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The Relationships Between Nonsuicidal Self-Injury Frequency and Suicidal Behaviors, Depression, and Anxiety: A Curvilinear Analysis

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THE RELATIONSHIPS BETWEEN NONSUICIDAL SELF-INJURY FREQUENCY
AND SUICIDAL BEHAVIORS, DEPRESSION, AND ANXIETY: A CURVILINEAR
ANALYSIS

A Thesis
Presented to
The Faculty of the Department of Psychological Sciences
Western Kentucky University
Bowling Green, KY

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

By
Sherry Woods

August 2017

THE RELATIONSHIPS BETWEEN NONSUICIDAL SELF-INJURY FREQUENCY
AND SUICIDAL BEHAVIORS, DEPRESSION, AND ANXIETY: A CURVILINEAR
ANALYSIS

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Nonsuicidal self-injury (NSSI) involves the deliberate damage of one's own bodily tissue without suicidal intent. A number of psychological disorders and indicators of distress are correlated with the behavior, including suicidal behaviors (e.g. Whitlock & Knox, 2007), depression (e.g. Ross & Heath, 2002), and anxiety (e.g. Victor & Klonsky, 2014), and yet the research literature has been mixed on whether increased frequency of NSSI is correlated with increased levels of these variables. The present study hypothesized that these relationships are curvilinear. Data from a larger study were analyzed using curvilinear regression analyses, and hypotheses were partially supported. Curvilinear relationships were found between NSSI frequency and both depression and anxiety, such that the relationships were positive until approximately 300 incidents, after which they became negative. The relationship between NSSI and suicide ideation was positive and linear. Among the whole sample, there were curvilinear relationships between both NSSI and suicide attempts as well as NSSI and suicide threats. Among only the portion of the sample who reported a history of these variables, there was no relationship between frequency and suicide attempts, and a curvilinear relationship between frequency and suicide threats that declined after 325 incidents. Results add to the current understanding of NSSI frequency and provide support for evidence that conflict with the proposed frequency criterion for nonsuicidal self-injury disorder.

Introduction

Nonsuicidal self-injury (NSSI) is defined as the deliberate damage of one's own bodily tissue without suicidal intent (Bentley, Nock, & Barlow, 2014). This excludes socially sanctioned behaviors, such as piercings or tattoos, and behaviors considered trivial, such as nail biting, unless they are undertaken with the explicit aim of harming oneself (Wilkinson & Goodyer, 2011). The most common method of NSSI is cutting (e.g. Glenn & Klonsky, 2013), but NSSI can take a variety of forms, such as burning, head banging, self-punching, biting, carving, and severe scratching (Muehlenkamp & Gutierrez, 2004). The majority of individuals who engage in NSSI report using more than one method (Whitlock, Muehlenkamp, & Eckenrode, 2008).

Although past research has treated nonsuicidal self-injury as part of a spectrum of general self-harm, with suicide at one extreme (e.g. Hawton, Rodham, Evans, & Weatherall, 2002), more recent research has found that individuals who engage in NSSI and individuals who engage in suicide attempts differ in regard to intent, affect before and after the event, number of methods used, and severity and lethality of injuries (Muehlenkamp & Kerr, 2010). As a result, a general consensus has emerged that NSSI should be treated as a related but distinct construct from suicidal behaviors (e.g. Brausch & Gutierrez, 2010; Hamza, Stewart, & Willoughby, 2012; Kerr, Muehlenkamp, & Turner, 2010).

The average age of onset is between 11-15 years (e.g. Jacobson & Gould, 2007; Muehlenkamp & Gutierrez, 2004; Nock & Prinstein, 2004), although a significant proportion of individuals do not engage in the behavior until young or emerging adulthood (Whitlock, Eckenrode, & Silverman, 2006). The reported prevalence rates of

NSSI vary greatly, which may be due to an increase in the behavior in the past two decades (e.g. Olfson, Gameroff, Marcus, Greenberg, & Shaffer, 2005), although more recent literature suggests this rate has now stabilized (Muehlenkamp, Claes, Havertape, & Plener, 2012). This proposed increase may explain the significant discrepancies between reported adult lifetime prevalence rates, which are typically close to 5% (e.g. Briere & Gil, 1998; Klonsky, 2011), and adolescent lifetime prevalence rates, which are typically close to 25% (e.g. Jacobson & Gould, 2007; Muehlenkamp et al., 2012). Lifetime prevalence rates in clinical samples are significantly higher, with adult clinical samples reporting ranges between 11-21% (e.g. Briere & Gil, 1998; Selby, Bender, Gordon, Nock, & Joiner, 2012), and adolescent clinical samples reporting rates as high as 50-80% (Glenn & Klonsky, 2013; Nock & Prinstein, 2004).

The reasons for engaging in NSSI are varied, and many individuals report the behavior serving multiple functions (e.g. Nixon, Cloutier, & Aggarwal, 2002; Nock & Prinstein, 2004). Several theoretical models of the functions of NSSI have been proposed, the most common of which include the four-function model posited by Nock and Prinstein (2004), the Experiential Avoidance Model (EAM) proposed by Chapman, Gratz, and Brown (2006), and the functional model derived from the Inventory of Statements About Self-Injury (ISAS; Klonsky & Glenn, 2009). Although models differ regarding the total number of functions proposed, most group functions of the behavior into two categories: intrapersonal, which includes emotion regulation, and interpersonal, which includes attempts to solve interpersonal problems or to communicate distress to others (e.g. Nock & Prinstein, 2004; Klonsky & Glenn, 2009). The four-function model posited by Nock and Prinstein (2004) proposed the additional dimension of positive

functions, which involve the inducement of a desired effect (e.g. positive affect, attention from others), and negative functions, which involve the removal of an undesired element (e.g. negative affect, interpersonal obligations).

Intrapersonal functions, the most predominant of which is emotion regulation, are by far the most commonly endorsed function (e.g. Klonsky, 2011), particularly for repetitive NSSI (Muehlenkamp, Brausch, Quigley, & Whitlock, 2013). The EAM proposes that the primary function of NSSI is to avoid unwanted emotional experiences (Chapman et al., 2006). The reason for initially turning to NSSI in order to fulfill this need varies; the function of the initial act of NSSI can range from imitating peers, to self-punishment, to social communication (Nock, 2009), but repeated incidents appear primarily to serve an emotion regulation function and are maintained primarily through negative reinforcement by ameliorating negative emotions (Chapman et al., 2006; Muehlenkamp et al., 2013). Although other models also focus on the reduction of negative cognitions as well as emotions and the induction of positive emotions and cognitions, there is nevertheless a consensus in the literature that intrapersonal functions are the primary reason for most habitual NSSI (e.g. Klonsky, & Glenn, 2013; Nock & Prinstein, 2004).

It is more common for the initial act of NSSI to be interpersonally motivated than for subsequent acts (Muehlenkamp et al., 2013). Interpersonal motivations can include functions such as social communication (e.g. “a cry for help”), gaining attention from others, or fitting in with a peer group (e.g. Nock & Prinstein, 2004). Although the interpersonal functions are far less commonly endorsed, recent research suggests that interpersonal conflicts often precede NSSI and may be a common source of the increased

negative affect that prompts engagement in NSSI (e.g. Townsend et al., 2016; Turner, Gratz, & Chapman, 2016). Therefore, it may be that interpersonal aspects of NSSI have been underreported, and as a result, understudied.

There are other functions of NSSI that do not fall into these two main categories but have nevertheless been reported in the literature. Some functions, such as engaging in NSSI in order to avoid engaging in suicidal behaviors (e.g. Suyemoto, 1998) and engaging in NSSI because it has become an addiction (e.g. Nixon et al., 2002) are more controversial. Although a significant number of individuals report these functions, sufficient empirical evidence has not established that NSSI reduces suicide ideation or has the properties of an addiction (e.g. Victor, Glenn, & Klonsky, 2012).

Correlates of NSSI

The high prevalence of NSSI is particularly concerning to clinicians, given the number of disorders and negative psychological outcomes that often co-occur with the behavior, such as suicidal behaviors, i.e. ideation, threats, and attempts (e.g. Klonsky, May, & Glenn, 2013), depression (e.g. Ross & Heath, 2002), and anxiety (e.g. Jacobson & Gould, 2007). NSSI is considered a transdiagnostic behavior that can occur in the context of a myriad of other disorders, and is associated with significant functional impairment.

NSSI and Suicide

Although NSSI and suicide attempts are distinct behaviors, they often co-occur, with rates of suicide attempts in clinical populations presenting with NSSI reaching as high as 70% (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). Furthermore, this relationship extends beyond the physical behaviors, as thoughts of NSSI and suicide

ideation also commonly coincide (Cloutier, Martin, Kennedy, Nixon, & Muehlenkamp, 2010). NSSI and suicidal thoughts and behaviors share a number of risk factors, including depression, borderline personality disorder (Nock et al., 2006), and a history of physical or sexual abuse (Muehlenkamp, Kerr, Bradley, & Adams, 2010). In both cross-sectional and longitudinal research, NSSI has been found to be one of the most robust predictors of suicidal ideation and attempts, even when controlling for depression, hopelessness, abuse history, and other psychopathology (e.g. Guan, Fox, & Prinstein, 2012; Hamza et al., 2012); this relationship is even stronger among individuals who endorsed forms of NSSI that result in greater tissue damage, such as burning (Tang et al., 2011). Individuals who engage in both NSSI and suicidal behaviors report higher levels of psychopathology and stressful life events than do those who engage in NSSI alone or suicidal behaviors alone (e.g. Whitlock & Knox, 2007).

NSSI and Depression

Given the common emotion regulation function of NSSI, it is unsurprising that NSSI is associated with a number of mood disorders and associated emotional psychopathology, such as depression (e.g. Jacobson & Gould, 2007). Depressive symptoms differentiate between adolescents who endorse NSSI and those who do not in both clinical (e.g. Ferrara, Terrinoni, & Williams, 2012) and nonclinical samples (e.g. Hankin & Abela, 2011). The association between NSSI and depression may be due to similar underlying vulnerabilities or to the use of NSSI to reduce depressive symptoms (Marshall, Tilton-Weaver, & Stattin, 2013). In a longitudinal study, Marshall et al. (2013) found that although baseline depressive symptoms predicted future engagement in NSSI, future time point assessments saw no significant lag between concurrent NSSI and

depressive symptoms. Furthermore, Guerry and Prinstein (2010) found that depressive symptoms predicted lower rates of NSSI remission during a 6-month follow-up period; this may be due to potential difficulties individuals with depressive symptoms might have in giving up a coping mechanism for these symptoms. Taken together, these findings suggest that depression is implicated not only in the onset but also the maintenance of NSSI.

NSSI and Anxiety

In addition to depression, individuals who engage in NSSI also report higher levels of anxiety (e.g. Hoff & Muehlenkamp, 2009), and diagnosed anxiety disorders are significantly more common in NSSI samples than in both the general population (Chartrand, Sareen, Toews, & Bolton, 2011; Victor & Klonsky, 2014) and non-NSSI clinical samples (Selby et al., 2012). Anxiety may be an even better predictor of NSSI than depression; Klonsky, Oltmanns, and Turkheimer (2003) found that although the relationship between depression and NSSI was significantly diminished when controlling for the effects of anxiety, the relationship between anxiety and NSSI remained substantial even when controlling for the effects of depression.

Feelings of anxiety often precede incidents of NSSI (Chapman & Dixon-Gordon, 2007; Victor & Klonsky, 2014), which are then undertaken in an attempt to reduce these feelings. Specific factors of anxiety, such as worry and rumination (Anderson, 2009), as well as specific types of anxiety, such as anxiety over abandonment (Levesque, Lafontaine, Bureau, Cloutier, & Dandurand, 2010), have been implicated as predictors of NSSI.

Nonsuicidal Self-Injury Disorder

Despite these significant associations with other disorders and psychopathology, prior to 2013, nonsuicidal self-injury was only present in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) as a symptom of borderline personality disorder (BPD, American Psychiatric Association [APA], 2000). Although NSSI does occur in a significantly higher proportion of individuals with borderline personality disorder (e.g. Soloff, Lis, Kelly, Cornelius, & Ulrich, 1994), NSSI also occurs at significant rates independently of BPD (e.g. Selby, Bender, Gordon, Nock, & Joiner, 2012). Additionally, although there is some overlap between the occurrence of BPD and NSSI, this overlap is no greater than the overlap between occurrences of BPD and other Axis I disorders, such as depression (Glenn & Klonsky, 2013).

In the most recent edition of the *DSM*, the APA designated nonsuicidal self-injury disorder (NSSID) as a condition that requires further study (5th ed.; DSM-5; APA, 2013). The proposed criteria for NSSID are (a) intentionally harming oneself without suicidal intent on 5 or more days within the past year; (b) the reason for the behavior is either to relieve negative emotions or cognitions, to resolve an interpersonal issue, or to induce a positive emotional state; (c) the behavior is associated with (1) a negative emotional state immediately preceding the behavior, (2) persistent preoccupation with the behavior, or (3) frequent urges to engage in the behavior; (d) the behavior is not trivial or socially sanctioned; (e) the behavior causes clinically significant distress and impairment in multiple domains; and (f) the behavior is not better explained by the presence of another condition or disorder (5th ed.; DSM-5; APA, 2013). However, in the DSM-5 field trials, the inter-rater reliability for diagnoses of NSSID was unacceptably low (Reiger et al.,

2013), which has led a number of researchers to examine the proposed criteria more closely (e.g. Andover, 2014; Gratz, Dixon-Gordon, Chapman, & Tull, 2015, In-Albon, Ruf, & Schmid, 2013).

