back, and got a dirty look, as well as the following perceived interpersonal problems or emotional responses associated with interpersonal interactions: felt pressure from others, felt left out, felt ignored, felt insulted, felt rejected, felt disappointed by someone.

Data Analytic Strategy

Descriptive data regarding frequency and function of NSSI thoughts and NSSI behavior episodes were examined, along with descriptive information regarding total scores and subscales of the IIP-32 given at baseline. Additionally, the daily interpersonal experiences of those with NSSI were examined through EMA data collected on interpersonal problems which participants noted experiencing since the last entry. Bivariate correlations regarding baseline interpersonal problems, EMA interpersonal problems, EMA NSSI thoughts and behavior episodes, and DERS were examined. Due to the sum of NSSI behavior episodes exhibiting abnormal skew, outliers were "brought to the fence" of two standard deviations for NSSI behavior episodes and additionally for NSSI thoughts and the total NSSI frequency variable to promote consistency.

The aforementioned analyses were conducted through IBM SPSS Statistics 25.0. Primary independent variables included the IIP-32, used to measure interpersonal problems at baseline, and the DERS, used to measure difficulties in emotion dysregulation at baseline. Primary outcome variables included number of NSSI thoughts, number of episodes of NSSI behavior, number of SPR-motivated NSSI behavior episodes, and number of SNR-motivated NSSI behavior episodes. Additionally, moderation regression analyses were implemented using PROCESS (Hayes, 2016), a modeling tool used to run moderation regression analyses through IBM SPSS Statistics 25.0.

Aim1: Examine whether interpersonal problems predict NSSI thoughts and NSSI behaviors.

Hypothesis 1a: Interpersonal problems at baseline will predict higher frequency of NSSI thoughts over the EMA monitoring period, even after controlling for gender, age and depressive symptoms.

Hypothesis 1b: Interpersonal problems at baseline will predict higher frequency of NSSI behavior episodes over the EMA monitoring period, even after controlling for gender, age and depressive symptoms.

Analyses: Linear regression analyses were used to demonstrate the relationship between interpersonal problems at baseline, using IIP-32 total scores from participants, and NSSI thoughts aggregated by participant from the 2-week EMA monitoring period. The same methodology was used to test the relationship between baseline interpersonal problems and total NSSI behavior episodes over the EMA period.

Aim 2: Examine whether interpersonal problems are associated with NSSI behaviors with social reinforcement function.

Hypothesis 2a: Higher interpersonal problems at baseline will predict higher frequency of NSSI behavior episodes with social reinforcement function even after controlling for gender, age and depressive symptoms.

Hypothesis 2b: Higher interpersonal problems at baseline will predict higher frequency of SNR-motivated NSSI behavior episodes even after controlling for gender, age and depressive symptoms.

Hypothesis 2c: Higher interpersonal problems at baseline will predict higher frequency of SPR-motivated NSSI behavior episodes even after controlling for gender, age and depressive symptoms.

Analyses: Linear regression analyses will also be used to test the associations between total IIP-32 baseline scores of participants and total SPR- and SNR- motivated NSSI behavior episodes per participant during the 2-week EMA monitoring period.

Aim 3: Investigate the effect of emotion dysregulation on the relationship between interpersonal problems and NSSI behavior.

Hypothesis 3: Emotion dysregulation at baseline will moderate the relationship between interpersonal problems at baseline and NSSI behavior episodes during EMA, such that those exhibiting higher emotion dysregulation and higher interpersonal problems will also exhibit the most frequent NSSI.

Analyses: PROCESS (Hayes, 2016) was used through SPSS 25.0 to run moderation regression analyses. The interaction terms and simple slopes of analyses were examined, with plans to graph the form of the interaction.

Results

Descriptive Data

All 47 study participants completed the two-week EMA protocol and 40 participants (85.12%) completed at least 80% of the five prompted daily entries over the two-week period. Data including means, standard deviations, and ranges for baseline interpersonal problems from the IIP-32 total scores as well as subscales for all 47 participants are depicted in Table 1. One participant's scores on the IIP-32 were missing, and therefore the means of the IIP-32 total score and subscales were imputed as estimated numbers for this participant in order to include their data in analyses. Additionally, one participant's age was missing, and therefore the mean age from the sample was imputed for this participant in order to include their data in analyses. Total score on the IIP-32 can range from 0-128, with higher scores indicating greater difficulties in interpersonal relationships. Subscale scores can range from 0-16. Data from the total scores and subscales were all normally distributed with skewness and kurtosis in acceptable ranges. Therefore, all data and outliers were included in analyses. Baseline IIP-32 total scores resulted in a mean of 50.61 (SD=18.68, Range=13-91). Highest mean subscale scores on the IIP-32 were the subscales of: Caring (being too caring to others versus oneself, $M=7.57$, $SD=3.9$), Dependency (being too dependent on other people, $M=7.5$, $SD=3.78$), and Sociability (hard to socialize, $M=7.46$, $SD=4.4$). The IIP-32 total score had a significant positive correlation with NSSI behavior episodes at a moderate level ($r=0.3$, $p=0.04$). Subscales of Dependency (excess of

dependence; $r=0.33$, $p=0.02$) and Supportiveness (difficulty being supportive to others, $r=0.31$, $p=0.04$) were also significantly positively correlated with NSSI behavior episodes. Only one subscale, Assertiveness (difficulty being assertive) was significantly correlated with NSSI thoughts ($r=0.39$, $p<0.01$). However, the IIP-32 total score was trending significance with NSSI thoughts ($r=0.28$, $p=0.057$). Thus, it is estimated that with a larger sample size, this association may have been significant. The lack of many significant and highly correlated relationships between baseline interpersonal problems and NSSI thoughts and behaviors may be explained by the low n sample size, and thus low power.

