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Negative urgency and lack of perseverance: Identification of differential pathways of onset and maintenance risk in the longitudinal prediction of non-suicidal self-injury

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Abstract

Many researchers have identified impulsivity-related personality traits as correlates of and risk factors for non-suicidal self-injury (NSSI). Using a longitudinal design, we tested the hypothesis that one such trait, negative urgency (the tendency to act rashly when distressed), predicts the onset of NSSI during the first year of college and a different trait, lack of perseverance (the disposition to fail to maintain focus on tasks that are difficult or boring), predicts the maintenance of NSSI during the first year of college. In a sample of n = 1158 college women (mean age = 18.04, 95% of participants were 18 at Time 1), we found support for these hypotheses. Negative urgency, measured prior to college entry, predicted the onset of NSSI behavior across the first year of college (odds ratio = 1.58). Lack of perseverance predicted the maintenance of NSSI status across the first year of college, controlling for prior NSSI behavior (odds ratio = 1.73). These findings indicate that different impulsivity-related personality traits may play different roles in the risk process for NSSI.

Keywords

NSSI; longitudinal; negative urgency; lack of perseverance

Non-suicidal self-injury (NSSI) refers to the direct, deliberate destruction of bodily tissue without any suicidal intent (American Psychiatric Association, 2013). NSSI is differentiated from other harmful behaviors that are indirect (e.g. smoking, the intentions of which are not to cause harm) and from behaviors for which there is an intent to die or an ambivalence about the potential consequence of dying (American Psychiatric Association, 2013; Nock, 2010). Proposed diagnostic criteria for NSSI (the disorder is currently listed in Section 3 of the DSM-5 as a condition that requires further research) identify precipitants such as (a) negative affect, (b) the urge to act, and (c) the expectation that engaging in NSSI will relieve a negative feeling (American Psychiatric Association, 2013).

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NSSI is often considered a rash or impulsive act, so personality dispositions towards impulsive behavior may well be relevant for understanding risk for engagement in NSSI behavior. Although impulsivity has been identified as an important correlate of NSSI, this relationship is not always observed. It is perhaps the case that these mixed results are due to the use of multiple different constructs under the common label of impulsivity (Claes & Muehlenkamp, 2014; Glenn & Klonsky, 2010). One useful model of the personality underpinnings of impulsive behavior was developed by Whiteside and Lynam (2001) and added to by Cyders and Smith (2007). They identified five personality traits that can lead to impulsive action: (1) negative urgency: the tendency to act rashly when distressed; (2) positive urgency: the tendency to act rashly when in an unusually positive mood; (3) lack of planning: the tendency to act without forethought; (4) lack of perseverance: the tendency to quit when a task becomes difficult or boring; and (5) sensation-seeking: the need to seek out novel, thrilling, risky stimulation.

We propose a model for trait prediction of NSSI behavior that draws a distinction between risk for onset of NSSI and risk for maintenance of NSSI: we believe that different impulsivity-related traits contribute to onset and maintenance. Concerning onset, initial engagement in NSSI may well involve a rash, impulsive act for the purpose of achieving negative reinforcement. It does appear that NSSI can operate as a negatively reinforced coping or emotion-regulation strategy that temporarily relieves or helps avoid unwanted emotional arousal or feelings of guilt, sadness, or distress (Chapman, Gratz & Brown, 2006; Favazza, 1998; Gordon et al., 2010; Klonsky, 2007; Nock & Prinstein, 2004; 2005). Among the impulsivity-related traits described above, negative urgency is thought to operate via negative reinforcement (Cyders & Smith, 2008). A number of longitudinal studies have produced findings consistent with a negative reinforcement mechanism for negative urgency in the prediction of numerous impulsive behaviors, such as smoking, problem drinking, and binge eating (Anestis, Selby, & Joiner, 2007; Doran, Khoddam, Sanders, Schweizer, Trim, & Myers, 2013; Fischer, Peterson, & McCarthy, 2013; Guller, Zapolski, & Smith, in press; Pearson, Combs, Zapolski, & Smith, 2012; Settles, Cyders, & Smith, 2010). Importantly, many of these studies document prediction of onset of these behaviors by prior levels of negative urgency (Guller et al., in press; Pearson et al., 2012; Pearson, Zapolski, & Smith, 2014). Thus, we propose that negative urgency, a characteristic of individuals associated with impulsive acts to achieve negative reinforcement, predicts the onset of NSSI.