NSSID Frequency Criterion

In particular, a number of researchers and clinicians have called into question the frequency criterion of five or more instances of NSSI within the past year. In the original proposal for the inclusion of NSSID submitted to the APA, Shaffer and Jacobson (2009) noted that data upon which a frequency criterion could be based were limited. The number of reported lifetime occurrences of NSSI can vary widely; although a number of adolescents endorsing the behavior have reported only one or two instances (Brausch & Gutierrez, 2010), a large percentage of individuals have reported significantly greater frequencies. Hamza and Willoughby (2013b) found that 14.2% of a sample of self-injuring young adults reported over 100 occurrences, and the highest reported number of lifetime occurrences in a sample can reach the thousands (e.g. Anestis, Khazem, & Law, 2015).

In a review of the literature examining the proposed DSM-5 criteria, Zetterqvist (2015) suggested a higher frequency criterion would be more appropriate, considering the much higher frequencies often reported. Additionally, Selby, Kranzer, Fehling, and Panza (2015) pointed out that NSSI during adolescence is often transient, and therefore a higher threshold might be necessary in order to delineate a consistent pattern of clinically significant behavior. In support of these suggestions, Andover (2014) found that individuals with a history of NSSI who met the frequency criterion for NSSID were not significantly more likely to report clinically significant distress and impairment than

individuals who did not, and recommended that further research examine whether 5 days is a clinically meaningful cut-off.

Several studies have identified specific frequency criteria higher than five times. Muehlenkamp and Brausch (2016) used discriminant function analyses to identify 10 or more incidents as the point that differentiated between participants with NSSI on variables of psychopathology, including anxiety and depression; distress, including lower life satisfaction and social support; and impairment, including suicide ideation and attempts. Whitlock et al. (2013) found that increased risk of suicidal thoughts and behaviors was predicted by greater than 20 occurrences of NSSI, and Whitlock and Knox (2007) found that the relationship between NSSI and suicide ideation, plans, gestures, and attempts peaked at 11 to 50 incidents. Taken together, these findings suggest that a higher cut-off may be more appropriate.

There is some limited support for a criterion around five times per year. One of the main studies on which Shaffer and Jacobson (2009) based this criterion found that participants who reported five or more instances of NSSI within the past year had higher levels of suicidal ideation and were more likely to have diagnoses of depression, anorexia nervosa, and bulimia nervosa (Dulit, Fyer, Leon, Brodsky, & Frances, 1994). However, the sample for this study consisted of patients admitted to an inpatient psychiatric unit who had received a diagnosis of borderline personality disorder. Although most NSSI research at the time of Dulit et al. (1994) focused on populations diagnosed with BPD, more recent research has noted how commonly NSSI occurs independently of BPD (e.g. Selby et al., 2012), and therefore a sample of only inpatient participants with BPD is not representative of the population of individuals who engage in NSSI.

In addition, several of the studies that seem to support the frequency criterion suffered from the same methodological issue. In each study, the items assessing frequency were forced choice, with a low, predetermined ceiling that was not rooted in theory. For example, You, Leung, Fu, and Lai (2011) categorized Chinese adolescents into repetitive NSSI (i.e. six or more times) and episodic NSSI (i.e. five or fewer times) and found that the repetitive group had more depressive and dissociative symptoms as well as greater impulse-control problems. However, the highest option provided for the frequency items was “six times or more” (You et al., 2011). Therefore, the repetitive category may have included individuals who engaged in NSSI close to six times and individuals who engaged in NSSI hundreds or even thousands of times. Similarly, Brunner et al. (2007) grouped German ninth graders into repetitive NSSI (i.e. four or more times within the past year), occasional NSSI (i.e. one to three times in the past year), and no NSSI categories, and found that participants who reported suicide ideation were much more likely to belong to the repetitive NSSI group than the occasional NSSI group or the no NSSI group. However, Brunner et al. (2007) did not provide any theoretical justification for the cut-off numbers used for each frequency category, and so may have obscured other significant differences by condensing individuals with widely differing frequencies into one group without any theoretical basis for doing so.

Frequency

Overall, the literature on NSSI frequency has shown a number of inconsistencies, often dependent on the method used to assess frequency. Historically, researchers have used one of two methods for examining frequency. The first method has been to separate individuals reporting NSSI into groups based on frequency, either determined a priori

(e.g. You et al., 2011) or based on the results of statistical analyses such as latent class analyses (e.g. Hamza & Willoughby, 2013b) or group-based trajectory modeling (e.g. Barrocas, Giletta, Hankin, Prinstein, & Abela, 2014). The second method has been to treat frequency as a continuous variable. When the first method has been employed, membership in a higher frequency group often has been associated with greater levels of psychopathology. Using this method, significant differences have been found in regard to emotional problems (You et al., 2011), psychosocial impairment (Hamza & Willoughby, 2013b), depression (Barrocas et al., 2014), disordered eating and substance abuse (Brausch & Boone, 2015), and suicidal thoughts and behaviors (Brausch & Boone, 2015; Whitlock et al., 2013), such that higher frequency groups endorsed higher levels of the outcome variables.

However, when frequency of NSSI has been treated as a continuous variable, findings have been mixed. In a sample of Italian adolescents, DiPierro, Sarno, Perego, Gallucci, and Madeddu (2012) found positive linear relationships between NSSI frequency and depression, and NSSI frequency and anxiety. Conversely, Burke, Hamilton, Abramson, and Alloy (2015) noted a nonlinear relationship between NSSI frequency and depressive symptoms, which was mediated by higher levels of interpersonal stressful life events. Some studies have found a positive relationship between NSSI frequency and number of suicide attempts (e.g. Andover & Gibb, 2010), but others have not found such a relationship (e.g. Nock et al., 2006).

Paul, Tsypes, Eidlitz, Ernhout, and Whitlock (2015) proposed that one potential reason for these inconsistencies might be that the associations between NSSI frequency and a number of psychological variables are more complex than positive linear

relationships. If the relationships between NSSI frequency and certain variables are curvilinear, this might explain the lack of significant findings in studies using linear analyses, because the use of such analyses would therefore be inappropriate. Paul et al. (2015) found curvilinear relationships between NSSI frequency and suicide ideation, plans, and attempts such that the relationships between frequency and these variables increased until a maximum risk point, after which the relationships declined. In the case of ideation, the maximum risk point was between 11-20 occurrences; in the case of plans and attempts, the maximum risk point was between 21-59 occurrences (Paul et al., 2015).

Whitlock and Knox (2007) was the only other study that used analyses that revealed a curvilinear relationship between NSSI frequency and suicidality, which consisted of suicide ideation, gestures, plans, and attempts. This relationship peaked between 11 and 50 occurrences of NSSI, and subsequently declined (Whitlock & Knox, 2007). Both Paul et al. (2015) and Whitlock and Knox (2007) suggested that a possible reason that the relationship between NSSI and suicidal thoughts and behaviors declined after the maximum risk points was that, among individuals reporting higher frequencies, NSSI may be a consistent coping mechanism that helps to mitigate some distress, albeit in an unhealthy way. Future research should examine further differences between individuals reporting NSSI frequencies above and below maximum risk points to determine if this potential explanation is supported.

Hypotheses and Rationale

Given the complex relationships between NSSI frequency and a number of variables related to NSSI, the proposed study examined more closely a number of those relationships using curvilinear regression. Four hypotheses stemmed from the research

literature. First, it was predicted that, among participants indicating NSSI, the suicidal behavior dependent variables of suicide ideation, suicide threats, and suicide attempts would exhibit positive curvilinear relationships to the independent variable of NSSI frequency. The predicted curvilinear relationship was that as NSSI frequency increased, so would suicidal behaviors, until a maximum risk point, after which the relationship would level off or decline. Second, it was predicted that, among participants indicating NSSI, the dependent variable of depressive symptoms would exhibit a curvilinear relationship to the independent variable of NSSI frequency, following the same pattern. Third, it was predicted that, among participants indicating NSSI, the dependent variable of anxiety symptoms would also exhibit a positive curvilinear relationship with NSSI frequency, following the same pattern. These hypotheses were based on the findings of Paul et al. (2015) and Whitlock and Knox (2007), and, if supported, would provide a potential reason for previously mixed findings in the literature. If NSSI frequency and the dependent variables exhibited curvilinear relationships that leveled out at some point, this would mean that NSSI frequency is positively correlated with the dependent variables, but only up to a certain number of lifetime occurrences. After that point, greater numbers of lifetime NSSI incidents no longer reflect an increase in risk for the outcome variables. If these relationships instead declined, this finding could also provide support for the suggestion of Paul et al. (2015) that NSSI does serve as a somewhat effective, if unhealthy, way of mitigating negative affect and avoiding suicide for individuals who engage in the behavior a certain number of times.

The last hypothesis predicted that the points at which the expected curvilinear relationships leveled out would be higher than the suggested DSM-5 criteria of five or

more instances of NSSI. This hypothesis was based on the growing body of literature that has called into question the recently proposed frequency criterion for NSSID (e.g. Andover, 2014; Muehlenkamp & Brausch, 2016; Zetterqvist, 2015). If there does not appear to be a strong relationship between increased psychopathology and frequency of NSSI at five occurrences, it is likely that this is a cut-off point of low clinical significance, and future research should continue to search for a more appropriate frequency criterion for NSSID. If instead the relationships peaked at close to five incidents, this would provide support for the originally proposed frequency criterion.

Method

Participants

Participants for this study were undergraduate students at Western Kentucky University who endorsed at least one instance of NSSI as part of a larger, ongoing study examining risk behaviors and mental health in college students. The larger study recruited participants using the Western Kentucky University Study Board, and granted research participation credit to students in exchange for participation. In order to ensure a sample size large enough for adequate statistical power, data that were collected each semester since the beginning of the larger study in the fall semester of 2012 were used. Although using participant data from multiple semesters may present some issues with possible history or cohort effects, such effects are likely to be small for a timespan of only 3 years, and their impact on such a large sample is not likely to be great (Morling, 2014). Furthermore, although this is a convenience sample, the choice of using college-age students to examine NSSI and related variables is both common in this area of research and supported by the literature (e.g. Jacobsen & Gould, 2007). NSSI is most

common in adolescence, but a significant proportion of individuals who self-injure report beginning the behavior in young or emerging adulthood (Whitlock et al., 2006); thus, using a sample of university students allows for capturing more of the behavior than would be observed in a younger sample. In order to only focus on a population in the typical age range for university, participants older than 25 years old were excluded from analyses, so as to minimize any potentially confounding age differences.

The overall sample contained 1197 participants and had a prevalence rate of approximately 28.7% for NSSI, which yielded an initial sample of 341 participants who had at least one lifetime instance of NSSI and were within the targeted age range. The initial range of NSSI frequency was 1-10,000 instances. After excluding one extreme outlier of 10,000, z-scores were calculated and 11 additional participants were excluded for being three standard deviations from the mean, for a final sample of 329 participants. Participants identified as 69% female, 30.4% male, and .6% other, as well as 75.3% White/Caucasian, 8.8% Black/African-American, 5.5% Hispanic/Latino(a), 3.7% Asian, 3.7% multi-ethnic, 2.4% other, and .6% Native American. The average age was 19.4 years ($SD = 1.78$).

Procedure

Participants signed up for available time slots for the larger college risk behaviors study online using WKU's Study Board. A maximum of five participants were allowed to sign up for each time slot, so as to ensure enough space in the laboratory to fill out the measures with privacy. Participants signed informed consent sheets, were given instructions (see Appendix A) by the graduate student overseeing the data collection session, and completed all measures in the laboratory. An undergraduate research

assistant was present in the main room of the laboratory for the entire session so as to be available to answer any questions regarding the measures. When participants completed the measures, they brought the completed packet to the back room of the laboratory, where the graduate assistant briefly went through the packet to ensure completion and to perform a short risk assessment (for risk assessment guidelines, see Appendix B). A white noise machine outside of the door to the back room of the laboratory ensured that any follow-up questions that needed to be asked after the risk assessment would not be overheard by the other participants. Participants in the “no risk” category were given a debriefing sheet that further detailed the purpose of the larger, ongoing study and provided the principal investigator’s contact information as well as information on local mental health resources and crisis hotlines. Participants in the “low risk” category were given the same sheet, and were encouraged to make an appointment at the counseling center or other agency; participants in the “moderate risk” category were given the same sheet, and received an offer to directly call the counseling center from the laboratory to set up an appointment; and participants in the “high risk” category were given the same sheet, and were immediately escorted to the WKU Counseling Center.

Measures

Inventory of Statements About Self-Injury (ISAS; Klonsky & Glenn, 2009).

