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Predicting Future Suicide Attempts Among Adolescent and Emerging Adult Psychiatric Emergency Patients

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Abstract

Objective—The purpose of this study was to longitudinally examine specific characteristics of suicidal ideation in combination with histories of suicide attempts and non-suicidal self-injury (NSSI) to best evaluate risk for a future attempt among high-risk adolescents and emerging adults.

Method—Participants in this retrospective medical record review study were 473 (53% female; 69% Caucasian) consecutive patients, ages 15–24 years ($M = 19.4$ years) who presented for psychiatric emergency (PE) services during a 9-month period. These patients' medical records, including a clinician-administered Columbia-Suicide Severity Rating Scale, were coded at the index visit and at future visits occurring within the next 18 months. Logistic regression models were used to predict suicide attempts during this period.

Results—SES, suicidal ideation severity (i.e., intent, method), suicidal ideation intensity (i.e., frequency, controllability), a lifetime history of suicide attempt, and a lifetime history of NSSI were significant independent predictors of a future suicide attempt. Suicidal ideation added incremental validity to the prediction of future suicide attempts above and beyond the influence of a past suicide attempt, whereas a lifetime history of NSSI did not. Sex moderated the relationship between the duration of suicidal thoughts and future attempts (predictive for males, but not females).

Conclusions—Results suggest value in incorporating both past behaviors and current thoughts into suicide risk formulation. Furthermore, suicidal ideation duration warrants additional examination as a potential critical factor for screening assessments evaluating suicide risk among high-risk samples, particularly for males.

Keywords

Suicide; Non-suicidal self-injury; Assessment; Gender

Introduction

Suicide is the 3rd leading cause of death among adolescents and emerging adults ages 15–24 (Centers for Disease Control and Prevention (CDC), 2013). A nationally representative survey of United States high school students indicated that in the past year 15.8% had serious thoughts of suicide, 12.8% had made a suicide plan, and 7.8% had made a suicide attempt (CDC, 2012). Although the rates of suicidal ideation and suicide attempts begin to decline following the late-teens, mortality rates for suicide are higher for those between ages 20–24 (12.5 per 100,000) than those ages 15–19 (7.5 per 100,000; CDC, 2013). Mid-to-late adolescence and emerging adulthood are periods of elevated risk for suicidal behavior that warrant further study to inform prevention efforts.

The developmental processes in adolescence and emerging adulthood play an important role with regard to this increased risk for suicidal behavior. Adolescence and emerging adulthood are characterized by increases in a number of suicide risk factors such as substance abuse (e.g., Harford, Grant, Yi, & Chen, 2005), depression (e.g., Reinherz, Paradis, Giaconia, Stashwick, & Fitzmaurice, 2003), and sensation seeking and risky behaviors (Ortin, Lake, Kleinman, & Gould, 2012). Additionally, these developmental periods are characterized by significant life transitions, such as graduating high school and entering college or the workforce. Without the establishment of appropriate coping mechanisms or support to handle these challenges, these difficulties can translate to suicide risk. Persistent suicidal ideation in adolescence is associated with an increased risk of suicide attempts and psychiatric hospitalizations (Czyz & King, in press), which, in turn, can lead to significant distress and have a negative impact on development. In addition, suicidal ideation in adolescence is associated with an increased risk for suicidal thoughts and behaviors in young adulthood (e.g., Borges, Angst, Nock, Ruscio, & Kessler, 2008; Fergusson, Horwood, Ridder, & Beautrais, 2005). This potential for long-term impairment and high-risk status emphasizes the need to assess and intervene with both adolescents and emerging adults.

Screening for suicide risk in academic, primary care, and psychiatric settings has been implemented in an effort to prevent suicide. In 1996, the U.S. Preventative Task Force recommended suicide screening procedures in the primary care setting (U.S. Preventive Services Task Force, 1996), though a later evaluation of the program deemed the effectiveness of screening in this setting inconclusive (Gaynes et al., 2004). More recently, the U.S. Surgeon General and National Action Alliance for Suicide Prevention released the 2012 National Strategy for Suicide Prevention, which called for screening for suicide risk by primary care providers, emergency departments, and other health care providers (U.S. Department of Health and Human Services, 2012). While screening in broader populations may help identify those potentially at-risk and facilitate transfer to appropriate care, the majority of those meeting at-risk criteria do not go on to attempt or die by suicide. An ongoing challenge exists to determine which individuals, among an at-risk group, will actually go on to make suicide attempts.