However, once NSSI behavior is being engaged in regularly, other traits may play an important role in its maintenance. Individuals who engage in NSSI often attempt to reduce or stop the behavior: Smith, Steele, Weitzman, Trueba and Meuret (2014) recently found that up to 80% of recent self-injurers report a desire to stop engaging in NSSI. However, stopping this behavior requires one to persevere through upsetting emotions and high levels of negative affect, which are thought to increase the urge to engage in the behavior (Bresin, Carter & Gordon, 2013). A lack of an ability to maintain focus on the goal of stopping the behavior; that is, weak ability to persevere in pursuing that goal, may increase the likelihood of maintaining the behavior. We thus hypothesize that lack of perseverance is a primary trait predictor of maintenance of NSSI.

Existing personality studies have generally not distinguished between onset and maintenance of NSSI and so do not speak directly to our hypotheses. However, because of the importance of negative affect in NSSI behavior (Armey, Crowther, & Miller, 2011), the well-supported model that negative urgency involves rash acts to achieve negative reinforcement (Cyders & Smith, 2008), the established theoretical and empirical link between NSSI and the trait of negative urgency (Glenn & Klonsky, 2011; Klonsky, 2007; Selby, Anestis, & Joiner, 2008), and the transdiagnostic evidence that negative urgency predicts the onset of impulsive behaviors (e.g., Guller et al., in press), there is reason to hypothesis that negative urgency plays a role in NSSI onset. In addition, as we describe below, there is some evidence consistent with the role of lack of perseverance in maintenance of the behavior.

Cross-sectional prediction

In a number of cross-sectional studies, negative urgency has been shown to relate to NSSI. Glenn and Klonsky (2010) found that individuals who engaged in NSSI were best distinguished from individuals who did not engage in NSSI by trait levels of negative urgency. Negative urgency was one impulsivity-related predictor of NSSI among individuals seeking treatment for substance abuse (Lynam, Miller, Miller, Bornalova, & Lejuez, 2011), and the trait concurrently predicted self-injuring frequency, variety of NSSI methods, and number of years self-injuring in college students. In addition, negative urgency was the only impulsivity-related trait that was a common risk factor associated with increased NSSI, alcohol use and problematic eating, which are all behaviors typically associated with negative reinforcement (Dir, Karyadi, & Cyders, 2013).

While negative urgency has emerged as a correlate in several studies, other impulsivity-related traits have emerged less consistently. Lack of planning, lack of perseverance, sensation-seeking, and positive urgency correlated with NSSI in some studies but not others, and some studies have found no relationships between any of the traits and NSSI (Claes & Muehlenkamp, 2014; Lynam et al., 2011; Taylor, Peterson & Fischer, 2012). However, consistent with our proposed model, Glenn and Klonsky (2010) found that lack of perseverance significantly differentiated between current self-injurers and past self-injurers.

Longitudinal Prediction

The prospective prediction of NSSI behaviors from trait-based predictors is less often studied and less well understood. Bresin et al. (2013) used a daily diary methodology to gather ratings of negative affect and the urge to engage in NSSI for two weeks. Negative urgency significantly predicted the urge to engage in NSSI, and for those high in negative urgency, daily sadness was a positive predictor of urge to engage in NSSI. This finding that negative urgency predicted the subsequent urge to engage in self-injury over a two-week interval speaks to the value of research designed to test whether negative urgency predicts NSSI behaviors across a longer interval as well.

Two studies found no prospective prediction from negative urgency, lack of perseverance, or other impulsivity-related traits in the prediction of NSSI maintenance in young adults (Glenn & Klonsky, 2011; Wilcox, Arria, Caldeira, Vincent, Pinchevsky, & O'Grady, 2012).

When past NSSI behavior was considered in detail, impulsivity-related traits did not predict maintenance beyond overall NSSI frequency, number of NSSI methods, sex, and borderline personality disorder features (Glenn & Klonsky, 2011). The sample size of that study (n = 51) may have precluded identification of incremental prediction beyond past behavior.