The independent variable of NSSI frequency was operationally defined as the number of lifetime incidents of cutting, biting, burning, carving, severe scratching, and/or banging or hitting self, in the absence of suicidal intent, as indicated in Section I of the ISAS (Klonsky & Glenn, 2009). The ISAS (see Appendix C) is a self-report measure, developed for use with both clinical and non-clinical samples. The ISAS consists of a

mixture of forced-choice and open-ended items that assess the frequency, methods, and functions, as well as several contextual features, of nonsuicidal self-injury. The first section asks respondents to write the number of times they have performed 13 types of self-injury, such as “cutting,” “burning,” and “carving,” in their lives. For the purposes of the present study, the methods of “interfering with wound healing,” and “rubbing skin against rough surface” were excluded from analyses because the severity of these behaviors, and therefore the extent to which they classify as NSSI rather than typical, nonpathological behaviors, is debated in the literature (e.g. Jacobsen & Gould, 2007). Furthermore, the method of “pulling hair” was also excluded, both for the aforementioned reason and because a high frequency of hair pulling may capture instances of trichotillomania, an impulse-control disorder characterized by pulling out one’s own hair compulsively (Sah, Kooh, & Price, 2008), rather than NSSI. In addition, the method of “swallowing dangerous substances” was also excluded, both because this behavior is most often performed with suicidal intent, and because most other measures of NSSI do not include it, likely for this very reason (e.g. Jacobsen & Gould, 2007).

If a respondent did not indicate any occurrences of NSSI, the instructions directed the respondent to leave the remainder of the ISAS blank, as the remaining items are not applicable. The next part of the ISAS assesses contextual features, including age of onset, experience of pain, and time elapsed between urges to self-harm and acting on those urges. The third section presents 39 functions of NSSI that fall into the categories of interpersonal (e.g. “to bond with others”) and intrapersonal (e.g. “to punish myself”), and asks respondents to indicate, on a scale of 0 (“not relevant to me”) to 2 (“very relevant to me”) how relevant each statement is. The two function subscales of the ISAS have good

internal consistency, with Cronbach's alphas of .88 and .80 for the interpersonal and intrapersonal subscales, respectively (Klonsky & Glenn, 2009). Within the current sample, the Cronbach's alphas were .97 and .96 for the same subscales.

Self-Harm Behaviors Questionnaire (SHBQ; Gutierrez, Osman, Barrios, & Kopper, 2001). The dependent variables involving suicidal behaviors were operationally defined as scores on subscales of the Self-Harm Behaviors Questionnaire (SHBQ; Gutierrez, et al., 2001). Suicide ideation was operationally defined as the score on the suicide ideation subscale, which can range from 0-13. This score takes into account the number of reasons given for the ideation, the presence or absence of a specific plan, the level of lethality of the planned method, the presence or absence of definite steps to prepare for an attempt, and beliefs about others' reactions to a theoretical attempt, in order to determine the severity of ideation. Suicide attempts and suicide threats were operationally defined as the subscale scores for the suicide attempt and suicide threat sections of the SHBQ. In both of these sections, scores of zero indicate no attempts or threats were made. Scores of one or higher indicate at least one attempt or threat was made, with higher numbers indicating more severe history, and therefore, more severe risk for future attempts or threats. Suicide attempt scores take into consideration the number of attempts made, the potential lethality of the method of attempt(s), whether medical attention was needed after the attempt, and the recency of the attempt(s), and can range from 0-23. Suicide threat scores take into consideration the number of threats made, the potential lethality of the method described in the threat(s), recency of the threat(s), and the intent to die, and can range from 0-20.

The SHBQ (see Appendix D) is a self-report questionnaire with 52 items that assess the frequency, severity, and contextual features of self-harm, suicide attempts, suicide threats, and suicidal ideation. The items are a mixture of yes-or-no (e.g. “Have you ever attempted suicide?”) and open-ended questions (e.g. “If yes, how?”). The internal consistency estimates are high for all subscales, ranging from $\alpha = .89$ for the Suicidal Ideation subscale to $\alpha = .96$ for the Suicide Attempts subscale, and the measure has shown both good convergent and construct validity (Gutierrez et al., 2001). The internal consistency estimates for the sample were $\alpha = .82$ for the Suicide Ideation subscale, $\alpha = .95$ for the Suicide Attempt subscale, and $\alpha = .92$ for the Suicide Threats subscale.

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977).

The dependent variable of depression was operationally defined as the score on the CES-D (Radloff, 1977). The CES-D (see Appendix E) is a 20-item self-report measure that assesses how often over the past week respondents have experienced various symptoms of depression, such as “I thought my life had been a failure,” and “I did not feel like eating; my appetite was poor.” Respondents indicate whether they have experienced each item “rarely or none of the time” (0), “some or a little of the time” (1), “occasionally or a moderate amount of time” (2), or “most or all of the time” (3). Certain positive items, such as “I was happy,” are reverse-scored. Possible scores range from 0-60, with higher scores indicating greater depressive symptomatology, and a cut-off score of 16 indicating an increased risk of clinical depression. The CES-D has good internal consistency ($\alpha = .82$; Lewinsohn, Seeley, Roberts, & Allen, 1997), and has been validated for community

samples of adolescents and young adults (Radloff, 1991). In the current sample, the internal consistency estimate was $\alpha = .92$.

Zung Self-Rating Anxiety Scale (ZSAS; Zung, 1971). The dependent variable of anxiety was operationally defined as the score on the ZSAS (Zung, 1971). The ZSAS (see Appendix F) is a 20-item self-report measure that asks respondents to rate how often they have felt symptoms of anxiety during the past week on a scale of 1 (“none or a little of the time”) to 4 (“most or all of the time”). Several items, such as “I feel calm and can sit still easily” are reverse-scored. Within the measure, four types of anxiety symptoms are assessed: motor (e.g. “my arms and legs shake and tremble”), cognitive (e.g. “I feel like I’m falling apart and going to pieces”), autonomic (e.g. “I am bothered by stomachaches and indigestion”), and central nervous (e.g. “I am bothered by headaches, neck, and back pains”). Raw scores, which can range from 20-80, are converted into “Anxiety Index” scores ranging from 25-100 using a table, with higher scores indicating greater levels of anxiety. The ZSAS has adequate internal consistency in both clinical ($\alpha = .81$) and community ($\alpha = .69$) samples (Jegede, 1977), and has demonstrated good convergent (Olatunji, Deacon, Abramowitz, & Tolin, 2006) and discriminant validity (Beck, Brown, Epstein, & Steer, 1988). In the current sample, the internal consistency estimate was $\alpha = .88$.

Results

After 12 total outliers were excluded, the NSSI sample contained 329 participants. After descriptive statistics were run, preliminary analyses included two one-way MANOVAs to assess for gender and ethnicity differences to be controlled for in analyses. In order to test the hypotheses that the relationships between NSSI frequency and the

outcome variables were curvilinear, curvilinear regression analyses were conducted, and scatterplots were generated with the best-fit lines so as to describe the relationships and determine at approximately what level of NSSI frequency those relationships changed.

Descriptive Statistics and Bivariate Correlations

After the exclusion of outliers, NSSI frequency ranged from 1-612 lifetime instances, with a mean of 51.99 and standard deviation of 95.19. Descriptive statistics for each of the dependent can be found Table 1.

Table 1.
Descriptive statistics for dependent variables

Variable	n	M	SD	Skewness	Kurtosis
NSSI Frequency	329	51.99	95.19	3.38	13.03
Depression total score	282	21.31	12.42	.49	-.50
Anxiety total score	310	42.21	10.67	.21	.35
Suicide ideation subscore	327	4.27	4.40	.45	-1.19
Suicide attempt subscore	327	2.38	5.95	2.11	3.19
Suicide threat subscore	327	2.21	5.07	2.22	3.29

The variables of NSSI frequency, suicide attempts, and suicide threats had distributions that were significantly positively skewed. In the case of NSSI frequency, this was expected, because a significant proportion of individuals who try NSSI one or two times do not go on to engage in repeated NSSI (e.g. Brausch & Muehlenkamp, 2014). The skewed distributions of the suicide attempt and suicide threat subscores were due to the high number of zeros reported. Alterations were made to the planned analyses in order to account for the effect of these zeros; namely, analyses were re-run using only the portions of the sample that reported nonzero scores for each of those variables. In each case, this resulted in acceptable levels of skewness (-.09 and .54 for suicide attempts and suicide threats, respectively) and kurtosis (.52 and -.26).

Levels of all of the dependent variables were significantly higher in the sample of participants reporting NSSI compared to the sample that did not report NSSI (see Table 2). The mean depression score in the NSSI sample exceeded the CES-D clinical cut-off score of 16, and the mean anxiety score falls outside of the “normal” range and indicates “mild to moderate” levels of anxiety. There is no clinical cut-off for SHBQ subscales, but the means for suicide ideation, attempts, and threats were significantly higher than in the remainder of the sample.

Table 2.
T-tests between sample with and without nonsuicidal self-injury (NSSI)

Variable	t	df	p
Depression total score	-9.27	492.54	<.001
Anxiety total score	-9.41	529.94	<.001
Suicide ideation subscore	-11.90	508.02	<.001
Suicide attempt subscore	-5.67	430.57	<.001
Suicide threat subscore	-6.71	385.41	<.001

Bivariate correlations between each of the dependent variables are listed in Table 3.

There were significant correlations between all of the dependent variables, ranging from $r = .24$ for suicide attempts and suicide threats and $r = .76$ for anxiety and depression.

Table 3.
Correlation matrix for the dependent variables

Variable	1	2	3	4
1. Depression total score				
2. Anxiety total score	.76**			
3. Suicide ideation subscore	.47**	.32**		
4. Suicide attempt subscore	.41**	.25**	.36**	
5. Suicide threat subscore	.26**	.25**	.39**	.24**

Note: ** indicates significance at $p=0.1$

Preliminary Analyses

Two one-way MANOVAs were used to determine whether gender or minority status (indicated by a dummy-coded ethnicity variable) affected scores on the

independent or dependent variables. The multivariate result for gender was significant, Wilk's $\lambda = .85$, $F(18, 753) = 2.43$, $p = .001$. Follow-up univariate ANOVA results indicated that there were significant differences between males and females on scores for anxiety ($F(1, 271) = 6.482$, $p < .001$), and suicide ideation ($F(1, 271) = 2.99$, $p = .032$), such that female participants had significantly higher scores for both variables. For means and standard deviations, see Table 4.

Table 4
Significantly different means and standard deviations for female and male participants

Variable	Male		Female	
	M	SD	M	SD
Anxiety Total Score	38.32	10.40	43.94	10.23
Suicide Ideation Subscore	3.20	4.49	4.59	4.39

The multivariate result for minority status was also significant, Wilk's $\lambda = .93$, $F(6, 268) = 3.51$, $p = .002$. Follow-up univariate ANOVA results indicated that there were significant differences between Whites and non-Whites on scores for depression ($F(1, 273) = 4.60$, $p = .033$) and suicide threats ($F(1, 273) = 5.91$, $p = .016$), such that non-Whites had significantly higher levels of depression and significantly lower levels of suicide threats. For means and standard deviations, see Table 5. As a result of these tests, gender was controlled for in the analyses of anxiety and suicide ideation, and minority status was controlled for in the analyses of depression and suicide threats.

Table 5
Significantly different means and standard deviations for White and non-White participants

Variable	White		non-White	
	M	SD	M	SD
Depression total score	20.47	12.14	24.31	13.18
Suicide threat subscore	2.63	5.52	.84	3.39

Curvilinear Regressions and Scatterplots

Curvilinear regression analyses were used to determine if the relationships between NSSI frequency and each of the dependent variables were curvilinear, as hypothesized. In curvilinear regression analyses, in order to determine whether a curvilinear relationship exists, power vectors are calculated and added to the regression model step by step until two nonsignificant results occur. When the addition of a power vector results in a significant F change, this indicates that a curvilinear line best fits the relationship (Brown, 2016). In order to deal with possible linear dependency issues, power vectors were calculated from the z-scores of the NSSI frequency variable rather than the NSSI frequency variable itself. However, because NSSI frequency was not normally distributed, this method did not eliminate entirely the issue of correlations among the power vectors and the original frequency variable. Therefore, power vectors beyond X^4 were not able to be added to the regression equations.

The first curvilinear regression analysis revealed that NSSI frequency significantly predicted depression scores, and the addition of power vectors showed a curvilinear relationship. For the regression table, see Table 6. Note that partial regression coefficients are not included in the table because they cannot be interpreted in curvilinear regression analyses (Brown, 2016).

Table 6
Curvilinear regression table with nonsuicidal self-injury (NSSI) frequency as the predictor and depression as the dependent variable

Model	R	R ²	R ² Δ	FΔ	p
1. Minority status	.140	.019	.019	5.560	.019
2. Min. st., NSSI frequency	.235	.055	.048	10.554	.001
3. Min. st., frequency, x^2	.261	.068	.013	3.905	.049
4. Min. st., frequency, x^2 , x^3	.269	.073	.004	1.259	.263
5. Min st., frequency, x^2 , x^3 , x^4	.318	.085	.028	8.724	.003

A scatterplot was generated and the best-fit curvilinear line applied to this plot (see Figure 1) in order to better understand the nature of the curvilinear relationship between NSSI frequency and depression. This line showed a positive relationship between depression and NSSI frequency until approximately 300 lifetime instances of NSSI. For individuals who engaged in NSSI with this level of frequency, higher frequencies predicted higher levels of depression. The relationship appeared flat between approximately 300-450 lifetime instances. This level of frequency was predictive of a higher level of depression than either 1-300 lifetime instances or over 450 lifetime instances. After 450 lifetime instances, there was a negative relationship between NSSI frequency and depression. As individuals engaged in NSSI more frequently than 450 lifetime instances, lower levels of depression were predicted.