A number of suicide screening tools have been validated for use with high-risk populations. For example, Huth-Bocks and colleagues (2007) evaluated the predictive validity of a number of self-report assessment measures in a sample of 289 psychiatrically hospitalized

adolescents. They identified the Suicidal Ideation Questionnaire-Junior, Beck Hopelessness Scale, Reynolds Adolescent Depression Scale, and Suicide Probability Scale as predictors of a future suicide attempt within 6 months of administration. In a study of over 3,000 adults from an outpatient clinic, Beck and colleagues (1999) examined the Beck Scale for Suicide Ideation and found that suicidal ideation at the time of assessment was associated with a 5.4-fold increase in odds for dying by suicide. In a validity study, Posner and colleagues (2011) examined the Columbia-Suicide Severity Rating Scale (C-SSRS) across three different samples—adolescents who had attempted suicide, depressed adolescents in a medication efficacy trial, and adults presenting for services at a psychiatric emergency department. Results from this study indicated that past week and worst-point (lifetime) suicidal ideation severity, as measured by the C-SSRS, were significant predictors of future suicide attempts. Despite the predictive validity of these scales, the problem of over-prediction or “false positives” remains. A more fine-grained examination of risk factors for suicide is indicated.

Suicidal ideation has been established as a primary risk factor for suicide (e.g., Brown, Beck, Steer, & Grisham, 2000). However, suicidal thoughts may vary in persistence, content, methods, and intent, among other characteristics. This complexity has led researchers to examine suicidal ideation more specifically. For instance, the C-SSRS is composed of two subscales that assess different aspects of suicidal ideation: suicidal ideation severity and suicidal ideation intensity. The suicidal ideation severity subscale (SI Severity) assesses the type of suicidal thoughts, including the presence of specific plans and the intent to act on them. Posner et al. (2011) examined this scale prospectively and documented its significant predictive validity for future suicide attempts. The C-SSRS suicidal ideation intensity subscale (SI Intensity) assesses components of ideation such as how often thoughts occur, how long they last, and how difficult they are to control. This scale has been found to correlate significantly with depressive symptoms and suicidal ideation items of other measures (Posner et al., 2011). The C-SSRS scales were also examined by (Removed for Blind Review) in a sample of adolescents seeking psychiatric emergency services. These investigators found that SI Intensity, and specifically the SI Intensity scale’s duration item (i.e., how long suicidal thoughts last) were significant predictors of future suicide attempts. Further research is necessary to determine the role of the severity and intensity of ideation in relation to suicide risk, and whether there may be particular characteristics within these qualities of suicidal ideation that more precisely identify risk.

Previous suicidal behaviors are the strongest predictors of future suicidal behaviors, such as suicide attempts (e.g., Brent, Baugher, Bridge, Chen, & Chiappetta, 1999; Lewinsohn, Rohde, & Seeley, 1996). Furthermore, adolescents who have made multiple past attempts are significantly more likely to make a future attempt in comparison to adolescents with one past attempt or only suicidal ideation (e.g., Miranda et al., 2008). Similarly, a study by Goldston and colleagues (1999) longitudinally examined a sample of 180 psychiatrically hospitalized adolescents and found that the number of past suicide attempts was the strongest predictor of a future suicide attempt post-hospitalization. Suicide attempts in adolescence convey a long term risk, as a longitudinal birth-cohort study by Fergusson and colleagues (2005) indicated that those who made a suicide attempt prior to age 18 were 17.8

times more likely to make a suicide attempt between the ages of 18–25, even while controlling for a number of risk factors (e.g., psychiatric history, low self-esteem).

Non-suicidal self-injury (NSSI) is differentiated from suicide attempts by intent to die. Any self-injurious behavior (e.g., cutting) with at least some (nonzero) intent to die from the behavior can be defined as a suicide attempt (O'Carroll, Berman, Maris, & Moscicki, 1996). Nock and Kessler (2006) determined that those with intent to die during self-injury are significantly more likely to sustain medically lethal injuries and ultimately die by suicide. However, even if no suicidal intent is present during self-injury (i.e., NSSI), especially if done over a long period of time and with a variety of methods, NSSI is associated with an increased risk for making suicide attempts (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). A study by Whitlock and colleagues (2013) suggested that NSSI serves as a “gateway” to suicidal behavior by reducing inhibition toward an attempt through habituation to self-injury. This gateway function of NSSI aligns with the interpersonal theory of suicide, which argues that the desire to die and the capability to do so are necessary for a suicide to occur (Joiner, 2005; Van Orden et al., 2010). Only a few studies have longitudinally examined NSSI as a predictor of future suicide attempts (for a review, see Hamza, Stewart, & Willoughby, 2012), and results seem to differ by sample. Guan and colleagues (2012) found in a community sample that NSSI was a significant predictor of future suicidal thoughts and behavior, even when controlling for baseline suicidal ideation and past suicide attempts. However, in a sample of psychiatric hospitalized adolescents, Prinstein et al. (2008) found that while NSSI predicted a slower remission of suicidal ideation, it did not predict future suicide attempts. Other studies have indicated that NSSI may be a better predictor of a future suicide attempts than a past attempt in adolescents with depression (Asarnow et al., 2011; Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011). It is unknown whether these variations in the predictive ability of NSSI and past attempts are related to differences in samples, operationalization of variables, or other methodological variations. As such, additional longitudinal research on past suicide attempts and NSSI as predictors of future suicide attempts is needed.