The current study

We sought to predict the onset and maintenance of NSSI in a large sample (n = 1,158) of women going through their first year of college. We assessed these women at two time points: in July, prior to their arrival at the university, and in April, near the end of their first year of school. We measured both the onset of NSSI during the first year of college and the maintenance of NSSI across the first year of college. We tested two primary hypotheses. First, when all of the impulsivity-related traits are considered together, only negative urgency would predict the onset of NSSI; we chose to include all of the UPPS-P impulsivity traits in this predictive analysis due to the fact that the nature of these traits is less well understood in the prospective prediction of NSSI. Second, again considering the set of five impulsivity-related traits described above, only lack of perseverance would predict the maintenance of NSSI above and beyond past engagement in NSSI.

To predict NSSI maintenance, we tested whether lack of perseverance predicted continued engagement in NSSI behavior beyond prediction from Time 1 NSSI frequency and the other four impulsivity-related personality traits. We thus conducted a stringent test of its potential role in maintaining NSSI behavior.

We chose to conduct this study on college women for the following reasons. First, because the most common age of onset of NSSI is younger than college age (Nock, 2010), the beginning of college is rarely studied, even though this period is one in which both stopping and starting NSSI is common and the prevalence of NSSI engagement is still quite high (Glenn & Klonsky, 2011; Whitlock, Eckenrode, & Silverman, 2006; Wilcox et al., 2011). To our knowledge, this is the first study to examine the role of impulsivity-related traits in the onset of NSSI behavior among college women. Second, we studied women because Whitlock et al. (2011) reported that female college students are more likely than their male counterparts to endorse using NSSI to regulate affect and in response to strong urges; it thus seemed appropriate to conduct the first test of the negative urgency onset hypothesis in women.

Methods

Participants

Participants in this study were incoming freshman women at a large Southern-Midwestern university. Participants were recruited the summer before their freshman year of college to participate in a nine-month-long longitudinal study. The participant sample was limited to “traditional” incoming freshmen women, defined as entering college within three years of graduating high school. A sample of 1158 women participated at two time points: the month before the school year began (July) and near the end of the freshman year (April). The retention rate was 75% from Time 1 to Time 2; of the 92% of students who stayed in school

for the full year, we retained 82% (Sugarman, 2012). Retained and lost participants did not vary on any study variables and the Little (1988) test of whether data were missing completely at random was nonsignificant, a finding consistent with missing completely at random status for missing data. As a result, expectation maximization procedures were used to impute missing data. This procedure produces more reliable estimates of population parameters than traditional methods, such as mean substitution or case deletion (Enders, 2006).

The mean age of participants at the initiation of the study was 18.04 (95% of participants were 18 years old at Time 1; range = 18–19 years of age). Most participants were European American (87.7%), followed by African American (9.3%); the remainder identified as Asian American (2.1%), Native American/American Indian (0.5%), and Pacific Islander (0.4%).

Measures

Demographic Information—The participants filled out a demographic questionnaire obtaining information on estimated household income, age, ethnicity, and parental education.

Deliberate Self-Harm Inventory (DSHI; Gratz, 2001)—The DSHI is a behaviorally-based, self-report questionnaire that assesses the presence and frequency of each of 16 forms of deliberate self-harm. From the DSHI, we used the frequency measure, which is calculated by summing the frequency scores for each behavior in which a participant engaged (participants could report any frequency value; the range in our sample was 0–60). We did not use the 17th item on the DSHI, which was open-ended: “Have you ever done anything else to hurt yourself that was not asked in this questionnaire?” The DSHI is conceptually grounded in the idea of deliberate self-harm, defined by Gratz (2001) as the deliberate, direct destruction of body tissue without suicidal intent, but that results in injury that is severe enough for tissue damage to occur. Gratz (2001) reports reliability information on the measure with endorsement of each of the items recording dichotomously as positive for the behavior or not: the measure had high internal consistency (α = .82), adequate test-retest reliability over a period of time ranging from 2 to 4 weeks, mean 3.3 weeks (ϕ = .68, p< .001), and adequate construct, discriminant, and convergent validity (Gratz, 2001).