Table 2.0 contains information regarding NSSI thoughts and NSSI behavior episodes throughout the EMA monitoring period. 100% of participants ($n=47$) endorsed having NSSI thoughts at least once throughout the EMA period ($M=11.00$, $SD=8.32$, $Range=1-30.22$). 87.4% of the sample ($n=40$) endorsed engaging in NSSI behavior at least once throughout EMA ($M=2.95$, $SD=2.47$, $Range=0-8.91$). The sum total of episodes of NSSI behavior endorsed by participants throughout the 2-week monitoring period was 145. Table 3.0 further details the interpersonal functions of NSSI which participants endorsed. Of note, there were few interpersonal functions endorsed overall by participants. The total number of times interpersonal functions were endorsed during NSSI behavior episodes was 17 (23.40% of participants, $n=11$). Social Negative Reinforcement (SNR) functions were endorsed 15 times (21.28% of participants, $n=10$). Of the three SNR functions, the most highly endorsed was “to avoid doing something unpleasant” (12 times, 17.08% of participants, $n=8$). The function “to make others realize they are putting pressure on you” was endorsed 3 times ($n=3$) and “to avoid punishment or paying the consequences” was not endorsed by any participant. Only two instances of Social Positive Reinforcement (SPR) functions were endorsed throughout EMA. One participant

endorsed “to try to fit in with other people who are doing it” and one endorsed “to let others know that you’re in emotional pain”. The other two SPR functions of “to get attention from others” and “to get other people to act differently towards you” were not endorsed.

In addition to looking at baseline interpersonal problems, data was gathered regarding interpersonal problems endorsed per entry during the EMA monitoring period (Table 4.0). Regardless of whether participants endorsed engaging in an episode of NSSI, they were prompted with a list which included 13 interpersonal problem categories and asked to endorse any of the problems they had experienced since the last time they entered data into the app, with the ability to endorse multiple interpersonal problems within an entry. A sum total of 3,194 interpersonal problems were endorsed by participants throughout the monitoring period. Of those, 313 interpersonal problems were endorsed during episodes of NSSI behavior. Specifically, of all 145 NSSI behavior episodes reported during EMA, 110 of those (75.86%) occurred when interpersonal problems were also endorsed. The most highly endorsed interpersonal problem was “felt rejected” which occurred 438 times and was endorsed by 91.49% of participants. This was also the most commonly cited interpersonal problem to co-occur with NSSI behavior, endorsed during 45 episodes where NSSI behavior was also endorsed. Other highly endorsed categories of interpersonal problems included “felt disappointed by someone” (376 instances, endorsed by 89.36% of participants) which occurred during 25 episodes when NSSI behavior was endorsed, and “felt ignored” (360 instances, endorsed by 95.74% of participants) reported as occurring 37 times when NSSI behavior also occurred. The lowest interpersonal problem endorsed was “fought with a stranger or acquaintance” (30 instances, endorsed by 34% of participants) which occurred 4 times when NSSI behavior also occurred.

Correlations

Bivariate correlations were conducted to examine relationships and trends between EMA NSSI thoughts, EMA NSSI behavior episodes, covariates, and independent variables (depicted in Table 5). As would be expected, EMA NSSI behavior episodes had a significant positive linear relationship with EMA NSSI thoughts ($r=0.47$, $p=0.001$). Of note, although the covariate of BDI total score was not significantly correlated with EMA NSSI thoughts or behaviors, it was strongly and significantly correlated with DERS total score ($r=0.8$, $p<0.001$) and IIP-32 total scores ($r=0.66$, $p<0.001$). Additionally, the DERS and IIP-32 had a strong and significant positive relationship ($r=0.64$, $p<0.001$).

Hypothesis 1a and 1b: Baseline Interpersonal Problems Predicting NSSI Thoughts and Behaviors

Preliminary analyses were run to test whether interpersonal problems at baseline predicted EMA NSSI thoughts and EMA NSSI behaviors separately during EMA. Linear regression analyses were used to test this hypothesis. Predictor variables were continuous as well as normally distributed with no skewness or kurtosis.

In the first analysis step for hypothesis 1a, conducted with interpersonal problems as the independent variable and aggregated sum NSSI thoughts from EMA as the dependent variable, the IIP-32 was trending towards having a significant main effect on NSSI thoughts ($B=0.126$, $t=1.956$, $p=0.057$). Baseline interpersonal problems explained approximately 7.8% percentage of total variation found in NSSI thoughts during EMA. When running these same analyses including age, gender, and BDI score in the model as covariates, the IIP-32 did have a significant effect on NSSI thoughts ($B=0.216$, $t=2.367$, $p=0.023$). Interpersonal problems predicted NSSI

thoughts such that for every one unit increase of the total IIP-32 score, NSSI behaviors increased by 0.216. In this model, baseline interpersonal problems, age, gender, and BDI score together explained 14.9% of the total variance in NSSI thoughts. It is notable that when comparing to Block 3, in which solely the covariates of age, gender and BDI score were run, those variables explained only 3.5% of why NSSI thoughts occurred.

In hypothesis 1a, interpersonal problems were initially trending towards significantly predicting NSSI thoughts, and subsequently did significantly predict NSSI thoughts when covariates of BDI-II score, age and gender were factored into the analysis. Thus, it was deemed important to provide rationale for why these covariates were included in these analyses. BDI-II scores were included as symptoms of depression have been associated with self-harm in adolescents and young adults (e.g., Moran et al., 2012). Age and gender were included as both separately predicted NSSI thoughts. Poisson analyses demonstrated that age alone predicted NSSI thoughts ($B = 2.381$, $SE = 0.0917$, $Wald = 674.759$, $p < 0.001$, $RR = 10.82$) and gender alone predicted NSSI thoughts ($B = 1.609$, $SE = 0.4472$, $Wald = 12.951$, $p < 0.001$, $RR = 5.0$). As such, all three covariates were controlled for in the relationship between interpersonal problems and NSSI thoughts.