Despite substantial research delineating these risk factors, there is limited information available about how these vary by sex. In a national survey of high school students, females, in comparison to males, were more likely in the past year to endorse serious thoughts of suicide (19.3% vs. 12.5%), a suicide plan (15.0% vs. 10.8%), a suicide attempt (9.8% vs. 5.8%), and a suicide attempt requiring medical attention (2.9% vs. 1.9%; CDC, 2012). However, adolescent males in the United States are more than 3-times more likely to die by suicide than females (CDC, 2013). This disparity between suicidal ideation and attempts for females and suicide deaths for males has been referred to by some as the gender paradox of suicidal behavior (Canetto & Sakinofsky, 1998).

This gender paradox may be partially explained by a finding by Nock and Kessler (2006) that indicated more females than males engage in self-injury, but men engaging in self-injury were more likely to have intent to die, whereas females were more likely to engage as a means of communication. Additionally, psychological autopsy studies have indicated that males are more likely than females to use lethal means and to be intoxicated at the time of suicide (e.g., Marttunen, Aro, Henriksson, & Lonnqvist, 1991). Furthermore, the long-term

significance of suicidal ideation and behavior may differ across sexes. Lewinsohn and colleagues (2001) reported that suicidal ideation and suicide attempts in childhood/adolescence were predictive of young-adulthood suicide attempts for females, but not males. Similarly, a study by King and colleagues (in press) indicated that for psychiatrically hospitalized adolescents, suicidal ideation was a predictor of a suicide attempt for females during the 12-month post-hospitalization period, but not for males. Research related to sex differences in outcomes for NSSI has been limited, but studies do suggest that although females engage in NSSI more often than males, there may be different indicators and outcomes based on sex (e.g., Bakken & Gunter, 2012).

The present study seeks to longitudinally examine specific characteristics of suicidal ideation in combination with suicide attempt history to best evaluate risk for a future attempt among high-risk adolescents and emerging adults. It is hypothesized that suicidal ideation severity, suicidal ideation intensity, any lifetime suicide attempt, and any lifetime history of NSSI will be significant independent predictors of future suicide attempts. Additionally, it is hypothesized that suicidal ideation severity, suicidal ideation intensity, and a lifetime history NSSI will provide incremental predictive validity above and beyond the influence of a lifetime suicide attempt in predicting future suicide attempts. In order to examine whether the relationship between these risk factors and future attempts varies for males and females, sex will be examined as a moderator. Additionally, because this sample ranges from mid-late adolescence to emerging adulthood, age will be examined as a possible moderator of effects.

Method

Participants

Participants were 473 patients (253 female, 220 male), ages 15–24 ($M = 19.38$, $SD = 2.9$; 48% were 18 and under, 76% were 21 and under), seeking services from a university hospital's psychiatric emergency (PE) department, located in the Midwestern United States. The racial/ethnic distribution for this sample was: 69.2% White ($n = 327$), 16.8% Black ($n = 80$), 5.1% Asian ($n = 24$), 2.1% Hispanic ($n = 10$), and 6.8% Multi-racial ($n = 32$). A total of 297 (62.7%) patients were covered by private insurance, while 125 (26.5%) received coverage through Medicaid, and 51 (10.8%) patients had no health insurance coverage. The majority of patients (62.6%) had never made a previous visit to this PE department, whereas 17.8% had presented for one prior visit, and 19.7% had presented for two or more prior visits.

Inclusion criteria included residence in the local county of the hospital (to maximize capture of return visits) and an initial presentation between October 1, 2009 and June 30, 2010. Slightly more than half of the sample (51.6%) presented for services related to suicide (e.g., thoughts, attempts). Other reasons for visits included, but were not limited to: depression, anxiety, psychosis, manic symptoms, and non-suicidal self-injury. Over a third (34.9%) were psychiatrically hospitalized following the emergency presentation, whereas 63% were discharged home for outpatient care. The remaining 2.1% of patients were referred to partial-hospitalization programs.

Measures

Patient Data—Patient data from the PE visit were collected from electronic medical records with all information de-identified. The following variables were coded: race/ethnicity, sex, insurance (dichotomized for socioeconomic status (SES) in analyses as public/no insurance vs. private insurance), reason for visit, disposition, psychiatric history (yes/no to prior contact with mental health professional or prescription of psychotropic medication), history of physical abuse (yes/no), history of sexual abuse (yes/no), and past PE visits. Although all medical charts had a required and completed coding field for history of abuse, the manner in which this was assessed is unknown to study authors. Twenty percent of the medical forms were independently coded; excellent inter-rater reliability was established (Cohen's Kappa .79–.98).