UPPS-P Impulsivity Scale (Lynam et al., 2007)—The UPPS-P is a 59-item 4-point scale designed to assess five distinct personality traits that are related to impulsive behavior: negative urgency, positive urgency, lack of perseverance, lack of planning, and sensation seeking. Scores were computed as the average item score for each scale producing a range of possible scores from 0–4 for each scale. Negative urgency, the tendency to act rashly in response to distress, and positive urgency, or the tendency to act rashly when in an unusually positive mood, each have positive loadings on neuroticism and negative loadings on conscientiousness and agreeableness (Cyders & Smith, 2008). Example items of negative urgency (the scale has 12 items) include: “When I feel bad, I will often do things I later regret in order to make myself feel better now,” and “I often make matters worse because I act without thinking when I am upset.” Example items of positive urgency (14 items) include: “When I am very happy, I can’t seem to stop myself from doing things that can

have bad consequences," and "Others are shocked or worried about the things I do when I am feeling very excited." Sensation seeking, the tendency to seek out novel and thrilling experiences, is analogous to the excitement seeking facet of extraversion on the NEO PI-R (Costa & McCrae, 1992). Example items of sensation seeking (12 items) include: "I generally seek new and exciting experiences and sensations," and "I would enjoy fast driving." Lack of planning, the tendency to act without thinking, is analogous to low scores on the deliberation facet of conscientiousness. Example items of lack of planning (11 items) include: "My thinking is usually careful and purposeful," and "I don't like to start a project until I know exactly how to proceed" (both reverse-coded). Lack of perseverance, the tendency to quit when a task becomes difficult or boring, is analogous to low scores on the self-discipline facet of conscientiousness on the same measure. Example items of lack of perseverance (10 items) include: "I generally like to see things through to the end," and "Once I get going on something I hate to stop" (both reverse-coded). In numerous prior studies, each of the scales has coefficient alpha estimates of internal consistency greater than $\alpha = .80$ (cf. Smith, Fischer, Cyders, Annus, Spillane, & McCarthy, 2007; Cyders & Smith, 2007).

Procedure

Time 1—The study was online and accessible through the university's Qualtrics survey system. The Time 1 assessment took place in July prior to the participants' first day of move-in. We sent an e-mail to all incoming first-year women with instructions on accessing the Qualtrics system. Eligibility was determined by questions regarding sex, nature of enrollment (traditional or otherwise), and English-speaking ability; prospective participants who were not women, who were more than three years post-high school graduation, or who were unable to speak English were not able to complete the online survey. Upon completion, participants were entered in a raffle to win one of 8 $250 gift cards to Target. Informed consent was obtained for each participant using the online platform. The study procedure and the consent procedure were approved by the University Institutional Review Board (IRB).

Time 2—Informed consent was again obtained at Time 2 using the online platform, in accordance with the IRB approved protocol. The Time 2 assessment took place in late April of the participants' freshman year; participants were paid $10 for their participation. The participants completed the same group of demographic, personality, and self-injury measures as they completed at Time 1.

Data Analysis – NSSI Onset

We conducted a binomial logistic regression analysis predicting NSSI onset at Time 2. The five impulsivity-related traits at Time 1 were the five predictors and they were entered simultaneously. To predict the onset of NSSI, we identified those women negative for lifetime history of NSSI at Time 1 who then engaged in NSSI by Time 2. In addition, we transformed impulsivity trait scores to z-scores so that results can be interpreted in terms of standard deviation changes, rather than unit changes. The predictor variables in this analysis were Time 1 negative urgency, lack of planning, lack of perseverance, sensation seeking, and positive urgency. Once we selected only those participants who endorsed no lifetime

prevalence of NSSI at Time 1, the outcome variable was reported lifetime prevalence of self-injury at Time 2.

Data Analysis – NSSI Maintenance

We conducted a second set of binomial logistic regression analyses to predict Time 2 NSSI maintenance from NSSI frequency at Time 1 and the five impulsivity-related traits, also measured at Time 1. To measure maintenance of NSSI behavior, we began by selecting all participants who, at Time 1, reported having engaged in NSSI behaviors in their lives. We then created a variable to represent NSSI engagement within 6 months of Time 2 assessment. All participants who had a lifetime history of NSSI at Time 1 and NSSI behavior within 6 months of Time 2 assessment were considered to have maintained the behavior across the study period. We chose the 6 month time interval at Time 2 to facilitate comparison of results from our sample to those of Glenn and Klonsky (2011), who predicted 6-month NSSI recency status from a number of NSSI-related and other variables.