Additional preliminary analyses were run for hypothesis 1b, using interpersonal problems measured as sum total scores from the IIP-32 as the independent variable and aggregated sum NSSI behavior episodes from EMA analyzed as the dependent variable. The IIP-32 had a significant main effect ($B = 0.04$, $t = 2.130$, $p = 0.039$) on the dependent variable of EMA NSSI behavior. Baseline interpersonal problems explained approximately 9.2% percentage of total variation found in NSSI behavior episodes during EMA. When running these same analyses including age, gender, and BDI score in the model as covariates, the IIP-32 continued to have a

significant effect on NSSI behaviors ($B=0.078$, $t=2.991$, $p=0.005$). Interpersonal problems predicted EMA NSSI behaviors such that for every one unit increase of the total IIP-32 score, NSSI behavior episodes increased by 0.078. In this model, baseline interpersonal problems, age, gender, and BDI score together explained 22% of the total variance in NSSI behaviors. Similar to the analyses run with NSSI thoughts, this is especially notable when comparing to Block 3 in which solely the covariates of age, gender and BDI score were analyzed and explained only 5.4% of why NSSI behaviors occurred.

Due to NSSI behavior episodes being a count variable and additionally presenting with some skewness in this dataset, the data were analyzed using Poisson regressions in addition to linear regressions. Poisson analyses demonstrated the same results, with interpersonal problems significantly predicting NSSI thoughts ($B= 0.019$, $SE=0.003$, $Wald=32.61$, $p<0.001$, $RR=1.02$) and significantly predicting NSSI behavior episodes ($B= 0.025$, $SE=0.006$, $Wald=16.28$, $p<0.001$, $RR=1.03$).

In addition to looking at NSSI behavior episodes, NSSI behavior was measured through the summed variable of EMA NSSI frequency, in which each action of NSSI was reported as a separate behavior. Using linear regression analyses, when NSSI frequency was analyzed as the outcome variable with age, gender, and BDI score as covariates, the IIP-32 was also a significant predictor ($B=0.333$, $t=3.576$, $p=0.001$). When running these same analyses using Poisson regression, the IIP-32 continued to be a significant predictor of NSSI frequency ($B= 0.033$, $SE=0.003$, $Wald=96.37$, $p<0.001$, $RR=1.03$).

Hypothesis 2a, 2b, and 2c: Baseline Interpersonal Problems Predicting NSSI Behaviors with Social Reinforcement Function

Preliminary analyses were run to test whether interpersonal problems at baseline predicted increased EMA NSSI behavior episodes with social reinforcement functions during EMA. As participants endorsed which NSSI functions they engaged in per episode, the outcome variables used were sum of EMA NSSI behaviors episodes with social reinforcement functions endorsed (including both positive and negative reinforcement functions), sum of EMA NSSI behavior episodes with only social negative reinforcement functions endorsed of the social functions, and sum of EMA NSSI behavior episodes with only positive reinforcement functions endorsed of the social functions. As the aforementioned outcome variables were not normally distributed due to a number of participants who did not endorse social reinforcement functions and the small sample size, data were analyzed using both linear regression analyses and subsequently with Poisson regression to account for the non-normal data. All results will be discussed, though data will be primarily presented through linear regression analyses for ease of interpretation.

In the first analysis examined, hypothesis 2a, the sum of all NSSI behavior episodes during EMA with any social reinforcement function endorsed was examined. Interpersonal problems measured as sum total scores from the baseline IIP-32 was run as the independent variable with aggregated sum EMA NSSI behavior episodes with social reinforcement functions run as the dependent variable. The IIP-32 had a significant main effect ($B=0.016$, $t=2.79$, $p=0.008$) on the dependent variable of NSSI behaviors with social reinforcement function. Baseline interpersonal problems explained approximately 14.8% percentage of total variation found in NSSI behaviors with social reinforcement function during EMA. When these analyses were run including the covariates of age, gender, and BDI score, the IIP-32 continued to have a significant effect on NSSI behaviors with social reinforcement function ($B=0.026$, $t=3.21$,

$p=0.003$). Interpersonal problems predicted NSSI behaviors with social functions such that for every one unit increase of the total IIP-32 score, SPR- and SNR- motivated NSSI behaviors increased by 0.026. In this model, baseline interpersonal problems, age, gender, and BDI score together explained 23.3% of the total variance in NSSI behaviors with social functions. In Block 3 solely the covariates of age, gender and BDI score were run and explained 4.5% of the variance, indicating that adding the IIP-32 into that model accounted for 18.8% more variance in the dependent variable.

Subsequently, the effect of the sum of baseline IIP-32 on NSSI behaviors with SNR function was examined to test hypothesis 2b. The IIP-32 had a significant main effect ($B=0.013$, $t=2.44$, $p=0.02$) on the dependent variable of SNR-motivated NSSI. Baseline interpersonal problems explained approximately 11.7% percentage of the total variation found in NSSI behaviors with SNR-motivated function during EMA. When these analyses were run including the covariates of age, gender, and BDI score, the IIP-32 continued to have a significant effect on NSSI behaviors with SNR function ($B=0.025$, $t=3.48$, $p=0.001$). Interpersonal problems predicted SNR-motivated NSSI behavior episodes such that for every one unit increase of the total IIP-32 score, SNR- motivated NSSI behaviors increased by 0.025. In this model, baseline interpersonal problems, age, gender, and BDI score together explained 24.3% of the total variance in NSSI behaviors with SNR function. In Block 3, the covariates of age, gender and BDI score were analyzed alone and explained solely 2.4% of the variance, indicating that adding the IIP-32 into that model accounted for 21.9% more variance in SNR-motivated NSSI.

In examining hypothesis 2c, the effect of interpersonal problems on SPR-motivated NSSI, the IIP-32 did not have a significant main effect on SPR-motivated NSSI, though was trending towards significance ($B=0.003$, $t=21.92$, $p=0.06$). When these analyses were run

including the covariates of age, gender, and BDI score, the IIP-32 also not have a significant effect on NSSI behaviors with SPR function ($B=0.00$, $t=0.219$, $p=0.83$). However, only two NSSI episodes were rated as having SPR-motivation, resulting in a low base rate.