Suicidal Thoughts and Behavior—The Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) is a semi-structured clinical interview that was used to assess for suicidal ideation severity, suicidal ideation intensity, and suicidal behaviors. The version of the C-SSRS used in this study assessed suicidal ideation in the past week and suicidal behaviors for both the past week and lifetime. The SI Severity scale is composed of five yes/no questions of increasingly severe suicidal thoughts in the past week [(1) a wish to be dead; (2) suicidal thoughts; (3) suicidal thoughts with a method; (4) suicidal intent (without specific plan); (5) suicidal intent with specific plan]. This scale is scored from 0–5 according to the most severe suicidal ideation endorsed. The SI Intensity scale includes five items and is administered to those endorsing at least one question from the SI Severity scale. It has five items (frequency, duration, controllability, deterrents, reasons for ideation) that are scored from 1–5 and summed for the total SI Intensity score. Suicidal behaviors are assessed dichotomously (yes/no) and include actual suicide attempts, interrupted suicide attempts, aborted suicide attempts, other preparatory acts (e.g., collecting pills, writing suicide note), and non-suicidal self-injury (NSSI). The C-SSRS has been validated for use with clinical adolescent and adult populations and demonstrated strong psychometric properties (Posner et al., 2011).

Procedure

The C-SSRS is used as a routine clinical assessment tool in the participating PE department, with completed forms scanned into patients' electronic medical records. Staff were trained in C-SSRS administration through a training video by Posner (2008) and an in-person training session with an author of this study. Institutional Review Board permission was obtained. All patient data were de-identified and coded onto separate data forms. The medical records of patients seeking services during the nine-month presentation period were assessed for future visits during the subsequent 18 months.

Data Analytic Plan

Initial analysis consisted of sex comparisons using t-tests for continuous variables and chi-square analyses for categorical variables. Logistic regressions were used to calculate odds ratios and 95% confidence intervals for making a suicide attempt in the 18-month follow-up period. Those who did not make a return visit were included in the analyses as non-

attempters during the follow-up period. All logistic regressions controlled for age, sex, and SES (Insurance). Since the vast majority of suicide attempts made during follow up were by White participants, we were underpowered to examine race as a covariate. History of sexual abuse and index visit disposition were also examined as covariates but were non-significant when controlling for the main effect variables, and were removed from the regression analyses.

Three of the logistic regressions examined single predictor variables (Lifetime Suicide Attempt, Lifetime NSSI, SI Severity). A fourth logistic regression examined SI Severity and Lifetime NSSI for incremental validity above and beyond past suicide attempts. Additional logistic regressions examined predictors among a subsample of patients experiencing suicidal ideation at index visit. SI Intensity was examined for incremental validity as a predictor of a future suicide attempt above and beyond past suicide attempts. Exploratory logistic regressions examined the individual items of the SI Intensity scale for incremental validity above and beyond suicide attempts.

In the final step of all regressions, age and sex were examined as moderators between main effect variables and future suicide attempts. All regressions utilized a backward selection procedure to remove non-significant interaction variables ($p > .05$), allowing for concise final models. The displayed tables contain the final reduced models. Stepwise analyses are described in-text. The Hosmer-Lemeshow goodness of fit test was insignificant ($p > .05$) for all regressions, suggesting the models fit the data well.¹

Results

Sex Differences in Index Visit Clinical Characteristics

There were no significant sex differences for a psychiatric history or a history of physical abuse, however females were more likely to report histories of sexual abuse, NSSI, and suicide attempts (See Table 1). Females were also more likely to endorse suicidal thoughts (SI Severity = 2) in the past week ($\chi^2 = 4.80$, $df = 1$, $p = .028$). No sex differences were evident for suicidal intent (SI Severity = 4) or a suicide attempt in the past week. Among those with at least some suicidal ideation, there were no sex differences in intensity (SI Intensity) (Table 1).

Future Attempter Index Visit Clinical Characteristics

During the 18-month period following the index visit, 31.1% of patients (77 female, 70 male) made return visits for PE services. 18.2% (46 female, 40 male) were psychiatrically hospitalized at least once (not including index visit hospitalizations), and 7.2% (16 females, 18 males) attempted suicide at least once. Two patients, both males, died during this period, though the cause of death is not yet known to authors. As displayed in Table 2, the index visit clinical characteristics of those who made a suicide attempt during the 18-month follow-up period differed from those who did not make an attempt during this period. At

¹134 of the 473 participants in this study, ages 15–17, were included in the (Removed for Blind Review) study. The significance of results from regression analyses in the present study did not differ when these 134 participants were excluded. Therefore, the presented regressions included all patients.

index visit, those who went on to make a future attempt were more likely to have endorsed suicidal ideation ($\chi^2 = 7.14$, $df = 1$, $p = .008$) and suicidal intent ($\chi^2 = 21.57$, $df = 1$, $p < .001$). Additionally, those who made future suicide attempts were more likely to initially present with no/public insurance, a past week suicide attempt, lifetime histories of sexual abuse, suicide attempts, and NSSI, and higher SI Severity and SI Intensity scores (See Table 2).