We entered Time 1 NSSI frequency at the first step of the regression equation and the five impulsivity traits together at the second step; thus, the predictive influence of the impulsivity traits was controlled for NSSI frequency. At step two, we added the five impulsivity-related traits as predictors simultaneously (negative urgency, lack of perseverance, positive urgency, sensation seeking and lack of planning). We thus predicted 6-month NSSI maintenance from the traits, controlling for Time 1 NSSI frequency.

As anticipated, Time 1 NSSI frequency was positively skewed and kurtotic. To preserve the interval scale data, yet reduce the skew and kurtosis, we performed a fourth root transformation on NSSI frequency. Doing so decreased the skew and kurtosis from 8.63 to 1.86 and 87.39 to 3.02, respectively. Z-scores of the impulsivity traits were used to represent these constructs in these analyses as well.

Results

To assess the reliability of the NSSI frequency measure, calculated by summing the frequencies of engagement in each of 16 self-harm behaviors, we used test-retest reliability over the 9 month interval of the study. The measure was quite stable, even over that long interval: $r = .72$.[1] Each of the five impulsivity traits proved internally consistent in this sample: negative urgency: $\alpha = .89$, positive urgency: $\alpha = .93$, sensation seeking: $\alpha = .85$, lack of planning: $\alpha = .84$, and lack of perseverance: $\alpha = .83$. Table 1 presents correlations among the key study variables. Three impulsivity-related traits (negative urgency, lack of perseverance, and positive urgency) related to NSSI frequency and two (lack of planning and sensation seeking) did not. As expected, correlations between a given impulsivity-

[1]We did not consider internal consistency to be a useful measure of reliability of the frequency data, because the frequency of engaging in one behavior, such as cutting, would not necessarily be related to the frequency of engaging in a different behavior, such as breaking one's own bones (possibly individuals have preferred methods of self-injury). To compare the reliability of the measure in this study to reliability results reported in the development sample (Gratz, 2001), we calculated coefficient alpha and test-retest when recording engagement in each behavior dichotomously. Doing so resulted in $\alpha = .74$ (as compared to $\alpha = .82$ in Gratz, 2001) and a test-retest correlation across 9 months of $r = .68$, which was the same value Gratz found over 3.3 weeks.

related trait at Time 1 with the same trait at Time 2 were high, indicating a large degree of construct stability over the 9-month period.

A total of 26 women (2.2% of the sample) were negative for lifetime history of NSSI at Time 1 and reported engaging in NSSI behaviors at Time 2. The percentage of individuals who reported onset in this sample was smaller than the 4.1% onset sample found by Hamza and Willoughby (2014). Individuals in our onset group reported engaging in an average of 14.21 lifetime NSSI episodes.[2] A total of 34 women (2.9% of the sample) reported a lifetime history of NSSI at Time 1 and continued engagement in NSSI behavior during the six months up to Time 2.

Table 2 presents group differences in the impulsivity-related traits for the NSSI onset group, the NSSI maintenance group, and the non-NSSI group. Two ANOVA contrasts were conducted. In the first, we explored group differences between the non-NSSI group and the average of the two NSSI-active groups (onset and maintenance). We found significant differences between the non-NSSI group and the NSSI-active groups for the impulsivity traits of negative urgency, lack of planning, and lack of perseverance; no such differences were found for sensation seeking and positive urgency.

In the second contrast, we explored group differences between the NSSI onset group and the NSSI maintenance group. The NSSI maintenance group had significantly higher mean scores on the trait of lack perseverance than did the NSSI onset group. This finding is consistent with our hypothesis that lack of perseverance would predict NSSI maintenance and would not predict NSSI onset.

Negative urgency predicting NSSI onset

This simultaneous regression compared the predictive effects of all five impulsivity-related traits on NSSI onset. As anticipated, negative urgency was the only significant predictor of NSSI onset (odds ratio (OR) = 1.58 $p < .05$); full regression results for this analysis can be seen in Table 3. With each standard deviation increase in negative urgency, individuals were 58% more likely to be in the group characterized by onset of NSSI behavior over the first year of college.