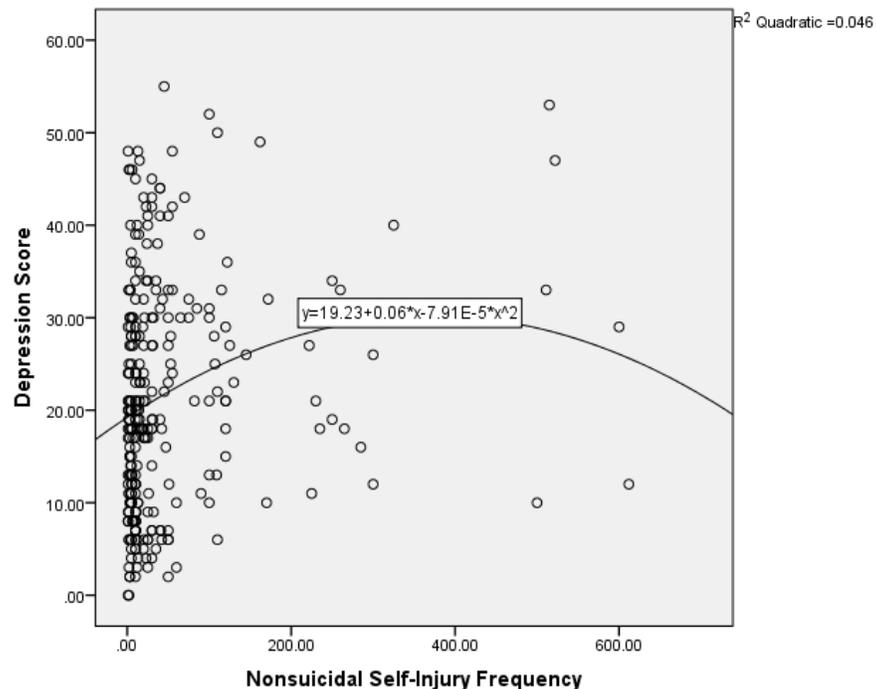


Figure 1. Scatterplot showing the relationship between nonsuicidal self-injury frequency and depression.

Similarly, the second curvilinear regression showed that anxiety scores were significantly predicted by NSSI frequency, and this relationship was also curvilinear (see Table 7).

Table 7
Curvilinear regression table with nonsuicidal self-injury (NSSI) frequency as the predictor and anxiety as the dependent variable

Model	R	R ²	R ² Δ	FΔ	p
1. Gender	.204	.041	.041	13.315	.000
2. Gender, NSSI frequency	.069	.063	.027	8.958	.003
3. Gender, frequency, x ²	.285	.081	.013	4.227	.041
4. Gender, frequency, x ² , x ³	.313	.098	.017	5.652	.018
5. Gender, frequency, x ² , x ³ , x ⁴	.344	.118	.020	6.988	.009

The scatterplot generated to show the relationship between NSSI frequency and anxiety demonstrated a similar relationship to that between NSSI frequency and depression (see Figure 2). There was a positive relationship between anxiety and NSSI frequency until approximately 300 lifetime instances. Until that point, higher levels of NSSI frequency predicted higher levels of anxiety. Between approximately 300-425 lifetime instances, the relationship between NSSI frequency and anxiety was such that an increase in NSSI frequency was not predictive of higher levels of anxiety. However, a number of lifetime instances within this range was predictive of higher levels of anxiety than either 300 or fewer lifetime instances, or 425 or greater lifetime instances. After approximately 425 lifetime instances, the relationship between NSSI frequency and anxiety was negative so that higher levels of NSSI frequency predicted lower levels of anxiety.

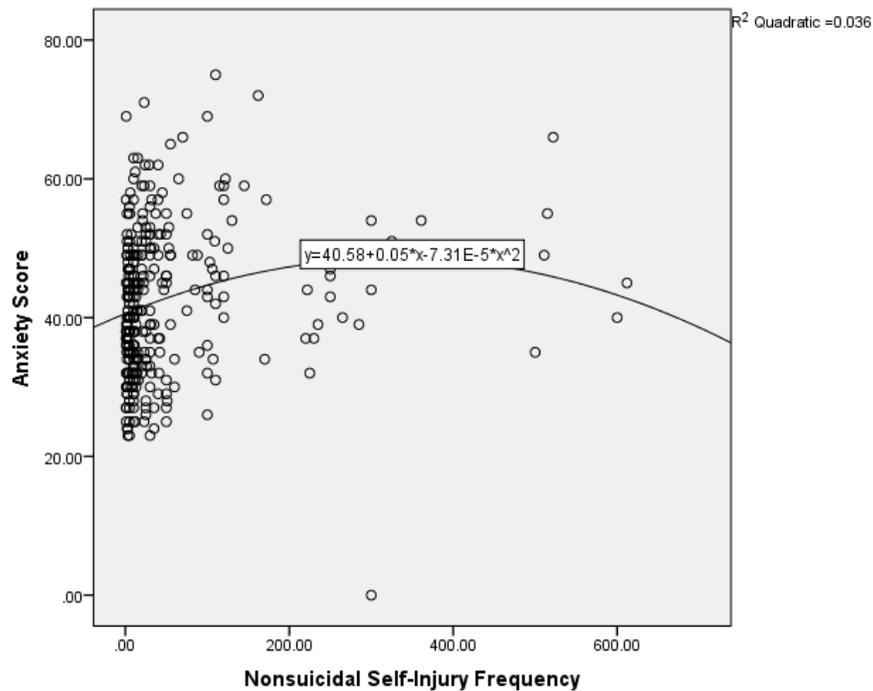


Figure 2. Scatterplot showing the relationship between nonsuicidal self-injury frequency and anxiety.

NSSI frequency significantly predicted suicide ideation, but adding power vectors did not result in significant changes in F and therefore, the relationship between NSSI frequency and suicide ideation was linear (see Table 8). Therefore, a scatterplot was not generated because further visualization of the relationship was unnecessary. Higher levels of NSSI frequency were predictive of higher levels of suicide ideation.

Table 8
Curvilinear regression table with nonsuicidal self-injury (NSSI) frequency as the predictor and suicide ideation as the dependent variable

Model	R	R ²	R ² Δ	FΔ	p
1. Gender	.163	.027	.027	8.895	.000
2. Gender, NSSI frequency	.221	.049	.022	7.524	.003
3. Gender, frequency, x ²	.226	.051	.002	.788	.375
4. Gender, frequency, x ² , x ³	.230	.053	.002	.685	.409

When the scatterplots for suicide threat and suicide attempt scores were examined, the data points all fell a significant distance from the best-fit lines. Coupled

with the skewed distributions of both variables, this suggested that the relationships indicated by these analyses might not describe the data well, likely due to the effect of the high number of zeros. Therefore, the analyses were run again using only individuals with scores greater than zero on these outcome variables ($n = 47$ for suicide attempts and $n = 57$ for suicide threats). In the overall sample, the relationship between NSSI frequency and suicide attempt scores was curvilinear (see Table 9).

Table 9
Curvilinear regression table with nonsuicidal self-injury (NSSI) frequency as the predictor and suicide attempt scores as the dependent variable (total sample)

Model	R	R ²	R ² Δ	FΔ	p
1. NSSI frequency	.105	.011	.011	3.611	.058
2. Frequency, x ²	.107	.011	.000	.123	.726
3. Frequency, x ² , x ³	.163	.027	.015	5.076	.025
4. Frequency, x ² , x ³ , x ⁴	.178	.032	.005	1.617	.204

Unlike the relationships between NSSI frequency and depression and NSSI frequency and anxiety, the relationship between NSSI frequency and suicide attempt scores did not ever become negative (see Figure 3). Suicide attempt scores indicated the severity of suicide attempt history, which included factors such as the number of attempts, the recency of the attempt, the severity of the method of attempt, and whether medical attention was needed after an attempt. Until approximately 450 lifetime instances of NSSI, the relationship between NSSI frequency and suicide attempt scores was positive, so that higher levels of NSSI frequency predicted a more severe history of suicide attempts. After approximately 450 lifetime instances, this relationship appeared flat and greater NSSI frequency did not predict a more severe history of suicide attempts than individuals who reported approximately 450 lifetime instances.

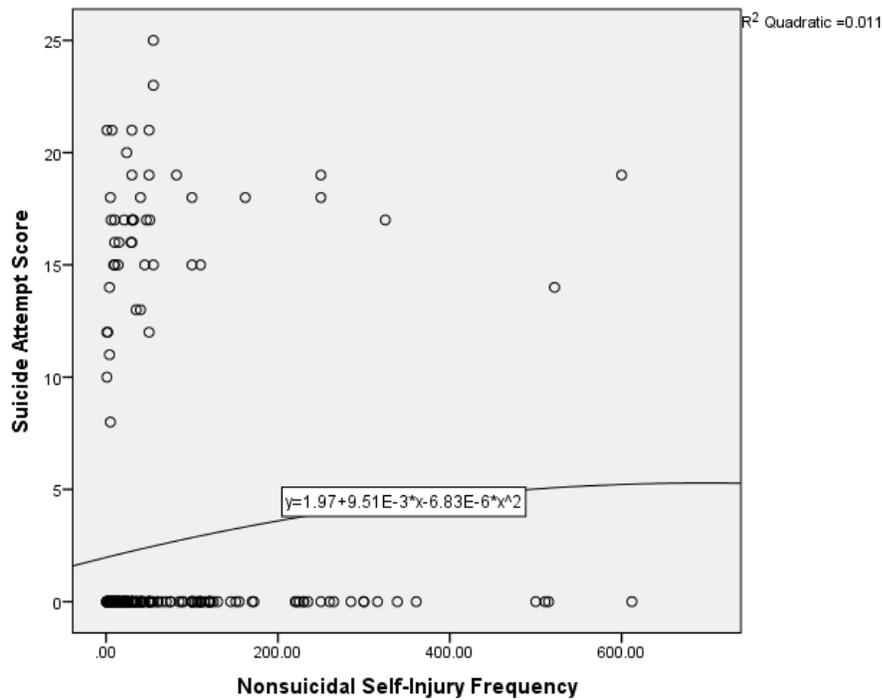


Figure 3. Scatterplot showing the relationship between nonsuicidal self-injury frequency and suicide attempt scores within the total sample.

However, when analyses were run using only those participants with nonzero suicide attempt scores ($n = 47$), NSSI frequency was not predictive of suicide attempt scores (see Table 10). Therefore, greater NSSI frequency did not predict more severe suicide attempt history.

Table 10

Curvilinear regression table with nonsuicidal self-injury (NSSI) frequency as the predictor and suicide attempt scores as the dependent variable (nonzero sample)

Model	R	R ²	R ² Δ	FΔ	p
1. NSSI frequency	.121	.015	.015	.674	.416
2. Frequency, x ²	.233	.054	.039	1.833	.183
3. Frequency, x ² , x ³	.364	.133	.078	3.890	.055
4. Frequency, x ² , x ³ , x ⁴	.364	.133	.000	.001	.974

In the overall NSSI sample, NSSI frequency predicted suicide threat scores. The addition of power vectors revealed that this relationship was curvilinear (see Table 11).

Table 11

Curvilinear regression table with nonsuicidal self-injury (NSSI) frequency as the predictor and suicide threat scores as the dependent variable (total sample)

Model	R	R ²	R ² Δ	FΔ	p
1. Minority status	.118	.014	.014	4.571	.033
2. Min. st., NSSI frequency	.119	.014	.000	.069	.793
3. Min. st., frequency, x ²	.119	.014	.000	.019	.891
4. Min. st., frequency, x ² , x ³	.189	.036	.022	7.208	.008
5. Min st., frequency, x ² , x ³ , x ⁴	.193	.037	.002	.501	.480

However, the best-fit line depicting this relationship was nearly flat, and therefore it is unlikely that the different levels of severity of suicide threat history predicted by different levels of NSSI frequency represent clinically significant differences. The severity of suicide threat history variable included factors such as how many threats were made, how lethal the method described in the threat(s) would be, how recently the threat(s) were made, and if there was an intent to die. The relationship between NSSI frequency and suicide threat scores was slightly positive until approximately 250 lifetime instances, so that greater NSSI frequencies until this point predicted more severe suicide threat history. The relationship was slightly negative after approximately 425 lifetime instances, so that greater NSSI frequencies after this point predicted less severe suicide attempt history (see Figure 4).

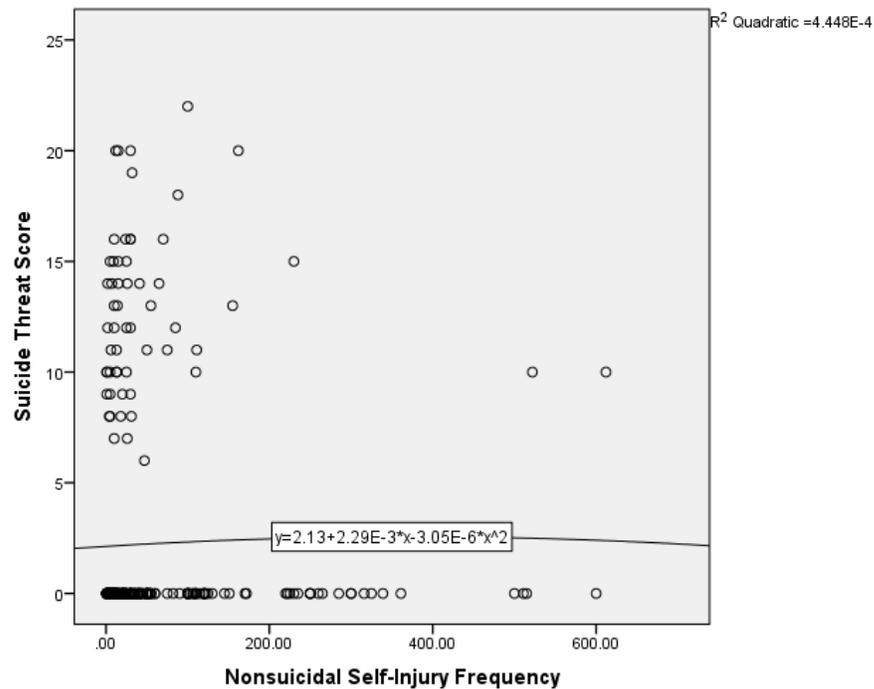


Figure 4. Scatterplot showing the relationship between nonsuicidal self-injury frequency and suicide threat scores within the total sample.