Logistic Regressions Predicting Future Suicide Attempts

Table 3 contains the final logistic regression models for index visit reports of Lifetime Suicide Attempt, Lifetime NSSI, and SI Severity as independent predictors, as well as one (model 4) containing all three predictors. When examined separately, all three variables were significant predictors of a future suicide attempt, in addition to SES. Lifetime Suicide Attempt was associated with a 4.8-fold increase in odds, Lifetime NSSI was associated with a 3.1-fold increase in odds, and each incremental point in SI Severity was associated with a 1.5-fold increase in odds. Sex and age did not moderate any of these relationships with future suicide attempts. In a stepwise model examining incremental validity, a step of SI Severity ($\chi^2 = 7.54$, $df = 1$, $p = .006$) significantly added to the predictive validity of the initial model examining Lifetime Suicide Attempt, SES, Age, and Sex ($\chi^2 = 27.53$, $df = 4$, $p < .001$), whereas a step of Lifetime NSSI ($\chi^2 = 2.76$, $df = 1$, $p = .096$) did not add predictive validity when added to the initial model. The final model with SI Severity, Lifetime NSSI, and Lifetime Suicide Attempt simultaneously examined can be seen in model 4 of Table 3.

Logistic Regressions Predicting Future Suicide Attempts Among Index Visit Ideators

Table 4 contains the final models for predicting future suicide attempts among index visit suicide ideators. In a stepwise model examining incremental validity, a step of SI Intensity ($\chi^2 = 6.77$, $df = 1$, $p = .009$) significantly added to the predictive validity of the initial model examining Lifetime Suicide Attempt, SES, Age, and Sex ($\chi^2 = 16.90$, $df = 4$, $p = .002$). Sex and age did not moderate the relationship between SI Intensity and future suicide attempts. In exploratory regressions examining the individual intensity items, only Frequency (i.e., how many times did you have these thoughts in the past week?) and Duration (i.e., when you have these thoughts, how long do they last?) were significant predictors of future suicide attempts. Controllability, Deterrents, and Reasons for Ideation were not significant predictors. In a stepwise model examining incremental validity, a step of Frequency ($\chi^2 = 5.78$, $df = 1$, $p = .016$) significantly added to the predictive validity of the model predicting attempts, which included Lifetime Suicide Attempt, SES, Age, and Sex ($\chi^2 = 18.59$, $df = 4$, $p = .001$). Sex and age did not moderate the relationship between Frequency and future suicide attempts. In an additional stepwise model, a step of Duration and Duration*Sex ($\chi^2 = 13.35$, $df = 2$, $p = .001$) significantly added to the predictive validity of the model predicting attempts, which included Lifetime Suicide Attempt, SES, Age, and Sex ($\chi^2 = 17.73$, $df = 4$, $p = .001$). Duration was a significant predictor of future suicide attempts for males (each incremental point associated with a 3.0-fold increase in odds for a future attempt), but not for females, controlling for the influence of Lifetime Suicide Attempt (4.3-fold increase in odds for a future attempt) (Figure 1). Age did not moderate this relationship.

Discussion

This study examined several characteristics of suicidal ideation, including severity and intensity, a lifetime suicide attempt, and lifetime NSSI as predictors of future suicide attempts among adolescents and emerging adults, while controlling for demographic factors such as age, sex, and SES. This study also examined age and sex as moderators of the relationship between these predictors and future suicide attempts. As hypothesized, SI Severity, SI Intensity, Lifetime Suicide Attempt, and Lifetime NSSI were each significant independent predictors of a future suicide attempt. Having public/no medical insurance predicted future suicide attempts for the full sample, even when controlling for the effects of suicidal ideation and suicide attempt history. This is consistent with past studies demonstrating an increased risk of suicide attempts among adolescents and emerging adults from lower socioeconomic backgrounds (e.g., Beautrais, Joyce, & Mulder, 1998). Past suicidal behavior and index suicidal ideation variables remained predictive of future attempts while controlling for one another, pointing to the importance of considering both history of suicidal behavior and characteristics of current suicidal thoughts in risk formulation.