Predicting NSSI maintenance

At step one of the logistic regression model, Time 1 NSSI frequency (OR = 10.24, $p < .001$) predicted NSSI maintenance at Time 2. In the second step of this regression equation, we tested our hypothesis that lack of perseverance predicts NSSI maintenance by adding the five impulsivity-related traits as predictors simultaneously. Time 1 NSSI frequency (OR = 9.57, $p < .001$) remained a significant predictor of NSSI maintenance, and lack of perseverance was the only impulsivity-related trait measured at Time 1 that significantly predicted NSSI maintenance at Time 2 (OR = 1.73, $p < .01$), above and beyond prediction

[2]We also explored the rates of NSSI cessation in this study. We considered those participants who endorsed engagement in NSSI within 6 months of Time 1 assessment but who did not endorse NSSI engagement within 6 months of Time 2 assessment to have ceased the behavior. Unfortunately, only a small number of individuals (n = 5) reported NSSI cessation over the course of this 9-month study, and we were thus unable to predict NSSI cessation in this sample.

from prior NSSI behavior and the other traits. With each standard deviation increase in lack of perseverance, individuals were 73% more likely to be in the group characterized by maintaining NSSI behavior over the first year of college. Full regression results for this analysis can be seen in Table 4.

Discussion

The findings of this study help clarify the role of impulsivity-related personality in the prospective prediction of NSSI. First, as hypothesized, negative urgency predicted the onset of NSSI behavior above and beyond all other impulsivity-related traits, such that each one-standard deviation increase in the trait of negative urgency was associated with a 58% greater likelihood of reporting NSSI onset 9 months later. Second, lack of perseverance significantly predicted NSSI maintenance over the course of the study: even when controlling for NSSI frequency and other impulsivity-related traits, each one-standard deviation increase in the trait of lack of perseverance at Time 1 was associated with a 73% greater likelihood of reporting NSSI maintenance (sustained engagement in self-injury behavior) 9 months later. Because prior longitudinal work did not separately assess onset and maintenance, the current findings are novel and may shed new light on personality contributions to NSSI.

The finding that negative urgency predicted NSSI onset is consistent with negative reinforcement models of NSSI (Chapman et al., 2006; Favazza, 1998; Gordon et al., 2010; Klonsky, 2007). Negative urgency appears to operate as part of a negative reinforcement process, in which rash, impulsive acts provide relief or distraction from distress and are thus reinforced in the future (Cyders & Smith, 2008; Dir et al., 2013). Just as negative urgency predicts the subsequent onset of smoking, binge eating, and drinking (Guller et al., in press; Pearson et al., 2012), all of which are behaviors thought to provide negative reinforcement, negative urgency also predicts the onset of NSSI, a behavior that is also understood to provide the negative reinforcement of relief or distraction from distress (Klonsky, 2007; Nock & Prinstein, 2004; 2005).

The finding that lack of perseverance, the tendency to quit a task once it becomes difficult or boring, is a significant longitudinal predictor of NSSI maintenance is both novel and consistent with Glenn and Klonsky's (2010) finding that, among young adults with a history of NSSI, high levels of lack of perseverance distinguished those who had engaged in NSSI more recently (within 6 months of assessment) from those with a history of NSSI who had not engaged in the behavior within the past 6 months. Our finding may be inconsistent with Glenn and Klonsky's (2011) finding that lack of perseverance did not predict NSSI behavior longitudinally. Possibly, the large sample size available in the current study may have enabled detection of a significant population effect. Perhaps low perseverance contributes to maintenance of NSSI in two ways: individuals who lack perseverance (1) may be less able to resist NSSI urges that result from high levels of distress and negative affect (Bresin et al, 2013) and (2) may be less able to follow through with coping strategies designed to replace or stop the behavior (Glenn & Klonsky, 2010).

Levels of negative urgency in the current college student sample were similar to those of prior college-student studies of the trait in relation to NSSI. Glenn and Klonsky (2010) report negative urgency scores of between 2.63–2.88 per item for self-injurers in a college population, which are similar to, though slightly higher than, the urgency scores per item among self-injurers found in this study (2.40–2.64). Item scores of 2.5 represent the midpoint of the 4 point scale. It is also important to note the predictive power of prior NSSI behavior on NSSI maintenance. Time 1 NSSI frequency was a powerful predictor of Time 2 NSSI. This finding is consistent with other prospective studies of NSSI that highlight the importance of past NSSI behavior in the prediction of future NSSI behavior (Chapman, Derbidge, Cooney, Hong, & Linehan, 2009; Glenn & Klonsky, 2011; Janis & Nock, 2008; Lewinsohn Rohde, & Seeley, 1994; Prinstein et al., 2008).