Among only those participants with nonzero suicide threat scores ($n = 57$), NSSI frequency predicted suicide threat scores, and the relationship was curvilinear (see Table 12).

Table 12

Curvilinear regression table with nonsuicidal self-injury (NSSI) frequency as the predictor and suicide threat scores as the dependent variable (total sample)

Model	R	R ²	R ² Δ	FΔ	p
1. Minority status	.088	.008	.008	.425	.517
2. Min. st., NSSI frequency	.091	.008	.001	.035	.853
3. Min. st., frequency, x^2	.302	.091	.083	4.840	.032
4. Min. st., frequency, x^2 , x^3	.314	.099	.007	.418	.521
5. Min st., frequency, x^2 , x^3 , x^4	.315	.099	.001	.029	.865

There was a positive relationship between NSSI frequency and suicide threat scores until approximately 225 lifetime instances of NSSI, so that greater NSSI frequency predicted more severe suicide threat history. Between approximately 225 lifetime instances and 325

lifetime instances, the relationship between NSSI frequency and suicide threat scores appeared relatively flat, so that greater NSSI frequency did not predict a more severe suicide threat history. Reporting a frequency within this range was predictive of the most severe suicide threat history. After approximately 325 instances, the relationship between NSSI frequency and suicide threat scores was negative, so that greater NSSI frequency predicted less severe suicide threat history (see Figure 5).

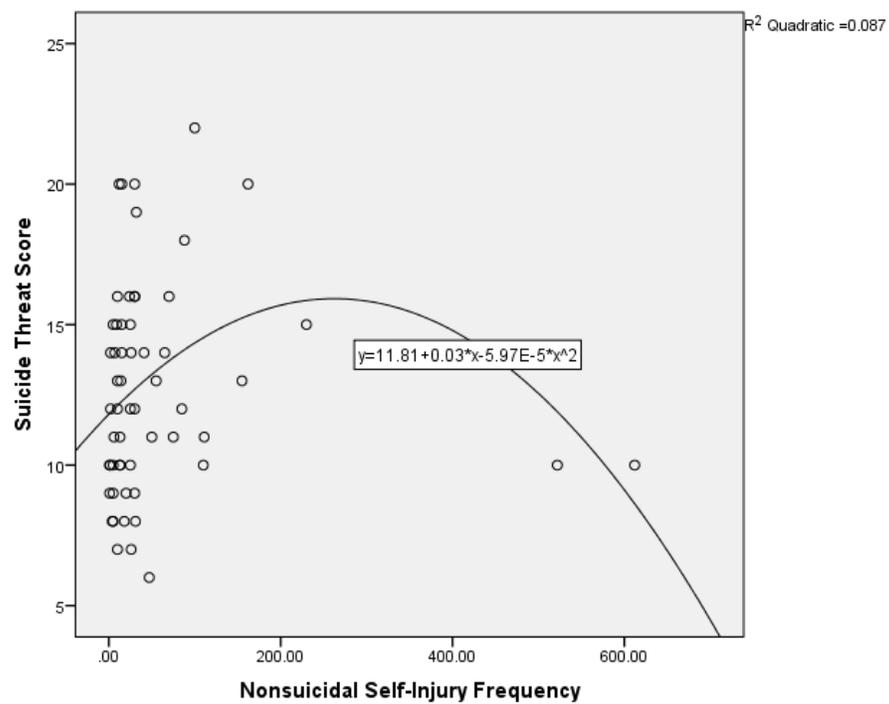


Figure 5. Scatterplot showing the relationship between nonsuicidal self-injury frequency and suicide threat scores within the portion of the sample with at least one suicide threat.

Discussion

The first set of hypotheses, that NSSI frequency would exhibit curvilinear relationships to depression, anxiety, suicide ideation, suicide attempts, and suicide threats was partially supported. Both depression and anxiety exhibited the predicted relationships

to NSSI frequency, but suicide ideation exhibited a positive linear relationship to NSSI frequency. In the total sample, suicide attempts and suicide threats both exhibited curvilinear relationships to NSSI frequency. In the suicide attempt history subsample, NSSI frequency did not predict suicide attempt history severity. In the suicide threat history subsample, suicide threat history severity exhibited a curvilinear relationship to NSSI frequency. The second hypothesis, that the points at which the expected relationships changed would be significantly higher than five instances of NSSI, was supported in every curvilinear relationship. These maximum risk points ranged from 225 lifetime instances for suicide threats in the suicide threat subsample and 450 lifetime instances for suicide attempt scores in the total sample.

Depression and Anxiety

Higher rates of depression and anxiety predicted higher rates of engagement in NSSI, but at a certain point, these relationships flattened out and eventually became negative. The numbers of lifetime incidents at which these relationships changed were similar, and much higher than those found by the previous studies that used curvilinear analyses to examine NSSI frequency (Paul et al., 2015; Whitlock & Knox, 2007). However, these past studies examined the relationships between NSSI and suicide-related outcome variables; no study to date has examined the relationships between NSSI frequency and depression and NSSI frequency and anxiety using these types of analyses. The potential explanation for the curvilinear relationship between NSSI and suicidality that was proposed by both Paul et al. (2015) and Whitlock and Knox (2007) may still apply to these previously unexamined variables; namely, that among individuals who

frequently engage in NSSI, NSSI might serve as an effective, although maladaptive, coping mechanism that helps to mitigate depression and anxiety.

However, it is important to note that the negative relationships between NSSI frequency and depression and anxiety did not occur until a number of incidents that likely represents very regular engagement in the behavior for a prolonged period of time (e.g. daily for approximately a year or near daily for several years). For individuals who engage in NSSI significantly less frequently (e.g., only a few incidents overall or only regular engagement for a short period of time), although NSSI may temporarily relieve negative affect, they nevertheless are more likely to have higher levels of depression and anxiety overall.

Suicide-Related Outcome Variables

Although NSSI frequency did predict higher levels of suicide ideation, this relationship was not curvilinear. This finding contradicts those of Paul et al. (2015) and Whitlock and Knox (2007), which may be due to methodological differences between these studies and the current study. Both Paul et al. (2015) and Whitlock and Knox (2007) sorted participants into discrete categories based on frequency, with over 50 incidents as the highest category. Doing so allowed the usage of logistic regression rather than curvilinear regression to demonstrate curvilinear relationships. Although these methodological choices allowed for a closer examination of the frequency ranges into which most individuals who engage in NSSI fall, the number of lifetime incidents in the current sample ranged from 1-612 even after excluding extreme outliers. Furthermore, the skewed distribution was such that approximately 50% of the sample endorsed 14 or fewer lifetime instances, 15% endorsed 100 or more instances, and only 2% endorsed 500

or more, making the creation of equal groups of similar frequency levels difficult. Splitting the groups into quintiles would have resulted in the final group containing participants who ranged in frequency from 60-612 lifetime instances, and it seems unlikely that this group would be homogeneous. In addition, among the studies that have group participants this way, there is no consensus on where the lines for each group should be drawn or theory on which these distinctions might be based; some studies have considered 5 or more times the highest frequency group (e.g. You et al., 2011), while others have made that distinction at 50 or more (e.g. Paul et al., 2015). The results of latent class analyses or other attempts to use statistical analyses to determine groups have been similarly inconsistent (e.g. Barrocas et al., 2014; Hamza and Willoughby, 2013b). Therefore, NSSI frequency was treated as a continuous variable so as not to group participants with vastly different lifetime frequencies into the same category or to exclude participants reporting higher frequencies, as the purpose of the current study was to examine a fuller range of NSSI frequency. This may be a possible reason for the results inconsistent with previous findings that did not do so.

The linear relationship between NSSI frequency and suicide ideation suggests that there is not a point at which more frequent engagement in NSSI is associated with lower suicide ideation. Although using NSSI as a means to prevent oneself from thinking about suicide is not the most common function endorsed (e.g. Suyemoto, 1998), these results seem to question the feasibility of this function. It is possible that engagement in NSSI results in short-term reductions in suicide ideation; however, the current study did not find evidence of an overall decrease in suicide ideation after a certain frequency in the same manner as depression and anxiety. It may be that short-term reductions in suicide

ideation immediately after NSSI, if they occur, are offset by long-term increases.

Engagement in NSSI may decrease negative thoughts and feelings temporarily while also increasing comfort with self-inflicted bodily harm over time. However, due to the cross-sectional nature of the current study, such temporal inferences cannot be drawn. Future research should examine these behaviors using methodologies such as ecological momentary assessment to determine the precise timing of if and how suicide ideation changes in relation to NSSI engagement.

Although NSSI is the best predictor of suicide attempts (Asarnow et al., 2011; Guan et al., 2012) the vast majority of participants had no history of suicide attempts, which is to be expected given the low base rate of the behavior. The high number of zeros for the suicide attempt score skewed the analyses such that the resulting regression line was a poor fit for most of the data and the ability to draw meaningful conclusions may be somewhat limited. The model using all participants suggests that at around 450 incidents of NSSI, the regression line flattens out and higher NSSI frequency is no longer predictive of more severe suicide attempt history. Unlike depression and anxiety, there is no decrease in severity at any point, and therefore individuals with more than 450 lifetime incidents remain more likely to have a more severe history of suicide attempts. This relationship provides more evidence against the anti-suicide function of NSSI, and is consistent with Joiner's Interpersonal-Psychological Theory of Suicide (IPT; Joiner, 2005), which posits NSSI increases one's capability to make a lethal or near-lethal attempt. The finding that this relationship is curvilinear is consistent with Paul et al. (2015) and Whitlock and Knox (2007), but unlike these previous studies, the current study did not find a decline in the relationship after 50 incidents. This may be due to the

abovementioned methodological differences in handling frequency and the types of analyses used.

Conversely, when analyses were run only with participants with a history of at least one suicide attempt, NSSI frequency did not significantly predict a more severe suicide attempt history. It appears that among those who engage in NSSI and have a suicide attempt history, more frequent NSSI does not predict more severe history. This finding might be seen as contradictory to the IPTS, such that those with higher NSSI frequencies might be expected to make more serious or more numerous attempts, due to their higher capability for suicide. However, the suicide attempt severity variable takes into account a number of factors, including number of attempts, the method of attempt(s), and medical severity of the attempt(s). Van Orden et al. (2008) found that individuals with multiple attempts had higher levels of capability for suicide than those with single attempts, which suggests that higher capability for suicide does predict a higher number of attempts; however, capability for suicide may not have an effect on the other factors that contributed to the attempt history severity score. Future research should examine the relationships between capability for suicide, method of attempt(s), and medical severity of attempt(s).

A slightly higher portion of the sample endorsed at least one suicide threat. As with suicide attempt history, when the total sample was analyzed, the best-fit regression line was significantly affected by the high number of zeros and therefore did not appear to represent the data well. The analyses did indicate a curvilinear relationship, but examination of the scatterplot revealed a nearly flat line. Although this line appears to show a slightly positive relationship at the lowest frequencies and a slightly negative

relationship at the highest frequencies, these differences do not appear to reflect clinically significant differences in suicide threat scores. Although Paul et al. (2015) and Whitlock and Knox (2007) examined a range of suicidal thoughts and behaviors, including suicide-related communication (which includes both explicit suicide threats and actions undertaken to make someone else believe that a suicide attempt has been made), curvilinear analyses have not been used to examine NSSI frequency and specifically suicide threats, and so there are no previous studies with which to compare these results.

When analyses were run using only the portion of the sample with both NSSI and suicide threat history, NSSI frequency significantly predicted the severity of the suicide threat history, and this relationship was curvilinear. Higher NSSI frequency predicted more severe suicide threat history until approximately 225 lifetime incidents, and then reversed at approximately 325 lifetime incidents. This finding suggests that frequent engagement in NSSI may reduce some of the factors that lead to more severe suicide threat history. However, it is difficult to speculate precisely what these factors may be, as suicide threats have been a relatively understudied form of suicidal behavior and are often conflated with other types of suicide-related communication in the literature. Future research should further investigate potential interpersonal and intrapersonal factors that might mediate the relationship between NSSI frequency and suicide threats.