Due to NSSI behavior episodes being a count variable and additionally presenting with some skewness in this dataset, Poisson regressions were analyzed in addition to linear regressions. Poisson analyses demonstrated the same results, with interpersonal problems significantly predicting NSSI behaviors with social reinforcement functions ($B= 0.062$, $SE=0.017$, $Wald=12.94$, $p<0.001$, $RR=1.06$) and significantly predicting SNR-motivated NSSI ($B= 0.069$, $SE=0.018$, $Wald=13.89$, $p<0.001$, $RR=1.07$). Poisson analysis results indicated that interpersonal problems did not predict SPR-motivated NSSI behavior. As there were only two instances of SPR-motivated NSSI endorsed among participants, the low count is deemed to explain that there was not enough data to yield significant results.

Hypothesis 3: Emotion Dysregulation Moderating the Relationship between Interpersonal Problems and NSSI Behavior

PROCESS was run through SPSS to conduct moderation analyses, using macro model 1. Several analyses were run with baseline scores of the DERS, used to measure emotion dysregulation, serving as the moderator variable between interpersonal problems and sum of EMA NSSI behavior episodes. These analyses were run with covariates of age, gender, and BDI score. Initially, baseline interpersonal problems from the total IIP-32 score was analyzed as the independent variable with total baseline DERS as the moderator and total sum of EMA NSSI behavior episodes as the outcome variable. The interaction term between baseline interpersonal problems and emotion dysregulation was not significant when measuring emotion dysregulation

through the total DERS score. As a next step, the same analyses were run with total score of each of the six subscales of the DERS (nonacceptance of negative emotions, inability to engage in goal-directed behaviors when experiencing negative emotions, difficulties controlling impulsive behaviors when experiencing negative emotions, limited access to emotion regulation strategies perceived as effective, lack of emotional awareness, and lack of emotional clarity) individually run as the moderator variable. None of the DERS subscales demonstrated a significant moderating effect on EMA NSSI behavior episodes.

At this point, interpersonal problems as measured through the sum of EMA interpersonal problems endorsed was explored. Sum total of EMA interpersonal problems endorsed during the two-week monitoring period was run as the independent variable to test if the total DERS score, and subsequently the individual DERS subscales, had a moderating effect on total sum of EMA NSSI behavior episodes. Analyses yielded no significant results for any of the interaction terms in the aforementioned analyses. All of the above analyses were also analyzed with the EMA NSSI behavior frequency variable run as the dependent variable, and all similarly yielded no significant results. Thus, there did not appear to be emotion dysregulation moderation between interpersonal problems and EMA NSSI behavior in this dataset.

Discussion

This study sought to further explore the link between interpersonal problems and NSSI thoughts and behaviors using EMA methodology, to examine social reinforcement functions of NSSI, and to investigate the moderating effect of emotion dysregulation on interpersonal problems and NSSI behavior. Descriptive data of interpersonal problems reported in the moment during EMA were also examined to explore commonly cited interpersonal difficulties among a

self-injuring population.

Results demonstrated that baseline interpersonal problems predicted higher frequency of EMA NSSI thoughts when controlling for age, gender, and depressive symptoms, and that a main effect of baseline interpersonal problems predicting higher frequency of EMA NSSI behavior episodes remained consistent when controlling for age, gender, and depressive symptoms. Additionally, baseline interpersonal problems predicted social-reinforcement motivated EMA NSSI behaviors generally, and specifically social negative reinforcement-motivated NSSI behaviors. However, it did not predict NSSI behavior motivated by social positive reinforcement, which was only cited as a function twice throughout the EMA period. Contrary to what was hypothesized, emotion dysregulation did not significantly moderate the strength of the relationship between interpersonal problems and NSSI behavior. These study results add further support to interpersonal problems being associated with NSSI thoughts and behaviors and lends to the discussion of how to further examine the complex role of how interpersonal problems and difficulties regulating emotions may interact to affect NSSI behavior.

Hypotheses 1a & 1b

The findings that baseline interpersonal problems predicted higher frequency of NSSI thoughts throughout the EMA monitoring period is consistent with what was hypothesized. Past research has identified interpersonal problems as a risk factor for suicidal thoughts (Prinstein et al., 2000). However, given there is limited research examining NSSI thoughts specifically as opposed to NSSI behaviors or suicidal thoughts, this is a novel finding. Of note, the main effect of interpersonal problems on NSSI thoughts was trending towards significance ($p=0.057$) whereas when analyzed with covariates of age, gender, and depressive symptoms, results were

significant ($p=0.023$). The finding that interpersonal problems had a main effect on NSSI behavior, even after controlling for age, gender and depressive symptoms, is also consistent with research associating various social and interpersonal difficulties with NSSI (Claes et al., 2010; Hilt et al., 2008; Muehlenkamp et al., 2013).

It is notable that in the aforementioned analyses for hypothesis 1, there were no effects of age and gender on EMA NSSI thoughts or EMA NSSI behaviors. Despite past research showing a trend that higher percentages of females engage in NSSI than males (e.g., Nixon et al., 2002; Sourander, 2006), these findings demonstrated that irrespective of gender, interpersonal problems predicted NSSI thoughts and behaviors. Regarding age, this population had a limited age range (ages 15-21) of predominantly older adolescents, which may account for no significant effect of age on this sample. Further, this study controlled for depressive symptoms through BDI-II scores. As symptoms of depression have been linked to interpersonal problems (e.g., Slavich et al., 2010) as well as self-harm in adolescents and young adults (e.g., Moran et al., 2012), this points to interpersonal problems, separate from depression, serving as a risk factor for NSSI thoughts and behaviors.