Age did not moderate the relationship of SI Severity, SI Intensity, Lifetime Suicide Attempt, or Lifetime NSSI with future suicide attempts, suggesting that despite lowered overall rates of suicidal thoughts and behavior, the presence of these risk factors conveys as much risk for emerging adults as it does for adolescents. While a number of social and individual risk-factors change based on contextual differences in the transition from adolescence to young adulthood (e.g., Hooven, Snedker, & Thompson, 2012), these primary risk factors (i.e., suicidal ideation, past attempts, lifetime NSSI) appear to be fairly stable in their predictive power of future attempts for adolescents and emerging adults.

Despite substantial sex differences in the prevalence rates of NSSI, suicidal ideation, and suicide attempts, sex did not moderate these predictors. Since the participants of this sample were all seeking emergency services for a psychiatric problem, there may have been homogeneity in the severity of clinical presentations across sexes. This may account for the absence of sex differences in the predictive validity of variables reported in a community/non-clinical sample (Lewinsohn et al., 2001). Additionally, King and colleagues' (in press) study of psychiatrically hospitalized adolescents used the Suicidal Ideation Questionnaire—Junior (SIQ-JR; Reynolds, 1987), so the inconsistency regarding the effects of sex on suicidal ideation and future suicide attempts may be based on differences in the measurement of suicidal ideation. Specifically, higher scores on the C-SSRS Severity scale reflect thoughts regarding suicidal method and intent whereas higher scores on the SIQ-JR may reflect more frequent suicidal thoughts of multiple types.

While Lifetime NSSI was a significant independent predictor of future suicide attempts, it lost significance when controlling for a Lifetime Suicide Attempt (with and without also controlling for SI Severity). This finding stands in contrast to the predictive ability of NSSI in community (Guan et al., 2012) and clinically depressed samples of adolescents (Asarnow et al., 2011; Wilkinson et al., 2011). In concordance with the suggestion that NSSI serves as a gateway to suicidal behavior (Whitlock et al., 2013), it may be that NSSI is particularly

predictive of future suicide attempts among those who have not yet made a suicide attempt or with younger age groups who have not yet reached the peak of suicidal risk occurring in the late-teens. This would align with the Interpersonal-Psychological Theory of Suicidal Behavior (Joiner, 2005; Van Orden et al., 2010), as a past suicide attempt may represent a higher level of acquired capability – conceptualized as fearlessness about physical pain and death itself acquired through risky behaviors or painful and provocative experiences that habituate a person toward suicidal behaviors-- for a future attempt, which would explain why NSSI was no longer predictive once a past attempt was accounted for. However, it may be that due to the age of this sample, lifetime histories of NSSI were more distal for older participants (e.g., 6 years ago for a 23 year old), and no longer associated with higher pain tolerance or acute distress. Additionally, this study did not differentiate those with chronic NSSI from those with single or few NSSI events, which may have also contributed to non-significant findings. We were underpowered to detect whether NSSI might be predictive specifically for non-attempters, as patients with a past suicide attempt made 22 of the 34 follow-up suicide attempts in this study. Further examination of NSSI as a predictor of suicide attempts is warranted.

The exploratory analysis of suicidal ideation characteristics revealed that the SI Intensity's frequency item (1–5) at index was associated with a 1.5-fold increase in the likelihood of a future suicide attempt, even while controlling for the 6.3-fold increase of having a prior suicide attempt. This finding suggests that the frequency item, which assess the number of times per week one is experiencing suicidal ideation, may be a particularly important predictor of future attempts. This finding is consistent with previous studies suggesting suicidal ideation becomes increasingly predictive of suicide attempts as it increases in frequency or occurrence (e.g., Lewinsohn et al., 1996). The exploratory analyses also revealed that for males, each incremental point on the SI Intensity's duration item (1–5) at index visit was associated with a 3.0-fold increase in the likelihood of a future suicide attempt, even while controlling for the 4.3-fold increase of having a prior suicide attempt; whereas the duration item held no predictive value of future female suicide attempts. It may be that for males, resisting action is more difficult when dealing with persistent thoughts of suicide that last for 4–8 hours or even more than 8 hours every day. (Removed for Blind Review) found the duration item of the SI Intensity scale to be predictive of future suicide attempts, and suggested this item may reflect a ruminative process by which the persistence of thoughts align with the attentional-fixation component to Wenzel and Beck's (2008) cognitive model of suicidal behavior. The duration of the suicidal thoughts may reflect a continuous reflective process and preoccupation with suicide, and it may be that males feel the need to act upon these thoughts more so than females. However, there remain alternative possibilities (e.g., agitation, sleep disruption) to the unique predictive ability of this scale item that warrant further exploration and study. Should future research replicate this finding, there are substantial implications to adding an assessment of duration of suicidal thoughts as a component of screening materials used for assessing suicide risk.

This study adds to the existing literature on the validity of the C-SSRS as a screening tool for longitudinally predicting future suicidal behaviors among adolescents and emerging adults seeking PE services. While several items from the C-SSRS were significant independent predictors of future attempts, there remain individuals who would appear to be

at elevated risk at index visit who did not go on to attempt suicide (i.e., false positives). In order to further improve screening measures such as the C-SSRS, future research on potential critical items, such as the SI Intensity item of “duration”, is warranted. In turn, these identified critical factors, particularly if sex-sensitive, could be differentially applied to the risk assessment of males and females, which would allow for better treatment recommendations and outcomes.

Limitations

This study has several strengths, such as its relatively large sample size and inclusion of all consecutive patients. However, there are several noteworthy limitations. Firstly, PE clinicians administered the C-SSRS, and while they were trained similarly, there is no inter-rater reliability data to assess whether some clinicians differed in scoring the form. Additionally, it is important to note that this study’s sample was presenting for PE services at one particular Midwestern hospital, and due to power constraints in predicting suicide attempts, race/ethnicity was not examined as a moderator of effects. It is unknown whether findings from this study would generalize to other populations, whether based on racial/ethnic differences or on other features such as clinical severity. Another limitation to this study is the potential underestimation of suicide attempts during the follow-up period by considering those who did not make return visits to have not made suicide attempts. To improve validity, the eligibility criteria of the study restricted participants to residents of the local county and the participating hospital provides the only PE services in the area; however, our suicide attempt outcome was a conservative estimate, as individuals may have moved residences during the follow-up period or decided against seeking PE services despite continued psychiatric difficulties (including low-severity suicide attempts). Furthermore, there were only 34 patients identified as attempting suicide during the 18-month follow-up period, so the lack of power may have resulted in larger confidence intervals.

Conclusions

Study results indicate that SES, SI Severity, SI Intensity, Lifetime Suicide Attempt, and Lifetime NSSI are significant independent predictors of a future suicide attempt for male and female adolescents and emerging adults ages 15–24 seeking PE services. Lifetime NSSI was not predictive of future suicide attempts when controlling for SI Severity and Lifetime Suicide Attempt. However, SI Severity and SI Intensity provided incremental validity predicting future suicide attempts above and beyond the influence of past attempts. Despite sex and age differences in the prevalence rates of NSSI, suicidal ideation, and suicide attempts, sex and age did not moderate these predictors. Sex did, however, moderate the relationship between the predictive power of one specific aspect of suicidal ideation and future suicide attempts—the duration of suicidal thoughts. This finding warrants further investigation as a potential critical item for predicting suicide attempts among high-risk samples.

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Figure 1.
Interaction of Duration by Sex

Table 1

Index Visit Clinical Characteristics and Gender Differences

Clinical Variables	Full Sample (N=473)	Males (N=222)	Females (n=251)	Pearson's χ^2
Public/No Insurance	37.3%	39.9%	35.0%	1.16
Psychiatric Hx	74.0%	72.5%	75.3%	0.47
Hx of Physical Abuse	21.4%	18.5%	23.9%	2.07
Hx of Sexual Abuse	19.0%	7.2%	29.5%	37.94***
Lifetime NSSI	45.9%	33.6%	57.2%	24.54***
Past week attempt	7.7%	7.6%	7.8%	0.01
Lifetime attempt	29.8%	25.2%	33.9%	4.20*
Multiple past attempts	15.4%	11.7%	18.7%	4.44*

Suicidal Ideation Scores	Full Sample Mean (SD)	Males Mean (SD)	Females Mean (SD)	t-test
Severity (0–5) n = 441	1.78 (1.9)	1.57 (1.9)	1.97 (1.9)	2.16*
Intensity (5–25) n = 220	14.13 (5.1)	13.89 (5.6)	14.32 (4.6)	0.60
Frequency (1–5)	2.99 (1.5)	2.88 (1.5)	3.07 (1.4)	0.94
Duration (1–5)	2.36 (1.2)	2.28 (1.3)	2.42 (1.2)	0.80
Controllability (1–5)	2.95 (1.5)	2.85 (1.6)	3.03 (1.4)	0.90
Deterrents (1–5)	2.12 (1.5)	2.11 (1.6)	2.13 (1.5)	0.10
Reasons (1–5)	3.71 (1.2)	3.75 (1.2)	3.69 (1.2)	–0.34

Note.

*
 $p < .05$ ***
 $p < .001$

Hx = History.

Table 2

Index Visit Clinical Characteristics of those Attempting and Not Attempting During 18-Month Follow-Up

Clinical Variables	No attempt (N=439)	Later attempt (n=34)	Pearson's χ^2
Public/No Insurance	35.3%	61.8%	9.40**
Psychiatric Hx	73.1%	85.3%	2.43
Hx of Physical Abuse	20.7%	29.4%	1.42
Hx of Sexual Abuse	18.0%	32.4%	4.22*
Lifetime NSSI	44.3%	67.7%	6.40*
Past week attempt	6.6%	22.6%	10.36**
Lifetime attempt	27.1%	64.7%	21.32***
Multiple past attempts	13.7%	38.2%	14.59***

Suicidal Ideation Scores	No attempt Mean (SD) (n = 410)	Later attempt Mean (SD) (n = 31)	t-test
Severity (0–5)	1.68 (1.9) (n = 410)	3.16 (2.2) (n = 31)	4.19***
Intensity (5–25)	13.72 (4.9) (n = 201)	18.26 (4.6) (n = 20)	3.94***
Frequency (1–5)	2.91 (1.5)	3.81 (1.3)	2.73**
Duration (1–5)	2.26 (1.2)	3.40 (1.5)	3.38**
Controllability (1–5)	2.86 (1.5)	3.85 (1.0)	3.88**
Deterrents (1–5)	2.03 (1.5)	2.95 (1.7)	2.65**
Reasons (1–5)	3.68 (1.2)	4.11 (1.2)	1.44

Note.

*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$

Hx = History.

Table 3

Logistic Regressions Predicting Future Suicide Attempts

	B	SE	Wald χ^2 (df = 1)	OR (95% CI)
Model 1 (n = 453)				
Constant	-1.196	1.228	0.949	0.302
Age	-0.144	0.066	4.664	0.87 (0.76, 0.99)*
Sex	0.487	0.382	1.625	1.62 (0.77, 3.44)
SES	0.943	0.384	6.033	2.57 (1.21, 5.45)*
Lifetime Attempt	1.569	0.391	16.138	4.80 (2.23, 10.32)***
Model 2 (n = 423)				
Constant	-2.794	1.407	3.943	0.061*
Age	-0.061	0.069	0.795	0.94 (0.82, 1.08)
Sex	0.603	0.399	2.286	1.83 (0.84, 3.99)
SES	1.031	0.388	7.048	2.80 (1.31, 6.00)**
Lifetime NSSI	1.139	0.425	7.169	3.12 (1.36, 7.19)**
Model 3 (n = 424)				
Constant	-2.257	1.333	2.868	0.105
Age	-0.109	0.071	2.380	0.90 (0.78, 1.03)
Sex	0.527	0.395	1.778	1.69 (0.78, 3.68)
SES	1.164	0.405	8.256	3.20 (1.45, 7.09)**
SI Severity	0.410	0.101	16.535	1.51 (1.24, 1.84)***
Model 4 (n = 422)				
Constant	-2.745	1.451	3.579	0.064
Age	-0.114	0.074	2.388	0.89 (0.77, 1.03)
Sex	0.779	0.419	3.458	2.18 (0.96, 4.95)
SES	0.994	0.421	5.585	2.70 (1.19, 6.16)*
Lifetime NSSI	0.591	0.456	1.682	1.81 (0.74, 4.41)
Lifetime Attempt	1.170	0.462	6.421	3.22 (1.30, 7.96)*
SI Severity	0.265	0.107	6.194	1.30 (1.06, 1.61)*

Note.

*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$.

Table 4

Logistic Regressions Predicting Future Suicide Attempts Among Ideators

	B	SE	Wald χ^2 (df = 1)	OR (95% CI)
Model 1 (n = 215)				
Constant	-5.020	1.966	6.518	0.007*
Age	-0.048	0.092	0.278	0.95 (0.80, 1.14)
Sex	0.635	0.511	1.545	1.89 (0.69, 5.14)
SES	0.662	0.551	1.448	1.94 (0.66, 5.71)
Lifetime Attempt	1.355	0.642	4.457	3.88 (1.10, 13.64)*
SI Intensity	0.143	0.058	6.026	1.15 (1.03, 1.29)*
Model 2 (n = 215)				
Constant	-3.379	1.736	3.788	0.034
Age	-0.112	0.092	1.479	0.89 (0.75, 1.07)
Sex	0.750	0.501	2.238	2.12 (0.79, 5.66)
SES	0.889	0.533	2.782	2.43 (0.86, 6.91)
Lifetime Attempt	1.840	0.609	9.132	6.30 (1.91, 20.78)**
SI Frequency	0.430	0.190	5.130	1.54 (1.06, 2.23)*
Model 3 (n = 215)				
Constant	-2.785	1.846	2.276	0.062
Age	-0.044	0.096	0.209	0.96 (0.79, 1.16)
Sex	-2.835	1.560	3.303	0.06 (0.01, 1.25)
SES	0.662	0.570	1.347	1.94 (0.63, 5.93)
Lifetime Attempt	1.451	0.630	5.312	4.27 (1.24, 14.67)*
SI Duration	-0.022	0.288	0.006	0.98 (0.56, 1.72)
SI Duration X Sex	1.092	0.445	6.018	2.98 (1.25, 7.13)*

Note.

*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$