Maximum Risk Points

The peaks of the curvilinear relationships between NSSI frequency and depression, NSSI frequency and anxiety, NSSI frequency and suicide attempts in the total sample, and NSSI frequency and suicide threats in the suicide threat sample were all significantly greater than five incidents. The wide range of reported lifetime incidents

made it difficult to precisely determine the relationships between NSSI frequency and the outcome variables at exactly five incidents, but there did not appear to be any significant difference between those who endorsed fewer than five incidents with those who endorsed five or more. These results provide support for the growing body of literature that suggests five instances is a cut-off with limited empirical support (e.g. Andover 2014; Muehlenkamp & Brausch, 2016). Engaging in five or more instances of NSSI in one year represents a frequency of less than once every two months on average, and yet the frequencies of NSSI predictive of the highest levels of depression and anxiety represent a much more frequent engagement. The maximum risk points for depression, anxiety, suicide attempts, and suicide threats all suggest daily or near-daily frequency for at least one year, or at least an approximately weekly frequency for several years. Although a cut-off point well below these maximum risk points may still represent a clinically concerning pattern of behavior, both the range and the mean found in this nonclinical sample suggest that five may be too low. However, the sample did have elevated levels of all outcome variables compared to the sample without NSSI, which indicates that even one incident of NSSI confers elevated risk for higher levels depression, anxiety, and suicidal behaviors. Any NSSI should be of clinical concern, but the results of this study provide support to the body of literature (e.g. Zetterqvist, 2015) that suggests five incidents within a year does not appear to be a meaningful distinction at which this behavior becomes potentially diagnosable.

Limitations

There are a number of limitations that should be considered when interpreting the results of the current study. First, the independent variable of frequency was not normally

distributed, and therefore interpretations of the analyses used should be made with caution. It is this abnormal distribution that has led to frequency rarely being studied as a continuous variable, but this methodological choice has often led to individuals with different frequencies being grouped together. In the current study, using such methodologies would have led to grouping individuals with 51 lifetime incidents in the same category as individuals with 500+ incidents; it seems unlikely that there would be no differences between these groups. In addition, this pattern in previous literature has led to a dearth of research examining relationships at the highest NSSI frequencies.

Initially, the discrete suicide attempt and suicide threat items were to be used for the suicide attempt and suicide threat variables rather than the total scores for each of these subscales. However, preliminary analyses of the data revealed that there was significant range restriction for these variables, and so the subscale scores were used instead. Therefore, results of these analyses do not necessarily indicate higher numbers of threats or attempts, but more generally, a more severe history of these behaviors. A single near-lethal attempt might lead to a similarly high score as a number of lower lethality attempts, and thus, the complexities of these variables should be considered when interpreting results.

Because the number of instances of NSSI reported represented lifetime occurrences rather than frequencies tied to specific time periods (e.g. several times a week), it is difficult to pinpoint exactly how regularly those in the sample engaged in NSSI. Using lifetime frequencies is more common in previous literature (e.g. Paul et al, 2015; Whitlock & Knox, 2007; You et al., 2011), and allows for easier comparisons between studies by using absolute numbers. However, using frequencies tied to time

periods (e.g. Barrocas et al., 2014) may lead to more accurate reporting due to the avoidance of recall issues with high numbers of lifetime instances. Nevertheless, the number of lifetime instances at which the relationships between NSSI frequency and the outcome variables of depression, anxiety, and suicide threat scores shifted were so high as to suggest near daily engagement for a period of time of approximately a year, or slightly less frequent engagement for several years. Therefore, although an exact frequency range (e.g. several times a week) cannot be delineated, participants who reported the highest lifetime occurrences likely engaged in NSSI on a frequent, regular basis.

Approximately 50% of the sample was not currently self-injuring at the time of participation. However, previous research has found that those who have stopped self-injuring are not significantly different from those currently self-injuring on a number of measures of psychosocial risk (e.g. Glenn & Klonsky, 2011; Hamza & Willoughby, 2013a), and so this may not have significantly affected results. Future research should examine these relationships in a sample of individuals currently engaging in NSSI so as to determine if these relationships remain. In particular, a clinical sample would likely yield more participants with higher NSSI frequencies and therefore provide more data points at the number of lifetime incidents of NSSI at which the relationships with the outcome variables decline.

Generalizability may also be limited, due to the nature of the sample. Both the overall sample and the NSSI sample were majority female and majority Caucasian, and all were in college. Therefore, applying the results of this study to other populations

would be inappropriate, and future research should examine these relationships in other populations in order to determine their generalizability.

As with most research on NSSI, the current study relied on self-report measures. This may have led to inaccuracies, particularly regarding higher NSSI frequencies. It may have been difficult for individuals to precisely recall how many times they engaged in the behavior, particularly for those who self-injured regularly for prolonged periods of time.

The use of the statistical software SPSS also led to a significant limitation. Because scatterplots generated by this software cannot be manipulated, it was not possible to more closely examine the scatterplots at the precise point of five incidents of NSSI. It was also difficult to precisely pinpoint the numbers of incidents at which the curvilinear relationships changed, although a range could be approximated.

Implications and Conclusions

The results of this study have a number of clinical implications. When treating individuals who have been engaging in NSSI regularly over a long period of time, clinicians should note that NSSI may actually be a somewhat effective coping mechanism, particularly with regards to depression and anxiety. When devising a treatment plan, emphasis should be placed on replacing NSSI with healthier coping mechanisms. These findings also provide context to the difficulty experienced by those attempting to recover from NSSI, and the ambivalence towards recovery that many individuals report (Kelada, Hasking, Melvin, Whitlock, & Baetens, 2016). If frequent engagement in NSSI leads to an overall reduction in other symptoms, it may remain appealing despite the other negative consequences of the behavior.

Additionally, individuals who report using NSSI as a way to control suicidal thoughts and behaviors, particularly suicide ideation, may not be experiencing the reductions in these thoughts and behaviors that they believe. Although causal inferences cannot be drawn, higher NSSI frequency predicted higher levels of suicide ideation. This may be due to the increase in capability for suicide that NSSI confers, or it may be because increased suicide ideation leads to an increased desire to use NSSI to control it; nevertheless, a decrease was not found at any level of NSSI frequency. Therefore, individuals who report higher frequencies of NSSI may be at an increased risk for suicidal thoughts and behaviors, even if they believe NSSI is in fact decreasing this risk.

NSSI frequency has been an area of the literature fraught with methodological issues and conflicting results. The findings of this study provide both a reason for previous conflicts in the literature and directions for future research into NSSI. The curvilinear relationships between NSSI frequency and depression, NSSI frequency and anxiety, and NSSI frequency and suicide threats (in the suicide threat subsample) suggest that when NSSI is engaged in regularly for a prolonged period of time, it can function as a way to mitigate negative thoughts and feelings. However, the linear relationship between NSSI frequency and suicide ideation, as well as the lack of a significant relationship between NSSI frequency and suicide attempt history (in the suicide attempt subsample), both suggest that NSSI may not be effective at reducing suicidal thoughts and behaviors. Finally, the study failed to find compelling evidence to suggest that 5 incidents in a year is likely to be a clinically concerning pattern of repetitive NSSI. Indeed, both the frequency range and the maximum risk points of well over 300 incidents for each of these curvilinear relationships suggest that NSSI does not become a

consistent, effective coping mechanism an individual might depend upon to reduce depression, anxiety, and suicide-related behaviors until a frequency of engagement well beyond 5 times in a year. Overall, results of the current study add to the understanding of NSSI frequency and provide support for evidence that conflict with the proposed frequency criterion for nonsuicidal self-injury disorder.

References

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Anderson, N. L. (2009). *A test of two models of non-suicidal self-injury* (Doctoral dissertation). Kent State University, Kent, OH.
- Andover, M.S. (2014). Non-suicidal self-injury disorder in a community sample of adults. *Psychiatry Research*, *219*, 305-310. doi:10.1016/j.psychres.2014.06.001
- Andover, M.S., & Gibb, B.E. (2010). Nonsuicidal self-injury, attempted suicide, and suicidal intent among psychiatric inpatients. *Psychiatry Research*, *178*, 101-105. doi:10.1016/j.psychres.2010.03.019
- Anestis, M.D., Khazem, L.R., & Law, K.C. (2015). How many times and how many ways: The impact of number of nonsuicidal self-injury methods on the relationship between nonsuicidal self-injury frequency and suicidal behavior. *Suicide and Life-Threatening Behavior*, *45*, 164-177. doi:10.1111/sltb.12120
- Asarnow, J. R., Porta, G., Spirito, A., Emslie, G., Clarke, G. Wagner, K. D.,...Brent, D. A. (2011). Suicide attempts and nonsuicidal self-injury in the treatment of resistant depression in adolescent: Findings from the TORDIA Trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, *50*, 772-781.

- Barrocas, A.L., Giletta, M., Hankin, B.L., Prinstein, M.J., & Abela, J.R. (2014). Nonsuicidal self-injury in adolescence: Longitudinal course, trajectories, and interpersonal predictors. *Journal of Abnormal Child Psychology*, *43*, 369-380. doi:10.1007/s10802-014-9895-4
- Beck, A.T., Brown, G., Epstein, N., & Steer, R.A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, *56*, 893-897. doi: 10.1037/0022-006X.56.6.893
- Bentley, K. H., Nock, M.K., & Barlow, D. H. (2014). The four-function model of nonsuicidal self-injury: Key directions for future research. *Clinical Psychological Science*, *2*, 638-656. doi:10.1177/2167702613514563
- Brausch, A.M., & Boone, S.D. (2015). Frequency of nonsuicidal self-injury in adolescents: Differences in suicide attempts, substance use, and disordered eating. *Suicide and Life-Threatening Behavior*, *45*, 612-622. doi:10.1111/sltb.12155
- Brausch, A. M., & Gutierrez, P. M. (2010). Differences in non-suicidal self-injury and suicide attempts in adolescents. *Journal of Youth and Adolescence*, *39*, 233-242. doi:10.1007/s10964-009-9482-0
- Briere, J., & Gil, E. (1998). Self-mutilation in clinical and general population samples: Prevalence, correlates, and functions. *American Journal of Orthopsychiatry*, *68*, 609-620. doi:10.1037/h0080369
- Brown, R. (2016). Curvilinear regression. In *Fundamentals of correlation and regression* (pp.159-168). Brown.

- Brunner, R., Parzer, P., Haffner, J., Steen, R., Roos, J., Klett, M., & Resch, F. (2007). Prevalence and psychological correlates of occasional and repetitive deliberate self-harm in adolescents. *Archives of Pediatric and Adolescent Medicine, 161*, 641-649. doi:10.1001/archpedi.161.7.641
- Burke, T.A., Hamilton, J.L., Abramson, L.Y., & Alloy, L.B. (2015). Non-suicidal self-injury prospectively predicts interpersonal stressful life events and depressive symptoms among adolescent girls. *Psychiatry Research, 228*, 416-424. doi:10.1016/j.psychres.2015.06.021
- Chapman, A.L., & Dixon-Gordon, K.L. (2007). Emotional antecedents and consequences of deliberate self-harm and suicide attempts. *Suicide and Life-Threatening Behavior, 37*, 543-552. doi:10.1521/suli.2007.37.5.543
- Chapman, A. L., Gratz, K. L., & Brown, M. Z. (2006). Solving the puzzle of deliberate self harm: The experiential avoidance model. *Behaviour Research and Therapy, 44*, 371-394. doi:10.1016/j.brat.2005.03.005
- Chartrand, H., Sareen, J., Toews, M., & Bolton, J.M. (2011). Suicide attempts versus nonsuicidal self-injury among individuals with anxiety disorders in a nationally representative sample. *Depression and Anxiety, 29*(3), 1-8. doi:10.1002/da.20882
- Cloutier, P., Martin, J., Kennedy, A., Nixon, M.K., & Muehlenkamp, J.J. (2010). Characteristics and co-occurrence of adolescent non-suicidal self-injury and suicidal behaviors in pediatric emergency crisis services. *Journal of Youth and Adolescence, 39*, 259-269. doi:10.1007/s10964-009-9465-1

- DiPierro, R., Sarno, I., Perego, S., Gallucci, M., Madeddu, F. (2012). Adolescent nonsuicidal self-injury: The effects of personality traits, family relationships, and maltreatment on the presence and severity of behaviours. *European Child and Adolescent Psychiatry, 21*, 511-520. doi:10.1007/s00787-012-0289-2
- Dulit, R. A., Fyer, M. R., Leon, A. C., Brodsky, B. S., & Frances, A. J. (1994). Clinical correlates of self-mutilation in borderline personality disorder. *The American Journal of Psychiatry, 151*, 1305-1311. doi:10.1176/ajp.151.9.1305
- Ferrara, M., Terrinoni, A., & Williams, R. (2012). Non-suicidal self-injury (NSSI) in adolescent inpatients: Assessing personality features and attitude toward death. *Child and Adolescent Psychiatry and Mental Health, 6*, 12. doi:10.1186/1753-2000-6-12
- Glenn, C. R., & Klonsky, E. D. (2011). Prospective prediction of nonsuicidal self-injury: A 1-year longitudinal study in young adults. *Behavior Therapy, 42*, 751-762. doi:10.1016/j.beth.2011.04.005.
- Glenn, C. R., & Klonsky, E. D. (2013). Nonsuicidal self-injury disorder: An empirical investigation in adolescent psychiatric patients. *Journal of Clinical Child and Adolescent Psychology, 42*, 496-507. doi:10.1080/15374416.2013.794699
- Gratz, K.L., Dixon-Gordon, K.L., Chapman, A.L., & Tull, M.T. (2015). Diagnosis and characterization of DSM-5 nonsuicidal self-injury disorder using the clinician-administered nonsuicidal self-injury disorder index. *Assessment, 22*, 527-539. doi:10.1177/1073191114565878