Of the baseline interpersonal problems assessed, being too caring to others versus oneself, being too dependent on others, and having difficulty socializing were the highest rated problems. This suggests that these self-injuring individuals may have difficulty taking care of their own needs above others, difficulty in socially connecting to others for interpersonal support and, once they have a social connection, may depend too much on others. As shown in previous research reporting lack of social skills (Claes et al., 2010) and deficits in social problem solving (Nock & Mendes, 2008) among those who engage in NSSI, this sample also demonstrated potential engagement in NSSI as a result of higher interpersonal problems or difficulty problem-

solving social demands. Additionally, the specific difficulties of over-dependence on others and difficulty being supportive to others were significantly associated with NSSI behaviors. The “too dependent” construct has measurements such as “I worry too much about other people’s reactions to me” and “I want people to admire me too much” which may indicate that individuals who highly endorsed these items worry and pay attention to how others perceive them. Interestingly, it also implies these individuals may have insight, to some extent, of interpersonal behaviors they engage in to excess which may be problematic.

Hypothesis 2a, 2b, & 2c

Interpersonal problems had a main effect of significantly predicting both EMA NSSI behaviors with social reinforcement functions ($p=0.003$) and specifically SNR-motivated NSSI ($p<0.001$), even after controlling for age, gender and depressive symptoms. This lends support for social reinforcement functions posited by Nock & Prinstein’s FFM of NSSI (2004) and further substantiates data of SNR-reported NSSI endorsed by young adults (Klonsky & Glenn, 2009). The current finding further proposes that interpersonal difficulties can partially explain higher frequency of SNR-motivated NSSI, evidenced as higher difficulties in interpersonal functioning predicting more frequent engagement in NSSI to alleviate social demands.

In contrast, baseline interpersonal difficulties did not predict SPR-motivated NSSI behavior. One possible explanation for this is the acknowledgement that SPR-motivated NSSI was only cited twice through the entire EMA monitoring period, and thus did not have the ability to be analyzed in a meaningful way given the low base rate. However, another explanation is that in the moment when individuals engage in NSSI, it may be without awareness of consequences that result and subsequently without awareness of social factors negatively or positively

reinforcing the behavior. For example, the social signaling hypothesis (Nock, 2008) discusses that individuals resort to NSSI when lower-level attempts at communicating distress have failed. Although this logically makes sense and is clinically an explanation that may be offered to a client by a therapist, especially when conducting interventions such as chain analyses, individuals may not be aware of this when engaging in NSSI in the moment. Interpersonal functions of NSSI are also less commonly cited than automatic functions (Brausch & Muehlenkamp, 2018; Nock & Prinstein, 2004) and less commonly studied, which may indicate not only a continued need for further research into understanding social functions, but continued need to determine ways to best assess and capture interpersonal functions of NSSI in clinical research.

A last proposed explanation has to do with whether an individual perceives NSSI as being effective in achieving a desire outcome. In Brausch and Muehlenkamp's study (2018) regarding individuals' perceived effectiveness of NSSI, they found not only that interpersonal functions were less frequently endorsed than automatic or intrapersonal functions, but that using NSSI to achieve intrapersonal functions was rated as more effective in achieving desired outcome than interpersonal functions. They further posit that intrapersonal functions may be more frequently endorsed because NSSI is perceived to be effective in achieving those functions. This proposed explanation might also apply to individuals in the current study who may not have endorsed SPR-motivated NSSI if they did not perceive NSSI to be effective in achieving said functions.

Hypothesis 3

Of the number of analyses conducted and variables used to explore if emotion dysregulation moderates the relationship between interpersonal problems and NSSI behaviors, no interaction analyses yielded significant results within this dataset. One explanation may be that although the DERS, the moderator variable used, is a comprehensive construct that is both reliable and valid, it was also a baseline measure of emotion dysregulation versus a measure taken during EMA. Both the predictor variable (IIP-32) and the moderator variable were assessed at the same time point, and could be posited to reciprocally influence each other making it difficult to determine which variable might moderate the other. Additionally, the baseline DERS was not correlated with EMA NSSI behavior episodes as would be expected, and as the predictor variable of baseline interpersonal problems was correlated with EMA NSSI behavior episodes. The DERS was actually found to have a significantly strong, positive correlation with the predictor variable of baseline interpersonal problems ($r=0.64$, $p<0.001$). Given these variables were found to be highly correlated, it may be that the contributions of both variables in explaining NSSI behaviors overlapped, making it difficult to quantify the individual contribution of each distinctive variable.

Consideration must also be given to other explanations as to why emotion dysregulation at times may not be as strong of a factor in the relationship between interpersonal problems and NSSI behavior. As negative cognitions and attributions may be part of the chain leading from an interpersonal trigger to engagement in NSSI, it is possible that negative cognitions and rumination may be responsible for part of this relationship. The cognitive process of ruminating, or repeatedly focusing on thoughts and emotions, may be at play in individuals who negatively appraise interpersonal events. Previous studies have suggested that rumination and negative affect may reciprocally influence each other (Moberly & Watkins, 2008), supporting the

Emotional Cascade Model (Selby, Anestis, Bender & Joiner, 2008) which posits that intense rumination in response to an emotion-eliciting event leads to a cycle or feedback loop between rumination and negative affect. It may be important to investigate both rumination and emotion dysregulation to determine the individual roles each may play in the development of NSSI behavior. A second explanation for the lack of significant interaction in this dataset is that interpersonal situations may have such a strong relationship to NSSI that emotion dysregulation itself does not strengthen that relationship. Further investigation regarding the relationship between interpersonal problems and emotion dysregulation is needed to help clarify this claim.

EMA Interpersonal Problems

Notably, of the 145 episodes of NSSI behavior reported during the EMA monitoring period, over 75% of those (110 episodes) occurred when interpersonal problems were endorsed. This continues to support the association that interpersonal problems and stress occur with NSSI behavior, and thus play a part in engagement in NSSI behavior. It is critical to highlight the EMA interpersonal problems that were highly endorsed throughout the two-week monitoring period and the interpersonal problems that occurred when NSSI behaviors were also endorsed. The most highly cited interpersonal problems endorsed by this self-injuring population were “felt rejected” followed by “felt disappointed by someone” and “felt ignored”. Specifically, the highest rated interpersonal problems when NSSI behavior also occurred were “felt rejected”, “felt ignored”, “felt insulted” and “felt left out”. This demonstrates a pattern of interpersonal problems that capture participants’ perceived internal states in response to an interpersonal stressor. To feel rejected or disappointed implies a participant’s interpretation of an interpersonal event and subsequent emotional response to that event. Thus, this fits in with the cognitive

vulnerability-stress model (Guerry & Prinstein, 2010) as it relates to the development and maintenance of NSSI. Self-injuring individuals in this sample cited more frequent interpersonal problems related to their negative attribution of an interpersonal stressor and emotional response, versus an external interpersonal event, such as being teased or fighting with a family member.

Implications

Taking into account the findings from the current study, this leads to important implications regarding clinical prevention and intervention for NSSI. First, interpersonal problems can be a precipitant to not only NSSI behaviors but also specifically to NSSI thoughts. Not all individuals who think about engaging in NSSI go on to engage in the behavior, as evidenced by Laye-Gindhu & Schonert-Reichl's findings (2005) that 42% of adolescents had thought about engaging in self-harm, though only 15% of the entire sample reported having engaged in NSSI. This leads to the question of why some adolescents contemplate self-harm but refrain from engaging in the behavior, whereas others will go on to self-harm. Identifying NSSI thoughts as early on as possible may assist in catching warning signs to NSSI earlier in the "cycle", and thus aid in prevention. The association of interpersonal problems in predicting NSSI behaviors suggests that interpersonal problems can be a risk factor for engaging in NSSI. Given this, more intervention focused on identifying potential interpersonal events or stressors that are triggers to NSSI can be beneficial, especially in assessing an individual's potential pattern of interpersonal problems that lead to NSSI.

Delving further, if an individual is unaware that they engage in NSSI for SPR- or SNR-motivated reasons in addition to ANR/APR functions, they may not be fully addressing and replacing NSSI with adaptive behaviors. For example, if an individual is taught distress tolerance

skills to use when they first become emotionally dysregulated to prevent ANR-motivated NSSI, and thus satisfy the function of emotion regulation, it would be important to know if their NSSI also served an SPR-motivated purpose of getting help from others. If so, a clinician might help the individual find other adaptive ways to ask for help so that another behavior that is less maladaptive than NSSI could serve that same social function. Thus, if an individual is aware that they engage in NSSI for socially-motivated reasons, they can work with clinicians to collaboratively identify specific interventions targeting that particular social function. It can almost be conceptualized as a skills-matching of specific interventions which targets the unique and individual functions of NSSI that are endorsed or brought to an individual's awareness. If an individual is not aware that their NSSI behavior has an additional social reinforcement function, it would be beneficial to increase their awareness of social functions and reinforcement patterns they engage in, in order to determine which interventions would best prevent NSSI.

Strengths & Limitations

As previous research has mainly focused on retrospective report when assessing NSSI, a primary strength of this study was the collection and use of EMA data to assess NSSI thoughts and behaviors. As participants were prompted multiple times daily to complete information regarding NSSI, this reflects a more accurate representation of real-life in the moment events than retrospective report and even daily diary studies or diary cards used in therapy, which are implemented once a day. Not only did this represent rich EMA data in relation to NSSI, but also in interpersonal problems experienced in the moment. Data collected regarding frequency of interpersonal problems and commonly cited interpersonal problems during EMA sheds light on what types of interpersonal problems self-injuring adolescents and young adults are reporting.

This study also examined NSSI thoughts, a construct which has been minimally focused on in past literature. Further, this sample was fairly diverse in terms of ethnicity with 62.7% of the sample identifying as a non-white race/ethnicity or as multi-racial. As past studies have focused on predominantly self-identified White/Caucasian participants, this speaks to results that may be more generalizable across other racial groups.

Despite its strengths, there were a number of limitations to the current study. First, this was a small sample size of 47 participants, resulting in a smaller effect size. Continuing to conduct studies examining interpersonal problems and NSSI on a larger scale will add to research supporting this link among youth and young adults. Second, EMA data was collected over a two-week span of time with a total of 145 episodes of NSSI behavior reported, whereas a study with the ability to assess over a lengthier period of time would provide more data to analyze. Additionally, although this sample consisted of both adolescents and young adults, there were very few adolescents in the study under the age of 18, which resulted in a more representative young adult sample. The youngest participant was also 15 years old, and thus younger adolescents were not represented in this sample. As there are significant increases in self-harm thoughts and actions from age 12 to 15 (Sourander et al., 2006), this younger adolescent period is an important age range in which to investigate NSSI. Furthermore, this study generally used baseline data for the predictor and moderator variables of interpersonal problems and emotion dysregulation. Utilizing other analyses to study these variables within the current EMA dataset may yield more accurate self-report, and results that are better able to more causally link these variables to NSSI. Finally, all data was self-report and therefore representative of participants' perceptions of interpersonal problems that occurred and functions

of NSSI behaviors. Participants may not have been aware of all functions of their NSSI behavior, and therefore may have underreported NSSI functions.

Future Directions

Continued research focused on both the role of interpersonal problems in predicting NSSI thoughts and behaviors as well interpersonal reinforcement processes involved in the maintenance of NSSI behaviors is imperative. There is limited research on interpersonal problems being a risk factor or predictor of NSSI thoughts, particularly as some past literature has not necessarily parsed out NSSI thoughts or behaviors as distinct from suicidal ideation and behavior. The current study should also be replicated in a larger sample size, and potentially over a longer length of time versus a 2-week period to gather more data points. Expanding the study to assess 12-15 year-olds would also be beneficial in assessing this younger developmental period. Although mixed results have been found for age of onset for NSSI, some studies have noted average age of onset around 12 or 13 years old (Muehlenkamp & Brausch, 2012; Nock & Prinstein, 2004).

Additionally, future analyses should compare and examine different EMA interpersonal problems reported, such as family conflict versus peer rejection. This would shed light on what interpersonal problems lead to NSSI thoughts and behaviors, and could be compared among different age groups and gender to gather information on patterns of interpersonal problems implicated in NSSI based on demographics. Further analyses in this data set geared at assessing how EMA interpersonal problems in one entry affect or influence NSSI thoughts or behaviors in subsequent episodes would also be valuable data in assessing more direct, real-time effects of interpersonal problems on NSSI.

This study provided evidence that interpersonal problems predict NSSI behavior with social reinforcement functions and specifically SNR functions. However, given that social reinforcement functions were minimally endorsed, especially SPR functions, replication of this study in a larger sample size with more EMA NSSI behavior episodes endorsed would lend more to this finding.

As multiple functions of NSSI were endorsed in this sample and are endorsed by self-injurers, further investigation into NSSI that serves multiple functions and implications of treatment is warranted. In the current study, participants at times reported both intrapersonal functions and interpersonal functions simultaneously. Determining if participants perceive one function to be more important or effective than another would be helpful in determining treatment strategies, and shedding light on which reinforcement processes may be maintaining NSSI. This also brings up the question of whether NSSI prevention should involve finding alternative ways to meet all functions endorsed, versus just one function. Research on perceived effectiveness of NSSI in meeting the aforementioned functions, especially social functions, could be beneficial in understanding how social-motivated NSSI is maintained.

Finally, it would be important to further investigate the relationship of emotion dysregulation in the role of interpersonal problems and NSSI. Replicating this study with a larger sample as well as studying these variables further using different measures of emotion dysregulation as moderator variables could further investigate the hypothesis that emotion dysregulation may strengthen the relationship between interpersonal problem triggers and engagement in NSSI.

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Tables

Table 1

Baseline Interpersonal Problems (IIP-32) and Emotion Dysregulation (DERS)

Scales	M	SD	Range	Correlation with EMA NSSI Behavior	Correlation with EMA NSSI Thoughts
IIP-32					
Excess Subscales					
Openness	5.65	4.01	0-13	0.06	-0.23
Caring	7.57	3.90	0-16	0.12	0.22
Dependency	7.5	3.78	0-16	0.33*	0.12
Aggressive	5.5	4.56	0-15	0.12	0.05
Deficit Subscales					
Sociability	7.46	4.40	0-16	0.03	0.11
Assertiveness	6.67	4.22	0-15	0.23	0.39**
Supportiveness	3.43	3.45	0-16	0.31*	-0.002
Involvement	5.61	4.81	0-16	0.12	0.14
Total Score	50.61	18.68	13-91	0.30*	0.28 †
DERS					
Subscales					
Nonacceptance	21.51	7.13	7-34	0.19	0.02
Goals	18.6	4.71	7-25	0.06	0.20
Impulse	17.6	5.23	7-29	-0.01	0.04
Awareness	16.62	5.36	7-29	-0.02	0.24
Strategies	26.13	7.13	12-40	0.13	0.25
Clarity	14.79	4.85	5-22	0.06	0.18
Total Score	115.23	21.51	7-34	0.11	

Note. M=mean; SD= standard deviation; * $p < 0.05$; ** $p < 0.01$; † trend level effect

*IIP-32=Inventory of Interpersonal Problems, Short Version: items scored using Likert scale (0-4) with possible total scores ranging from 0-128 and subscale possible totals ranging from 0-16.

*DERS=Difficulties in Emotion Regulation Scale: items scored using a Likert scale (1-5) with possible total scores ranging from 36-180 and subscale possible totals ranging from 6-30.

Table 2

NSSI Thoughts and Behaviors Throughout EMA

Variables	M	SD	Range	Total	Participants Who Endorsed (N and %)
Sum NSSI Thoughts	11.4	9.41	1-42	-	100% (47)
Sum NSSI Behaviors (Episodes)	3.09	2.91	0-15	145	87.4% (40)

Note. M=mean; SD= standard deviation; NSSI=Nonsuicidal Self-Injury; EMA= Ecological Momentary Assessment.

Table 3

NSSI Interpersonal Functions Throughout EMA

Functions	Total Times Endorsed	Participants Who Endorsed (N and %)
Social Negative Reinforcement (SNR)	15	21.28% (10)
To avoid doing something unpleasant	12	17.08% (8)
To avoid punishment or paying the consequences	0	-
To make others realize they are putting pressure on you	3	0.06% (3)
Social Positive Reinforcement (SPR)	2	0.04% (2)
To try to fit in with other people who are doing it	1	0.02% (1)
To get attention from others	0	-
To get other people to act differently towards you	0	-
To let others know that you're in emotional pain	1	0.02% (1)
Total Interpersonal Functions (SNR + SPR)	17	23.40% (11)

Note. NSSI=Nonsuicidal Self-Injury; EMA= Ecological Momentary Assessment.

Table 4

Interpersonal Problems (IPs) Throughout EMA

Variables	M	SD	Range	Participants Who Endorsed (N and %)	Total IPs Endorsed	IPs Endorsed with NSSI Behavior*
Fought with a friend or family member	4.12	3.79	0-13	30 (80.85%)	193 (6.04%)	30
Fought with a stranger or acquaintance	0.68	1.29	0-6	16 (34%)	30 (0.94%)	4
Felt pressure from others	7.34	9.21	0-46	40 (85.12%)	345 (10.8%)	30
Got criticized	5.38	6.04	0-25	36 (76.56%)	253 (7.92%)	31
Got teased or bullied	1.38	2.49	0-13	21 (44.68%)	65 (2.04%)	3
Felt left out	6.43	6.14	0-30	43 (91.49%)	302 (9.46%)	33
Learned about people talking about you behind your back	1.21	1.94	0-9	22 (46.81%)	57 (1.78%)	7
Felt ignored	7.65	8.74	0-49	45 (95.74%)	360 (11.27%)	37
Felt insulted	5.62	6.54	0-32	37 (78.72%)	264 (8.27%)	33
Felt rejected	9.32	9.66	0-51	43 (91.49%)	438 (13.71%)	45
Got dirty look	2.28	3.06	0-11	26 (55.32%)	107 (3.4%)	10
Felt disappointed by someone	8.00	11.28	0-60	42 (89.36%)	376 (11.77%)	25
Other	8.60	12.62	0-49	38 (80.85%)	404 (12.56%)	25
Total	0.96	1.59	0-13	-	3,194	313

Note. M=mean; SD= standard deviation. NSSI=Nonsuicidal Self-Injury; EMA= Ecological Momentary Assessment.

*Total number of episodes where both NSSI behavior and at least one interpersonal problem were endorsed was 110. Participants were able to endorse multiple interpersonal problems per entry. Therefore, this column adds up to more than 110.

Table 5

Correlations among EMA NSSI, Covariates, DERS, and IIP-32

	1	2	3	4	5	6	7
1. EMA NSSI Behaviors	——	.47**	.23	-0.01	-0.03	0.11	0.3*
2. EMA NSSI Thoughts		——	-0.01	0.17	0.11	0.18	0.28 †
3. Age			——	-0.08	-0.33*	-0.22	-0.06
4. Gender				——	0.23	0.17	-0.04
5. BDI Scores					——	0.8**	0.66**
6. DERS						——	0.64**
7. IIP-32							——

Note. * $p < .05$, ** $p < .01$, † trend level effect

Table 6

Predicting EMA NSSI thoughts using multiple regression

NSSI Thoughts (DV)	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Block 1: IIP-32					
$\Delta R^2 = .078$	0.126	0.064	0.28	1.956	0.057†

Block 2: IIP plus					
Covariates					
IIP-32	0.216	0.091	0.481	2.367	0.023*
Age	-0.280	0.738	-0.059	-0.379	0.707
Gender	4.246	2.535	0.254	1.675	0.101
BDI	-0.187	0.141	-0.292	-1.327	0.192
$\Delta R^2 = .149$					
Block 3: Covariates					
Alone					
Age	0.134	0.755	0.028	.178	0.860
Gender	2.626	2.568	0.157	1.022	0.312
BDI	0.05	0.104	0.078	0.482	0.632
$\Delta R^2 = .035$					

Note. Dependent variable for all blocks was NSSI Thoughts.

** $p < .05$, ** $p < .01$, † trend level effect*

Table 7

Predicting EMA NSSI behaviors using multiple regression

NSSI Behaviors (DV)					
	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Block 1: IIP-32	0.4	0.019	0.303	2.130	0.039*
$\Delta R^2 = .092$					
Block 2: IIP plus					
Covariates					

IIP-32	0.078	0.026	0.582	2.991	0.005*
Age	0.195	0.21	0.138	0.928	0.359
Gender	0.586	0.72	0.118	0.815	0.42
BDI	-0.076	0.04	-0.401	-1.906	0.064
$\Delta R^2 = .22$					
Block 3: Covariates					
Alone					
Age	0.343	0.222	0.243	1.548	0.129
Gender	0.005	0.754	0.001	0.007	0.995
BDI	0.009	0.031	0.047	0.291	0.772
$\Delta R^2 = .054$					
<i>Note. Dependent variable for all blocks was NSSI behaviors.</i>					
<i>* $p < .05$, ** $p < .01$</i>					

Table 8

Predicting EMA NSSI behaviors with Social Reinforcement Functions: Linear Regressions

1) All Social Reinforcement-Motivated NSSI (DV)					
	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Block 1: IIP-32	.016	.006	.384	2.79	.008*
$\Delta R^2 = .148$					
Block 2: IIP plus Covariates					
IIP-32	.026	.008	.618	3.207	.003*
Age	-.102	.064	-.233	-1.584	.121

Gender	.286	.221	.186	1.294	.203
BDI	-.021	.012	-.361	-1.731	.091
$\Delta R^2 = .233$					
Block 3: Covariates					
Alone					
Age	-.053	.069	-.121	-.769	.446
Gender	-.053	.069	.062	.403	.689
BDI	.007	.010	.115	.712	.480
$\Delta R^2 = .045$					

2) SNR-Motivated NSSI (DV)	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Block 1: IIP-32	.013	.005	.342	2.44	.019*
$\Delta R^2 = .117$					
Block 2: IIP plus Covariates					
IIP-32	.025	.007	.667	3.48	.001*
Age	-.101	.058	-.254	-1.736	.09
Gender	.269	.2	.193	1.349	.185
BDI	-.027	.011	-.5	-2.41	.02*
$\Delta R^2 = .243$					
Block 3: Covariates					
Alone					
Age	-.05	.063	-.134	-.837	.407
Gender	.082	.216	.059	.379	.707
BDI	.001	.009	.014	.084	.934
$\Delta R^2 = .024$					

3) SPR-Motivated NSSI (DV)	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Block 1: IIP-32	.003	.002	.276	1.923	.061†
$\Delta R^2 = .076$					
Block 2: IIP plus Covariates					
IIP-32	.000	.002	.044	.219	.828
Age	-.001	.018	-.008	-.052	.959
Gender	.017	.062	.040	.267	.791
BDI	.006	.003	.35	1.599	.117
$\Delta R^2 = .155$					
Block 3: Covariates					
Alone					
Age	Could not run	.017	.000	.000	1.0
Gender	.013	.059	.031	.219	.828