Should the current findings be replicated, there are important potential implications for intervention and the treatment of NSSI. It may prove valuable to consider differences in the risk process for the onset of NSSI and for its maintenance. Among those individuals who have not begun engaging in NSSI at the beginning of college, those with a high level of trait negative urgency may be particularly at risk for starting this harmful behavior. However, for those young adults who have a history of or are currently engaging in NSSI behavior, those with high levels of lack of perseverance are most at risk for maintaining engagement in NSSI over the first year of college. Interventions to reduce risk of onset may need to differ in some ways from interventions to avoid maintaining the behavior once it starts; there are different interventions associated with negative urgency and lack of perseverance (Zapolski, Settles, Cyders, & Smith, 2010).

The current findings should be considered in the context of the study's limitations. First, there is a need to integrate the risk factors identified in this study with the many other factors associated with NSSI, including childhood abuse and loss (Gratz, 2003), biological vulnerabilities to emotional dysregulation (Linehan, 1993; Nock, 2010), borderline personality disorder features (Glenn and Klonsky, 2011; Lynam et al., 2011), as well as alcohol use, drug use and smoking (Deliberto & Nock, 2008; Serras, Saules, Cranford, & Eisenberg, 2010). An important additional risk factor for why an individual might choose NSSI as a source of negative reinforcement may be a reduced fear of pain (Selby, Connell, & Joiner, 2010). Impulsivity-related personality traits, particularly negative urgency, have been shown to be independently associated with and predictive of some of these more well established NSSI risk factors (Anestis, Selby, & Joiner, 2007; Doran et al., 2013; Pearson et al., 2012; 2014; Settles et al., 2010). The development and longitudinal evaluation of more integrative risk models that includes both trait-based risk factors as well as environmental and behavioral risk factors is clearly necessary.

Second, data were collected by self-report questionnaire using a web-based format, so we did not have the opportunity to clarify questions or responses, particularly concerning the wording of the NSSI measure. Third, the rate of retention was not optimal, although data did appear to be missing completely at random. Fourth, because the typical age of onset for NSSI behavior is between 12–14 years of age (Nock, 2010), the current sample was not ideal for studying the initial experience of self-injurious behavior and we cannot generalize the findings to those individuals who initiate NSSI behavior prior to the college years.

Although this is not the typical study population for self-injury research, it is important to consider and study the experience of this age group (Whitlock et al., 2006). A substantial portion of college-aged women struggles with NSSI: several researchers report a 12-month prevalence rate of over 7% in a college sample (Gollust et al., 2008; Whitlock et al., 2006), and lifetime prevalence rates of 15.3% (Whitlock et al., 2011). The results of the present study show a similar 12-month NSSI prevalence rate of 8% and a slightly higher lifetime prevalence rate of 20.1% (calculated at Time 1). Finally, the sample is made up of predominantly white college women, which limits the generalizability of the findings in two ways. We cannot make any definitive statements about similarities or differences in NSSI and its risk factors as a function of race, and we cannot extend these results to the experience of NSSI in men. We chose to study women because, in light of evidence that negative reinforcement might be a more important contributor to NSSI for them (Whitlock et al., 2006), the study of women appeared to constitute a good first test of our hypothesis. It will, of course, be important to determine whether similar processes operate in men.

In summary, the prospective findings that negative urgency predicted NSSI onset in the first year of college and that lack of perseverance predicted NSSI maintenance months later beyond prior self-injury behavior serve to help clarify the role of impulsivity-related personality in NSSI behavior among young adult women. Perhaps there are two trait-based pathways to risk for NSSI (high negative urgency for onset and high lack of perseverance for maintenance), a possibility that may prove useful for the development of new risk and intervention models. These findings both provide support for existing negative reinforcement models of NSSI risk and provide direction for future research designed to study the roles of distress and impulsivity.

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Table 1

Correlations among key study variables

	NSSI Fx	T1 NU	T1 Plan	T1 Pers	T1 SS	T1 PU	T2 NU	T2 Plan	T2 Pers	T2 SS
NSSI Fx										
T1 NU	.15*									
T1 Plan	.02	.35*								
T1 Pers	.11*	.35*	.43*							
T1 SS	−.04	.07	.28*	−.13*						
T1 PU	.04	.65*	.43*	.37*	.14*					
T2 NU	.18*	.69*	.29*	.31*	.09*	.51*				
T2 Plan	.02	.30*	.65*	.29*	.23*	.37*	.37*			
T2 Pers	.13*	.29*	.32*	.67*	−.09*	.29*	.41*	.51*		
T2 SS	−.04	.05	.23*	−.07	.77*	.12*	.13*	.14*	−.12	
T2 PU	.07	.45*	.30*	.25*	.19*	.61*	.73*	.44*	.38*	.26*

Note. NSSI Fx = mean NSSI frequency at Time 1; this variable was only measured at Time 1. T1 NU = Time 1 negative urgency, T1 Plan = Time 1 lack of planning, T1 Pers = Time 1 lack of perseverance, T1 SS = Time 1 sensation seeking, T1 PU = Time 1 positive urgency. At Time 2, the corresponding variables are denoted with T2 NU, Plan, Pers, SS, PU.

* $p < .01$.

Table 2

Descriptive statistics of the impulsivity traits of NSSI onset, NSSI maintenance and non-NSSI group

Means (SD)	NSSI Onset Group (n=26)	Maintenance Group (n = 34)	Non-NSSI Group (n = 894)	Contrast 1 t-value	Contrast 2 t-value
Negative Urgency	2.32 (.52)	2.47 (.59)	2.03 (.55)	4.88**	1.09
Lack of Planning	2.01 (.44)	2.19 (.65)	1.97 (.44)	2.11*	1.53
Lack of Perseverance	1.96 (.48)	2.25 (.56)	1.79 (.44)	5.23**	2.49*
Sensation Seeking	2.64 (.51)	2.75 (.59)	2.77 (.57)	−1.03	.69
Positive Urgency	1.67 (.46)	1.69 (.68)	1.59 (.48)	1.41	.15
Percentages				Chi Square (df = 6) 9.74	
European American	84%	91%	87%		
African American	8%	6%	10%		
Asian	4%	0%	2%		
Other	4%	3%	1%		

Note. Scores presented for impulsivity-related traits are mean (standard deviation) scores per item, measured at Time 1. NSSI Onset Group = participants who did not endorse having engaged in NSSI at Time 1, but did endorse having engaged at Time 2. NSSI Maintenance Group = individuals who endorsed lifetime NSSI engagement at Time 1 and NSSI engagement in the 6 months preceding Time 2 assessment. Non-NSSI group = participants who did not endorse NSSI at any point in the study. Contrast 1 compares the non-NSSI group to the average of two NSSI groups (onset and maintenance). Contrast 2 compares the NSSI onset group to the NSSI maintenance group.

* $p < .05$;

** $p < .01$. Chi square for group differences by race was not significant.

Table 3

Logistic regression analyses for prediction of NSSI onset.

Prediction of NSSI onset					
Variable	**B**	**SE B**	**Wald**	**OR**	**χ^2**
Step One					**6.87***
T1 Negative Urgency	.46	.23	3.89	**1.58***	
T1 Lack of Planning	−.05	.24	.05	.95	
T1 Lack of Perseverance	.20	.22	.79	1.22	
T1 Sensation Seeking	−.19	.21	.81	.83	
T1 Positive Urgency	−.19	.25	.59	.44	

Note. All impulsivity traits were measured in z-scores.

* $p < 0.05$

Table 4

Hierarchical logistic regression analyses for prediction of NSSI maintenance.

Prediction of NSSI maintenance, all variables

Variable	B	SE B	Wald	OR	χ^2
Step One					**179.02****
NSSI Frequency	2.26	.28	64.81	**9.57****	
Step Two					**10.20***
T1 Negative Urgency	.19	.28	.46	1.21	
T1 Lack of Planning	.26	.24	1.13	1.29	
T1 Lack of Perseverance	.55	.24	5.24	**1.73****	
T1 Sensation Seeking	−.11	.25	.20	.89	
T1 Positive Urgency	−.24	.26	.84	.79	

Note. The NSSI frequency score is the fourth root transformation of the raw score. All impulsivity traits were measured in z-scores; odds ratios.

* $p < 0.05$,

** $p < 0.01$