- Guan, K., Fox, K.R., & Prinstein, M.J. (2012). Nonsuicidal self-injury as a time-invariant predictor of adolescent suicide ideation and attempts in a diverse community sample. *Journal of Consulting and Clinical Psychology, 80*, 842-849.
doi:10.1037/a0029429
- Guerry, J.D., & Prinstein, M.J. (2010). Longitudinal prediction of adolescent nonsuicidal self-injury: Examination of a cognitive vulnerability-stress model. *Journal of Clinical Child and Adolescent Psychology, 39*, 77-89.
doi:10.1080/15374410903401195
- Gutierrez, P.M., Osman, A., Barrios, F.X., & Kopper, B.A. (2001). Development and initial validation of the Self-Harm Behavior Questionnaire. *Journal of Personality Assessment, 77*, 475-490. doi: 10.1207/S15327752JPA7703_08
- Hamza, C.A., Stewart, S.L., & Willoughby, T. (2012). Examining the link between nonsuicidal self-injury and suicidal behavior: A review of the literature and an integrated model. *Clinical Psychology Review, 32*, 482-495.
doi:10.1016/j.cpr.2012.05.003
- Hamza, C. A., & Willoughby, T. (2013a). A longitudinal person-centered examination of nonsuicidal self-injury among university students. *Journal of Youth and Adolescence, 43*, 671-685. doi:10.1007/s10964-013-9991-8
- Hamza, C.A., & Willoughby, T. (2013b). Nonsuicidal self-injury and suicidal behavior: A latent class analysis among young adults. *PLoS ONE, 8*(3).
doi:10.1371/journal.pone.0059955

- Hankin, B.L., & Abela, J.R.Z. (2011). Nonsuicidal self-injury in adolescence: Prospective rates and risk factors in a 2½ year longitudinal study. *Psychiatry Research, 186*, 65-70. doi:10.1016/j.psychres.2010.07.056
- Hawton, K., Rodham, K., Evans, E., & Weatherall, R. (2002). Deliberate self harm in adolescents: Self-report survey in schools in England. *British Medical Journal, 325*, 1207–1211. doi:10.1136/bmj.325.7374.1207
- Hoff, E.R., & Muehlenkamp, J.J. (2009). Nonsuicidal self-injury in college students: The role of perfectionism and rumination. *Suicide and Life-Threatening Behavior, 39*, 576-587. doi:10.1521/suli.2009.39.6.576
- In-Albon, T., Ruf, C., & Schmid, M. (2013). Proposed diagnostic criteria for the DSM-5 of nonsuicidal self-injury in female adolescents: Diagnostic and clinical correlates. *Psychiatry Journal, 2013*, 1-12. doi:10.1155/2013/159208
- 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*, 129-147.
doi:10.1080/13811110701247602
- Jegede, R. O. (1977). Psychometric attributes of the Self-Rating Anxiety Scale. *Psychological Reports, 40*, 303-306. doi:10.2466/pr0.1977.40.1.303
- Joiner, T. E. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.

- Kelada, L., Hasking, P., Melvin, G., Whitlock, J., & Baetens, J. (June 2016). “ ‘I do want to stop, at least I think I do:’ An international comparison of recovery from nonsuicidal self-injury among young people.” Presented at the annual conference of the International Society for the Study of Self-Injury, Eau-Claire, WI.
- Kerr, P.L., Muehlenkamp, J.J., & Turner, J.M. (2010). Nonsuicidal self-injury: A review of current research for family medicine and primary care physicians. *Journal of the American Board of Family Medicine*, 2, 240-259.
doi:10.3122/jabfm.2010.02.090110
- Klonsky, E.D. (2011). Non-suicidal self-injury in United States adults: Prevalence, sociodemographics, topography and functions. *Psychological Medicine*, 41, 1981-1986. doi:10.1017/S0033291710002497
- Klonsky, E.D., & Glenn, C.R. (2009). Assessing the functions of non-suicidal self-injury: Psychometric properties of the Inventory of Statements about Self-injury (ISAS). *Journal of Psychopathological Behavior Assessment*, 31, 215-219.
doi:10.1007/s10862-008-9107-z
- Klonsky, E. D., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology*, 122, 231-237. doi:10.1037/a0030278
- Klonsky, E.D., Oltmanns, T.F., & Turkheimer, E. (2003). Deliberate self-harm in a nonclinical population: Prevalence and psychological correlates. *American Journal of Psychiatry*, 160, 1501-1508. doi:10.1176/appi.ajp.160.8.1501

- Levesque, C., Lafontaine, M., Bureau, J., Cloutier, P., & Dandurand, C. (2010). The influence of romantic attachment and intimate partner violence on non-suicidal self-injury in young adults. *Journal of Youth and Adolescence*, *39*, 474-483. doi:10.1007/s10964-009-9471-3
- Lewinsohn, P.M., Seeley, J.R., Roberts, R.E., & Allen, N.B. (1997). Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychology and Aging*, *12*, 277-287. doi:10.1037/0882-7974.12.2.277
- Marshall, S.K., Tilton-Weaver, L.C., & Stattin, H. (2013). Non-suicidal self-injury and depressive symptoms during middle adolescence: A longitudinal analysis. *Journal of Youth and Adolescence*, *42*, 1234-1242. doi:10.1007/s10964-013-9919-3
- Morling, B. (2014). *Research methods in psychology* (2nd ed.). New York, NY: W.W. Norton & Company.
- Muehlenkamp, J.J., & Brausch, A.M. (2016). Reconsidering criterion A for the diagnosis of non-suicidal self-injury disorder. *Journal of Psychopathology and Behavioral Assessment*, *38*, 1-12. doi:10.1007/s10862-016-9543-0
- Muehlenkamp, J., Brausch, A., Quigley, K., & Whitlock, J. (2013). Interpersonal features and functions of nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*, *43*, 67-80. doi:10.1111/j.1943-278X.2012.00128.x
- Muehlenkamp, J. J., Claes, L., Havertape, L., & Plener, P. L. (2012). International prevalence of adolescent non-suicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health*, *6*. doi:10.1186/1753-2000-6-10

- Muehlenkamp, J.J., & Gutierrez, P.M. (2004). An investigation of differences between self-injury and suicide attempts in a sample of adolescents. *Suicide and Life-Threatening Behavior, 34*, 143-162. doi:10.1521/suli.34.1.12.27769
- Muehlenkamp, J.J., & Kerr, P.L. (2010). Untangling a complex web: How non-suicidal self-injury and suicide attempts differ. *Prevention Researcher, 17*, 8-10.
- Muehlenkamp, J. J., Kerr, P. L., Bradley, A. R., & Adams, L. M. (2010). Abuse subtypes and nonsuicidal self-injury: Preliminary evidence of complex emotion regulation patterns. *The Journal of Nervous and Mental Disease, 198*, 258–263.
doi:10.1097/NMD.0b013e3181d612ab
- Nixon, M. K., Cloutier, P. F., & Aggarwal, S. (2002). Affect regulation and addictive aspects of repetitive self-injury in hospitalized adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*, 1333-1341.
doi:10.1097/00004583-200211000-00015
- 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*, 78-83.
doi:10.1111/j.1467-8721.2009.01613.x
- Nock, M.K., Joiner, T.E., Gordon, K.H., Lloyd-Richardson, E., Prinstein, M.J. (2006). Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research, 144*, 65-72.
doi:10.1016/j.psychres.2006.05.010
- Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology, 72*, 885-890.
doi:10.1037/0022-006X.72.5.885

- Olatunji, B.O., Deacon, B.J., Abramowitz, J.S., Tolin, D.F. (2006) Dimensionality of somatic complaints: Factor structure and psychometric properties of the Self-Rating Anxiety Scale. *Journal of Anxiety Disorders*, 20, 543-56.
doi:10.1016/j.janxdis.2005.08.002
- Olfson, M., Gameroff, M. J., Marcus, S. C., Greenberg, T., & Shaffer, D. (2005). National trends in hospitalization of youth with intentional self-inflicted injuries. *The American Journal of Psychiatry*, 162, 1328-1335.
doi:10.1176/appi.ajp.162.7.1328
- Paul, E., Tsypes, A., Eidlitz, L., Ernhout, C., & Whitlock, J. (2015). Frequency and functions of non-suicidal self-injury: Associations with suicidal thoughts and behaviors. *Psychiatry Research*, 225, 276-282. doi:
10.1016/j.psychres.2014.12.026
- Radloff, L. S. (1977). The CES-D scale: A self report depression scale for research in the general population. *Applied Psychological Measurements*, 1, 385-401.
doi:10.1177/014662167700100306
- Radloff, L.S. (1991). The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. *Journal of Youth and Adolescence*, 20, 149-166.
doi:10.1007/BF01537606
- Regier, D.A., Narrow, W.E., Clarke, D.E., Kraemer, H.C., Kuramoto, S.J., Kuhl, E.A., & Kupfer, D.J. (2013). DSM-5 field trials in the United States and Canada, Part II: Test-retest reliability of selected categorical diagnoses. *American Journal of Psychiatry*, 170, 59–70. doi:10.1176/appi.ajp.2012.1207099

- Ross, S., & Heath, N. (2002). A study of the frequency of self-mutilation in a community sample of adolescents. *Journal of Youth and Adolescence, 31*, 67-77.
doi:10.1023/A:1014089117419
- Sah, D.E., Kooh, J., & Price, V.H.(2008) Trichotillomania. *Dermatologic Therapy, 21*, 13-21. doi:10.1111/j.1529-8019.2008.00165.x
- Selby, E.A., Bender, T.W., Gordon, K.H., Nock, M.K., & Joiner, T.E. (2012). Nonsuicidal self-injury (NSSI) disorder: A preliminary study. *Personality Disorders, 3*, 167-175. doi:10.1037/a0024405
- Selby, E.A., Kranzler, A., Fehling, K.B., & Panza, E. (2015). Nonsuicidal self-injury disorder: The path to diagnostic validity and final obstacles. *Clinical Psychology Review, 38*, 79-91. doi:10.1016/j.cpr.2015.03.003
- Shaffer, D., & Jacobson, C. (2009). Proposal to the DSM-V childhood disorder and mood disorder work groups to include non-suicidal self-injury (NSSI) as a DSM-V disorder. *American Psychiatric Association*. Retrieved from <http://www.dsm5.org/ProposedRevisionAttachments/APADSM-5NSSIProposal.pdf>
- Soloff, P. H., Lis, J. A., Kelly, T., Cornelius, J., & Ulrich, R. (1994). Self-mutilation and suicidal behavior in borderline personality disorder. *Journal of Personality Disorders, 8*, 257-267. doi:10.1521/pedi.1994.8.4.257
- Suyemoto, K. L. (1998). The functions of self-mutilation. *Clinical Psychology Review, 18*, 531-554. doi:10.1016/S0272-7358(97)00105-0

- Tang, J., Yu, Y., Wu, Y., Du, Y., Ma, Y., Zhu, H.,...Liu, Z. (2011). Association between non-suicidal self-injuries and suicide attempts in Chinese adolescents and college students: A cross-section study. *PLoS One*, 6(4), e17977. doi:10.1371/journal.pone.0017977
- Townsend, E., Wadman, R., Sayal, K., Armstrong, M., Harroe, C., Majumder, P.,...Clarke, D. (2016). Uncovering key patterns in self-harm in adolescence: Sequence analysis using the Card Sorting Task for Self-Harm (CaTS). *Journal of Affective Disorders*, 206, 161-168. doi: 10.1016/j.jad.2016.07.004
- Turner, B.J., Gratz, K.L., & Chapman, A.L. (June 2016). "Refining interpersonal models of NSSI: New evidence from a daily diary study." Presented at the annual conference of the International Society for the Study of Self-Injury, Eau-Claire, WI.
- Van Orden, K. A., Witte, T. K., Gordon, K. H. Bender, T. W., & Joiner, T. E. (2008). Suicidal desire and the capability for suicide: Tests of the Interpersonal-Psychological Theory of suicidal behavior among adults. *Journal of Consulting and Clinical Psychology*, 76, 72-83. doi:10.1037/0022-006X.76.1.72
- Victor, S. E., Glenn, C. R., & Klonsky, E. D. (2012). Is non-suicidal self-injury an "addiction"? A comparison of craving in substance use and non-suicidal self-injury. *Psychiatry Research*, 197, 73-77. doi:10.1016/j.psychres.2011.12.011
- Victor, S.E., & Klonsky, E.D. (2014). Daily emotion in non-suicidal self-injury. *Journal of Clinical Psychology*, 70, 364-375. doi:10.1002/jclp.22037
- Whitlock, J., Eckenrode, J., & Silverman, D. (2006). Self-injurious behaviors in a college population. *Pediatrics*, 117, 1939-1948. doi:10.1542/peds.2005-2543

- Whitlock, J., & Knox, K.L. (2007). The relationship between self-injurious behavior and suicide in a young adult population. *Archives of Pediatric and Adolescent Medicine, 161*, 634-640. doi: 10.1001/archpedi.161.7.634
- Whitlock, J., Muehlenkamp, J., & Eckenrode, J. (2008). Variation in nonsuicidal self-injury: Identification and features of latent classes in a college population of emerging adults. *Journal of Clinical Child and Adolescent Psychology, 37*, 725-735. doi:10.080/15374410802359734
- Whitlock, J., Muehlenkamp, J., Eckenrode, J., Purington, A., Abrams, G.B., Barriera, P., & Kress, V. (2013). Nonsuicidal self-injury as a gateway to suicide in young adults. *Journal of Adolescent Health, 52*, 486-492.
doi:10.1016/j.adohealth.2012.09.010
- Wilkinson, P., & Goodyer, I. (2011). Non-suicidal self-injury. *European Child & Adolescent Psychiatry, 20*, 103-108. doi:10.1007/s00787-010-0156-y
- You, J., Leung, F., Fu, K., & Lai, C.M. (2011). The prevalence of nonsuicidal self-injury and different subgroups of self-injurers in Chinese adolescents. *Archives of Suicide Research, 15*, 75-86. doi: 10.1080/13811118.2011.540211
- Zetterqvist, M. (2015). The DSM-5 diagnosis of nonsuicidal self-injury disorder: a review of the empirical literature. *Child and Adolescent Psychiatry and Mental Health, 9*, 31-43. doi:10.1186/s13034-015-0062-7
- Zung, W.K. (1971). A rating instrument for anxiety disorders. *Psychosomatics, 7*, 371-379. doi:10.1016/S0033-3182(71)71479-0

Appendix A
Instructions

Hello, my name is _____ and I am a graduate student in Dr. Brausch's lab. Today, you will be completing the measures in the packet in front of you in order to receive 4 research participation credits. Please carefully read all instructions to ensure you are completing the measures properly. Additionally, please note that some of the measures in the packet have questions on both the front and back sides, so be sure to fill out both sides. The completion of these measures should take between 35 minutes to an hour. If you have any questions about the measures, _____ will be available to answer them at any time. When you are finished completing the measures, please bring your packets into the back room, one at a time, so I can make sure the packet is completed, grant you your participation credit, and complete our debriefing procedure. Does anyone have any questions about these instructions?

Appendix B
Risk Assessment Guidelines

High Risk

If a participant is determined to be at high risk for suicidal behavior, s/he will be given specific referral information. If a student reports a suicide attempt within the past 12 months *and* current thoughts of or a plan for suicide, s/he will be considered “high risk” and researchers will immediately refer the student to the WKU Counseling Center (walk him/her to the center in Potter Hall; call to let them know you are bringing a walk-in).

Moderate Risk

If a student reports a suicide attempt within the past 12 months and thoughts of suicide within the past 6 months, but does not describe a current plan or intent, s/he will be considered “moderate risk” and the researcher should offer to call the counseling center from the lab to make an appointment for them.

Low Risk

Students who report a suicide attempt more than 12 months ago *and/or* thoughts about suicide within the past year will be considered “low risk” and will be encouraged to make an appointment at the counseling center or other agency on the debriefing form.

Appendix C

Inventory of Statements About Self-Injury (ISAS)

Section I. Behaviors

This questionnaire asks about a variety of self-harm behaviors. Please only endorse a behavior if you have done it intentionally (i.e., on purpose) and without suicidal intent (i.e., not for suicidal reasons).

1. Please estimate the number of times in your life you have intentionally (i.e., on purpose) performed each type of non-suicidal self-harm (e.g., 0, 10, 100, 500):

Cutting _____	_____	Severe Scratching
Biting _____	_____	Banging or Hitting Self
Burning _____	_____	Interfering w/Wound Healing
Carving Surface _____	_____	(e.g. picking scabs) Rubbing Skin Against Rough
Pinching _____	_____	Sticking Self w/Needles
Pulling Hair _____	_____	Swallowing Dangerous Substances
Other _____, _____		

Important: If you have performed one or more of the behaviors listed above, please complete the final part of this questionnaire. If you have not performed any of the behaviors listed above, you are done with this particular questionnaire and should continue to the next.

2. If you feel that you have a main form of self-harm, please circle the behavior on the first page above that you consider to be your main form of self-harm.

3. At what age did you:

First harm yourself? _____ Most recently harm yourself?
_____ (approximate date – month/date/year)

4. Do you experience physical pain during self-harm?

Please circle a choice: YES SOMETIMES NO

5. When you self-harm, are you alone?

Please circle a choice: YES SOMETIMES NO

6. Typically, how much time elapses from the time you have the urge to self-harm until you act on the urge?

Please circle a choice:

<1 hour 1-3 hours 3-6 hours
6-12 hours 12-24 hours >1 day

7. Do/did you want to stop self-harming?

Please circle a choice: YES NO

Section II. Functions

Instructions

This inventory was written to help us better understand the experience of non-suicidal self-harm. Below is a list of statements that may or may not be relevant to your experience of self-harm. Please identify the statements that are most relevant for you:

- Circle **0** if the statement is **not relevant** for you at all
- Circle **1** if the statement is **somewhat relevant** for you
- Circle **2** if the statement is **very relevant** for you

“When I self-harm, I am...”

Response

- | | | | |
|---|---|---|---|
| 1. ...calming myself down | 0 | 1 | 2 |
| 2. ...creating a boundary between myself and others | 0 | 1 | 2 |
| 3. ...punishing myself | 0 | 1 | 2 |
| 4. ...giving myself a way to care for myself (by attending the wound) | 0 | 1 | 2 |
| 5. ...causing pain so I will stop feeling numb | 0 | 1 | 2 |
| 6. ...avoiding the impulse to attempt suicide | 0 | 1 | 2 |
| 7. ...doing something to generate excitement or exhilaration | 0 | 1 | 2 |
| 8. ...bonding with peers | 0 | 1 | 2 |
| 9. ...letting others know the extent of my emotional pain | 0 | 1 | 2 |
| 10. ...seeing if I can stand the pain | 0 | 1 | 2 |
| 11. ...creating a physical sign that I feel awful | 0 | 1 | 2 |
| 12. ...getting back at someone | 0 | 1 | 2 |
| 13. ...ensuring that I am self-sufficient | 0 | 1 | 2 |
| 14. ...releasing emotional pressure that has built up inside of me | 0 | 1 | 2 |
| 15. ...demonstrating that I am separate from other people | 0 | 1 | 2 |
| 16. ...expressing anger toward myself for being worthless or stupid | 0 | 1 | 2 |
| 17. ...creating a physical injury that is easier to care for than my emotional distress | 0 | 1 | 2 |
| 18. ...trying to feel something (as opposed to nothing even if it is physical pain) | 0 | 1 | 2 |
| 19. ...responding to suicidal thoughts without actually attempting suicide | 0 | 1 | 2 |
-

20. ...entertaining myself or others by doing something extreme	0	1	2
21. ...fitting in with others	0	1	2
22. ...seeking care or help from others	0	1	2
23. ...demonstrating I am tough or strong	0	1	2
24. ...proving to myself that my emotional pain is real	0	1	2
25. ...getting revenge against others	0	1	2
26. ...demonstrating that I do not need to rely on others for help	0	1	2
27. ...reducing anxiety, frustration, anger, or other overwhelming emotions	0	1	2
28. ...establishing a barrier between myself and others	0	1	2
29. ...reacting to feeling unhappy with myself or disgusted with myself	0	1	2
30. ...allowing myself to focus on treating the injury, which can be gratifying or satisfying	0	1	2
31. ...making sure I am still alive when I don't feel real	0	1	2
32. ...putting a stop to suicidal thoughts	0	1	2
33. ...pushing my limits in a manner akin to skydiving or other extreme activities	0	1	2
34. ...creating a sign of friendship or kinship with friends or loved ones	0	1	2
35. ...keeping a loved one from leaving or abandoning me	0	1	2
36. ...proving I can take the physical pain	0	1	2
37. ...signifying the emotional distress I'm experiencing	0	1	2
38. ...trying to hurt someone close to me	0	1	2
39. ...establishing that I am autonomous/independent	0	1	2

Response Key: 0 – not relevant, 1 – somewhat relevant, 2 – very relevant

Appendix D
Self-Harm Behaviors Questionnaire

Current age: _____

A lot of people do things which are dangerous and might get them hurt. There are many reasons why people take these risks. Often people take risks without thinking about the fact that they might get hurt. Sometimes, however, people hurt themselves on purpose. We are interested in learning more about the ways in which you may have intentionally or unintentionally hurt yourself. We are also interested in trying to understand why people your age may do some of these dangerous things. It is important for you to understand that if you tell us about things you've done which may have been unsafe or make it possible that you may not be able to keep yourself safe, we will encourage you to discuss this with a counselor or other confidant in order to keep you safe in the future. Please circle **YES** or **NO** in response to each question and answer the follow-up questions. For questions where you are asked who you told something to, do not give specific names. We only want to know if it was someone like a parent, teacher, doctor, etc.

Things you may have actually done to yourself on purpose.

1. Have you ever hurt yourself on purpose (e.g., scratched yourself with fingernails or sharp object)? **YES** **NO**

If no, go on to question #2.

If yes, what did you do?

a. Approximately how many times did you do this? -

b. Approximately when did you first do this to yourself? (*write your age*)

c. When was the last time you did this to yourself? (*write your age*)

d. Have you ever told anyone that you had done these things? **YES** **NO**

If yes, who did you tell?

e. Have you ever needed to see a doctor after doing these things? **YES** **NO**

Times you hurt yourself badly on purpose or tried to kill yourself.

2. Have you ever attempted suicide? **YES** **NO**

If no, go on to question #4.

If yes, how?

(**Note:** If you took pills, what kind? _____ how many?

_____ over how long a period of time did you take them?

_____)

a. How many times have you attempted suicide?

b. When was the most recent attempt? (*write your age*)

c. Did you tell anyone about the attempt? **YES** **NO**

d. Did you require medical attention after the attempt? **YES** **NO**

If yes, were you hospitalized overnight or longer? **YES** **NO**

How long were you hospitalized?

e. Did you talk to a counselor or some other person like that after your attempt?
YES **NO**

Who? _____

3. If you attempted suicide, please answer the following:

a. what other things were going on in your life around the time that you tried to kill yourself?

b. Did you actually want to die? **YES** **NO**

c. Were you hoping for a specific reaction to your attempt? **YES** **NO**

If yes, what was the reaction you were looking for?

d. Did you get the reaction you wanted? **YES** **NO**

e. Who knew about your attempt? -

Times you threatened to hurt yourself badly or try to kill yourself

4. Have you ever threatened to commit suicide? **YES** **NO**

If no, go to question #5.

If yes, what did you threaten to do?

a. Approximately how many times did you do this?

b. Approximately when did you first do this? (*write your age*)

c. When was the last time you did this? (*write your age*)

d. Who did you make the threats to? (e.g., mom, dad)

e. What other things were going on in your life during the time that you were threatening to kill yourself?

f. Did you actually want to die?	YES	NO
g. Were you hoping for a specific reaction to your threat?	YES	NO
h. Did you get the reaction you wanted?	YES	NO

If you didn't, what type of reaction was there to your threat?

5. Have you ever talked or thought about:

Wanting to die?	YES	NO
Committing suicide?	YES	NO

a. What did you talk about doing?

b. With whom did you discuss this?

c. What made you feel like doing that?

d. Did you have a specific plan you how you would try to kill yourself?

	YES	NO
--	------------	-----------

If yes, what plan did you have?

e. In looking back, how do you imagine people would react to your attempt?

f. Did you think about how people would react if you did succeed in killing yourself?

	YES	NO
--	------------	-----------

If yes, how did you think they would react? -

g. Did you ever take steps to prepare for this plan?

	YES	NO
--	------------	-----------

If yes, what did you do to prepare?

Appendix E
Center for Epidemiologic Studies Depression Scale (CES-D), NIMH

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

During the Past Week				
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I did not feel like eating; my appetite was poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I felt that I could not shake off the blues even with help from my family or friends.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I felt I was just as good as other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I had trouble keeping my mind on what I was doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I felt depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I felt that everything I did was an effort.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I felt hopeful about the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I thought my life had been a failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I felt fearful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. My sleep was restless.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I was happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I talked less than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I felt lonely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. People were unfriendly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I enjoyed life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I had crying spells.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I felt sad.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I felt that people dislike me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I could not get "going."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SCORING: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of

positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomology.

Appendix F
Zung Self-rating Anxiety Scale

Listed below are 20 statements. Please read each one carefully and decide how much the statement describes how you have been feeling **during the past week**. Circle the appropriate number for each statement.

	None or a little of the time	Some of the time	Good part of the time	Most or all of the time
1. I feel more nervous and anxious than usual	1	2	3	4
2. I feel afraid for no reason at all.	1	2	3	4
3. I get upset easily or feel panicky.	1	2	3	4
4. I feel like I'm falling apart and going to pieces.	1	2	3	4
5. I feel that everything is all right and nothing bad will happen.	1	2	3	4
6. My arms and legs shake and tremble.	1	2	3	4
7. I am bothered by headaches, neck, and back pains.	1	2	3	4
8. I feel weak and get tired easily.	1	2	3	4
9. I feel calm and can sit still easily.	1	2	3	4
10. I can feel my heart beating fast.	1	2	3	4
11. I am bothered by dizzy spells.	1	2	3	4
12. I have fainting spells or feel faint.	1	2	3	4
13. I can breathe in and out easily.	1	2	3	4
14. I get feelings of numbness and tingling in my fingers and toes.	1	2	3	4
15. I am bothered by stomachaches or indigestion.	1	2	3	4
16. I have to empty my bladder often.	1	2	3	4
17. My hands are usually dry and warm.	1	2	3	4
18. My face gets hot and blushes	1	2	3	4
19. I fall asleep easily and get a good night's rest.	1	2	3	4
20. I have nightmares.	1	2	3	4

Score total: