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Characterizing gender differences in nonsuicidal self-injury: Evidence from a large clinical sample of adolescents and adults

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Abstract

While nonsuicidal self-injury (NSSI) is common in both men and women, research exploring the intersection of NSSI and gender has been limited by the use of small samples of males drawn primarily from non-clinical populations. To address these limitations, we analyzed data from a large sample of patients enrolled in an NSSI partial hospitalization program (PHP) to compare males and females across several variables, including NSSI characteristics, correlates, and pre-post treatment outcomes. Results indicated similar NSSI characteristics and treatment outcomes for males and females, with few exceptions. Males notably reported lower severity levels for most NSSI correlates (e.g., psychopathology, suicidality), highlighting the need to screen males for NSSI even when reporting comparatively less impairment. Finally, our results also suggest that PHP treatment for NSSI can be beneficial for both males and females. These findings have implications for the assessment, diagnosis, conceptualization, and treatment of NSSI in males and females.

Keywords

nonsuicidal self-injury; self-mutilation; deliberate self-harm; suicide; treatment; gender

1. Introduction

Nonsuicidal self-injury (NSSI) is the intentional, direct injury to one's own body without suicidal intent [1]. NSSI is associated with negative physical and psychological outcomes,

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including tissue damage, depressive and anxiety disorders [2], eating disorders [3], and substance use [4]. Most notably, extensive cross-sectional and longitudinal research indicates that NSSI is one of the strongest correlates of suicidal ideation and attempts [5–7].

Early NSSI research primarily focused on understanding these behaviors in females, due to the assumption that females were more frequently affected than males [8, 9]. Variability in findings are evident, however, with some studies of adults indicating equal or higher prevalence in males when compared to prevalence rates in females [10, 11]. Similarly, within school-based adolescent samples, findings differ on rates across genders, with some data suggesting that gender differences occur more commonly in older adolescents [12–14]. Recent meta-analytic work suggests that, while females continue to be overrepresented, the average lifetime NSSI prevalence rate among males in the general population is over 26% [15].

To date, relatively few studies have examined differences in NSSI characteristics between males and females beyond prevalence rates. Findings from studies of undergraduate college students suggest that females and males do not differ in number of NSSI methods used [16, 17], but that differences may exist for other aspects of NSSI, such as medical severity [16], the relevance of social and internal functions of self-injury [17], and corporeal location of the injury [14, 17]. In addition, Bresin and Schoenleber [15] found that certain methods of NSSI were more commonly reported among females (i.e., cutting), whereas other methods did not show a gender disparity (i.e., burning or self-hitting).

In addition to understanding how NSSI itself may differ by gender, research utilizing nonclinical adolescent and young adult samples has examined associations between NSSI and other psychological constructs. For example, some research suggests that NSSI is associated with depression [18–20] and anxiety [21] in similar ways for males and females. In contrast, some correlates of NSSI have only been associated with females, such as spirituality concerns [18], Borderline Personality Disorder (BPD) symptoms [19], sexual assault, drug use, and sexual minority status [22], while there is some evidence that NSSI in men is associated with substance use and African-American ethnicity [22]. Further, NSSI may relate to negative views of one’s own body in different ways for males and females; in one study of undergraduate students, males with a history of NSSI reported similar levels of self-objectification as females with and without a history of NSSI, but higher levels than males without NSSI [23]. Researchers have also suggested that the association between NSSI and suicidality varies by gender; a large longitudinal study of adolescents in China found that the association between attempted suicide and NSSI was stronger for females than males, and that NSSI frequency was associated with increased likelihood for suicide attempts over time for females, but not for males [24].

The vast majority of the existing literature investigating NSSI characteristics and correlates associated with gender have been limited to general population samples; very few have examined clinical populations. The disparity in NSSI prevalence between males and females is generally greater in clinical populations, with females significantly outnumbering males [15]; this may be due to differences in treatment-seeking behavior across genders, in particular the stigma males feel against seeking mental health treatment [25, 26]. Some

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research suggests that other NSSI characteristics in clinical samples may also vary by gender, with females reporting an earlier age of onset than males [27], and males reporting higher NSSI frequency per day and greater pain intensity with NSSI [28]. Interestingly, in the latter study, males also reported differences in the function of NSSI functions, fewer NSSI methods, and lower intensity of emotions before and after NSSI. These findings present a mixed picture regarding the severity of NSSI in clinical samples of males and females.

Regarding common NSSI correlates, Islam and colleagues [29] found no differences between genders on clinical severity of non-NSSI pathology (e.g., eating disorder symptoms, stealing, alcohol/drug use). Rizzo and colleagues [30] expanded on this work, showing an association between NSSI and physical aggression among males, in contrast to associations among females between NSSI and anger, hostility, and verbal aggression, but not physical aggression. These differences may be due to the gendered implications of aggression; physical aggression may be more socially acceptable for males, providing a socially sanctioned and covert method for NSSI. Kicking or punching walls for example, can lead to significant injury, but may be viewed as aggression turned outwards instead of inwards, and may not be noticed as a method of NSSI [31]. Indeed, research has indicated that gender role expectations and performance may influence the diagnosis, treatment, and conceptualization of NSSI in men and women [32, 33].

Researchers have begun the important task of clarifying the nature of NSSI in males when compared to females, both with respect to the injury itself as well as numerous correlates, yet the existing literature remains limited in several ways. First, because much of the existing research has focused on nonclinical samples of adolescents and young adults, it is unclear what gender differences, if any, exist for individuals with clinically significant and impairing NSSI. Second, given significantly greater gender differences in NSSI prevalence in clinical samples compared to nonclinical samples [15], existing work in clinical samples includes too few males to address nuanced differences between genders. Third, in many cases, assessment tools for NSSI have been limited in scope, making it difficult to evaluate the multitude of ways in which NSSI may differ between females and males. Finally, large gaps in the literature exist with regard to NSSI and gender; for instance, no research has described differences in treatment outcomes for NSSI, or whether NSSI Disorder criteria are associated with clinical severity differently for each gender.

To address these issues, the current study used data collected during routine clinical evaluation and outcomes assessment at a partial hospitalization treatment program for NSSI. This sample provides a unique opportunity to investigate how NSSI characteristics and correlates are associated with gender in a large, diverse group of adolescents and adults, all of whom experienced clinically significant NSSI at the time of assessment. Our study had three primary research questions. First, we aimed to investigate how NSSI phenomenology (e.g., methods, location, functions, proposed DSM-5 NSSI disorder criteria) differed between males and females in an acute care setting. Based on prior research, we hypothesized that female self-injurers would be more likely to report cutting behavior [15, 17, 28], higher levels of the affect regulation function of NSSI [17, 28], engaging in NSSI on their arms or legs [14, 17], and experiencing stronger craving for NSSI [34] than males.

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Second, we examined differences between males and females on known NSSI correlates (e.g., BPD symptoms, suicidality, comorbid diagnoses, psychopathology, quality of life). Given large, well-designed studies highlighting gender differences in BPD symptoms [19] and suicidality [24] among self-injurers, we hypothesized that females would endorse more BPD symptoms and a more significant history of suicidality than males. Third, we evaluated whether, and to what extent, males and females differ in their response to clinical intervention on relevant outcome variables (e.g., suicidality, NSSI urges, BPD symptoms, overall psychopathology, and quality of life). As the intervention being evaluated has primarily been validated in females [34], there was insufficient evidence to support a specific hypothesis about the relationship between gender and treatment outcomes for NSSI.

2. Methods

2.1. Subjects and Procedures

To examine potential gender differences among self-injurers within a clinical setting, we utilized data that were collected as part of routine clinical care and program evaluation for an acute NSSI treatment program at a large private behavioral health hospital in the Midwestern United States. The treatment program, which, for the majority of patients, involves partial hospitalization as well as a step down to intensive outpatient treatment, enrolls individuals ages 11 and up for whom self-injury, including both nonsuicidal and suicidal, are the primary presenting problem. While patients are referred to this program for NSSI and/or suicidal thoughts and behaviors, only patients who reported engaging in at least 1 episode of NSSI in the year prior to treatment intake were included in these analyses. Further, patients often present with comorbid mental disorders, such as mood, anxiety, eating, and substance use disorders.

The treatment program is designed as a three-week, group-based intervention, based on the Emotion Regulation Group Therapy treatment model [35]. The program aims to teach patients skills to adaptively identify and respond to their emotions with the goal of reducing the frequency of self-injury. Examples of topics covered in the curriculum include emotional awareness, functions and consequences of self-injury, primary and secondary emotions, emotional willingness/unwillingness, impulse control, distress tolerance, and emotion regulation strategies. In addition to primary skills groups, patients also receive individual therapy/case management and family therapy, as well as participate in process, expressive therapy, medication management, and spirituality therapy groups.

All patients are asked to complete assessments at admission and discharge as part of routine clinical assessment and program outcome evaluation. Archival data included in the present study were naturalistically collected between 2007 and 2017 from these intake and discharge assessments and were de-identified prior to analysis according to the Safe Harbor standard (HIPAA Privacy Rule 45 CFR § 164.514[(b][2]). It is important to note that data were collected naturalistically and were not part of a consented research study. All data collection, management, and de-identification procedures were conducted in accordance with the hospital's Institutional Review Board and deemed exempt from further review per federal guidelines.

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2.2 Data Selection Criteria and Screening Procedures

Patients were included in analyses if they completed any portion of the intake or discharge questionnaires described below. Patients were excluded if they had a primary diagnosis of a psychotic disorder, or if they did not report NSSI in the year prior to intake.

Of the 5,383 admissions (male $n = 625$, 11.61%) during the timeframe noted above, 28 were removed due to a primary psychotic disorder diagnosis (male $n = 2$, 7.14%) and 20 (male $n = 5$, 25%) were removed due to entirely missing data on all admission questionnaires. Past year NSSI was considered present if a patient endorsed any NSSI on a measure specifically asking about the year prior to admission. If the patient had not completed the past year NSSI measure but had completed a measure assessing NSSI in the week before entering treatment, and the patient endorsed engaging in NSSI during that week, they were included as having NSSI present. Using this composite measure, a total of 83 assessments were excluded due to reporting zero episodes of past year NSSI on the full measure, and 288 assessments were excluded due to missing data. Missingness on this variable was unrelated to gender (Cohen's $d = .03$, $p = .28$). For analyses focusing on admission data only (questions 1 and 2 above), we used the earliest admission for each patient; after removing later admissions, data were available from 3351 individuals (male $n = 401$, 11.97%) for analysis.

To address question 3 (gender differences in response to NSSI treatment), we used the first complete set of data (admission and matching discharge) for each patient. For occasions when patients were discharged and re-admitted within a 30-day window, we considered the first and second treatment stays to be part of the same treatment period, and the first admission and the last discharge were used to evaluate treatment outcome. A total of 1331 patients had data on an admission and matching discharge; the gender ratio for this subsample (male $n = 148$, 11.12%, female $n = 1183$, 88.89%) was almost identical to that of the admission only sample (male $n = 401$, 11.97%, female $n = 2950$, 88.03%).

2.3. Measures

2.3.1. Demographics—Patient age, gender, and ethnicity were obtained from electronic medical records.

2.3.2. Diagnoses of mental disorders—The supervising psychiatrist for each patient assigned between one and five diagnoses of mental disorders per patient based on ICD-9 diagnostic criteria. Diagnostic data were obtained from electronic medical records.

2.3.3. NSSI characteristics, diagnosis, and life history—All patients completed the Alexian Brothers Assessment of Self-Injury (ABASI) [36], a self-report measure designed to assess a variety of NSSI characteristics and frequent correlates of NSSI. The ABASI assesses 21 different methods of NSSI used in the past year, including methods not typically assessed for in the NSSI literature (e.g., methods not resulting in tissue damage); these methods were excluded from analysis, leaving 14 commonly accepted methods of NSSI. For this study, methods of NSSI were coded as present or absent, and the youngest age of onset reported across all methods of NSSI was used as age of NSSI onset.

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The ABASI also includes single items assessing other features of NSSI including the use of rituals with NSSI, using NSSI to avoid suicide, viewing NSSI as problematic, wanting to stop NSSI, and using substances before NSSI. Additionally, patients reported whether or not they had experienced emotional, sexual, and physical abuse. An item assessing whether patients engaged in NSSI before being hurt by others was excluded from analyses due to concerns about lack of clarity in item meaning.

Finally, the ABASI assesses the diagnostic criteria for NSSI Disorder proposed in the DSM-5 [37], yielding a yes or no summary value for each patient as to whether they meet diagnostic criteria for NSSI Disorder. The ABASI has been shown to be both reliable and valid in a mixed age clinical sample [36].

2.3.4. Recent NSSI frequency and characteristics—The Weekly Treatment Monitoring form [38] was used to assess for impulsivity, frequency, and medical severity of NSSI in the preceding week.

2.3.5. NSSI urges—Patients completed the Alexian Brothers Urge to Self-Injure Scale [34], a measure of the subjective impulsion to self-injure. This measure has been shown to exhibit excellent internal consistency reliability, and to be appropriately correlated with other measures of clinical severity among people who engage in self-injury [34]. This five-item measure yields a total summed score that ranges from 5 to 30, with higher scores indicating greater recent urges to self-injure.

2.3.6. NSSI functions—Patients completed the short form of the Inventory of Statements About Self-Injury (ISAS-SF) [39, 40]. This 26-item measure assesses 13 specific NSSI functions (2 items per function), which are then combined into two overarching factors: interpersonal or internal (e.g., to influence others, to avoid interacting with people) and intrapersonal or social functions (e.g., to change one's mood, to avoid dissociation). The two-factor structure has been well established [41], and the measure has been validated in nonclinical and clinical samples; additionally, the ISAS-SF has almost identical psychometric properties to the original ISAS, including acceptable internal consistency reliability [40].

2.3.7. Impairment and symptoms of psychopathology—Patients completed three self-report measures designed to assess overall functioning and symptoms of psychopathology that are often related to NSSI. The *Short Form of the Quality of Life Enjoyment and Satisfaction Questionnaire* [42] is a 14-item self-report measure of overall quality of life across a variety of domains. The *Behavior and Symptom Identification Scale* [43], a 24-item measure of a variety of psychiatric symptoms, yields a total score that provides an overall estimation of psychopathology severity across multiple domains. Within this measure, a single item in which patients rated their suicidal thoughts over the week preceding the assessment was used to assess for severity of suicidal ideation. Patients also completed the *Borderline Evaluation of Severity over Time* [44], a 15-item measure of BPD symptoms where higher scores are associated with greater BPD symptoms. All of these measures have previously demonstrated appropriate internal consistency reliability and validity.

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2.4. Data Analysis

2.4.1. Multiple imputation of missing data—As these data were collected naturalistically in a treatment setting, some missing data were expected, primarily due to addition or removal of specific questionnaires over the period in which these data were collected. No data were missing on gender, age, primary diagnosis, number of diagnoses, all of which were part of the patient's medical record rather than collected via self-report on a questionnaire. Among questionnaire measures, missing data ranged from 0.03% (number of NSSI episodes in the past week) to 44.82% (a subset of the BASIS-24 items). Items that were added and/or removed together had very similar amounts of missing data; for example, items assessing abuse history, NSSI body locations, and NSSI features consistent with DSM-5 diagnostic criteria were each missing exactly 1479 responses (44.14%), while items on the ISAS-SF ranged from 302 to 360 missing responses (9.01% to 10.74%).

We addressed these missing data through multiple data imputation, consistent with recommendations by Enders [45]. Specifically, we used SPSS version 24.0 to impute missing data for questionnaires using Markov Chain Monte Carlo (MCMC) fully conditional specification for 50 imputations, allowing up to 100 iterations per imputation.

2.4.2 Statistical analyses—Following multiple imputations, a variety of statistical tests were used to address our questions of interest. First, to compare males and females with respect to descriptive and demographic characteristics, independent-samples *t*-tests (for interval data) and chi-squared analyses (for binary and ordinal data) were used. For analyses where data were not imputed (for example, comparing women and men on age, a variable which had no missing data), results were converted to a standard metric of effect size, Cohen's *d* [46], wherein an effect size of .3 to .5 is considered small, .5 to .8 is considered medium, and above .8 is considered large. For analyses using data following multiple imputation, values necessary to calculate a pooled Cohen's *d* were not available, and are therefore not presented here. For questions 1 and 2, we conducted forward entry logistic regressions with gender (females = 1, males = 0) as the outcome variable and NSSI characteristics and correlates as predictor variables, and present odds ratios (OR) as measures of effect size. Per the recommendations of Osborne [47] regarding interpretability of odds ratios, all reported ORs have been converted to be greater than 1.0, with the direction of each effect (higher or lower odds in males compared to females) described in the text. For pre- to post-treatment analyses (question 3), we used linear mixed models to evaluate changes in relevant outcomes over time while modeling number of days in treatment as a within-subjects covariate and gender as a between-subjects covariate, following the recommendations of van Ginkel and Kroonenberg [48]. We chose this method, rather than repeated measures ANCOVA, because SPSS does not support conducting ANOVAs using multiply imputed datasets [48]. Given the number of analyses conducted, we implemented an alpha correction to reduce our Type I error risk, whereby results below the threshold of $p < .01$ were considered statistically significant.

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3. Results

3.1. Demographic and Diagnostic Characteristics

The full sample included 401 males (11.97%) and 2950 females (88.03%). Patients were primarily non-Hispanic white (84.44%), with a mean age of 17.80. Most patients were under the age of 18 at admission (76.24%). There were no significant differences between male and female patients with respect to age (in years and dichotomized into adolescent/adult groups) or ethnicity.

Patients received between one and five diagnoses of mental disorders ($M = 2.37$). The most commonly provided diagnoses were depressive disorders (73.77%), unspecified mood disorders (10.47%), and bipolar spectrum disorders (10.44%). There were no gender differences in total number of diagnoses. With respect to specific disorders, males were more likely than females to have a primary diagnosis of an unspecified mood disorder ($d = .08$, $p = .01$) or of a disorder that did not fit into any of the other categories ($d = .20$, $p < .001$), although this latter result should be interpreted with caution given the very low rate of "other" diagnoses (0.36% of all primary diagnoses, $n = 12$). Information about demographic and diagnostic characteristics of the sample can be found in Table 1.

3.2. Question 1: NSSI Characteristics and Phenomenology

3.2.1. NSSI methods—Patients reported an average of 5.19 NSSI methods in the preceding year. The most commonly endorsed methods were cutting (82.95%), scratching/rubbing/pinching (58.94%), and hitting (43.43%). There were no gender differences in number of NSSI methods ($p = .40$). When all 14 specific methods were entered simultaneously into a logistic regression predicting gender, scratching/rubbing/pinching was significantly more common in females ($OR = 1.62$, $p = .001$), and burning/branding exhibited a trend-level association with male gender ($OR = 1.47$, $p = .02$). Details of this analysis can be found in Table 2.

3.2.2. Body locations—The most commonly endorsed body locations for NSSI were arms (88.21%), followed by legs (59.74%) and abdomen/stomach (30.98%). Male patients reported fewer body locations than women ($p = .001$). We then evaluated differences in specific body locations using logistic regression, with the 7 individual body areas entered simultaneously. Females were more likely to report NSSI on their abdomen/stomach ($OR = 2.39$, $p < .001$) and legs ($OR = 1.77$, $p < .001$), and males were more likely to report NSSI on their torso/chest ($OR = 2.51$, $p < .001$). Results for the full logistic regression can be found in Table 2.

3.2.3. Additional NSSI characteristics—Patients reported on a variety of other characteristics of their NSSI; full details of these analyses can be found in Table 3. There were no differences between males and females with respect to social functions ($p = .93$); however, males reported significantly lower levels of internal functions ($p < .001$) than females.

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There were no significant gender differences in the frequency, medical severity, and impulsivity of NSSI in the week preceding assessment. When asked about recent urges for NSSI, however, males reported lower levels of NSSI urges ($p < .001$).

The remaining NSSI items assessed general experiences with NSSI, not limited to the past week or year. There were no gender differences in age of NSSI onset, use of rituals with NSSI, dissociation during NSSI, wanting to stop NSSI, using NSSI to avoid suicide, viewing NSSI as a problem, or using substances before NSSI. Males were, however, significantly less likely to meet proposed diagnostic criteria for NSSI Disorder ($p < .001$).

3.3. Question 2: NSSI Correlates

To understand how gender might be associated with common correlates of NSSI, we compared males and females with NSSI with respect to quality of life, overall psychopathology, BPD symptoms, suicidality, and abuse history (see Table 4 for details). Male patients reported higher quality of life, lower rates of overall psychopathology, fewer BPD symptoms, and less suicidality than females (all ps < or = .001). Males were less likely to report emotional ($p < .001$) and sexual ($p < .001$) abuse than females, but did not differ in their reported rates of physical abuse ($p = .16$).

3.4. Question 3: NSSI Treatment Outcomes

A total of 1331 patients, of which 11.12% were male ($n = 148$), had available data for both admission to and discharge from treatment. These assessments took place an average of 23.78 days apart ($SD = 80.83$), and length of time in treatment did not differ by gender ($d = .12$, $p = .35$).

Differences between males and females on NSSI treatment outcome variables can be found in Table 5. As in the larger sample of admission-only data, in these analyses, females reported, on average, worse functioning at intake (e.g., lower quality of life, higher psychopathology) than males, although these differences were not statistically significant using our adjusted alpha value (ps = .04 to .16). At discharge, this general pattern continued, although the group differences became substantially smaller, and no group differences were statistically significant (ps = .14 to .99).

We then used linear mixed models to predict change in each outcome variable from gender and number of days in treatment. In each case, the pooled fixed effect of days in treatment was not statistically significant (ps = .19 to .94). Similarly, the pooled fixed effect of gender was not significantly related to change in any of the assessed outcomes using the alpha = .01 threshold (ps = .04 to .34).

4. Discussion

This study yielded several notable findings regarding similarities and differences in NSSI characteristics, correlates, and treatment outcomes for males and females. First, males and females did not differ with respect to most NSSI characteristics (question 1), including body locations, and recent frequency, severity, and impulsivity of NSSI. Males and females also reported similar ages of onset for NSSI, rates of wanting to stop NSSI, identifying NSSI as a

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problem, rituals or substances with NSSI, and dissociation or suicidal thoughts with NSSI, as well as similar rates of social NSSI functions. Although we hypothesized that females would endorse cutting more frequently than males, rates of almost all NSSI methods did not differ by gender; only burning/branding (more common in males) and scratching/rubbing/pinching (more common in females) showed gender differences. This pattern of findings across various NSSI-relevant domains indicates that the way we presently assess NSSI should function equally well for males and females.

There were, however, some NSSI characteristics that differed by gender, with results indicating that in some clinically relevant ways, males presented as less severe than females. Consistent with our hypotheses, males reported lower levels of internal NSSI functions, such as affect regulation, which have previously been associated with suicidality [49]. This finding suggests that clinically severe males may be less likely to use NSSI for regulating internal negative states. Given that most treatments for NSSI heavily emphasize emotion regulation skills [35, 50], this finding suggests that these treatments may be less relevant for males than females. Further, as seen in previous work [34], males in this study reported fewer recent NSSI urges, even though other recent NSSI characteristics did not differ by gender. While male patients may be less likely to actually experience NSSI urges than females, it is also possible that they are less likely to disclose those urges when they occur. It is, therefore, important to consider gender in future studies of the association between NSSI outcomes and NSSI urges, as previous findings showing an association between NSSI urges and poorer treatment outcomes may not necessarily hold true for both genders [36].

While the majority of NSSI characteristics examined were not associated with gender, known correlates of NSSI did show marked differences between males and females (question 2). Self-injuring males exhibited less evidence of impairment and negative correlates of NSSI than females, including fewer symptoms of BPD, lower levels of suicidality and psychopathology, better quality of life, and lower rates of emotional and sexual abuse. This pattern of findings expands upon existing work highlighting the weaker relationship between NSSI and BPD [19] and NSSI and suicidal behavior [24] among males than is found in females.

Males were also less likely than females to meet proposed DSM-5 diagnostic criteria for NSSI Disorder; this result may indicate an actual difference in prevalence of NSSI Disorder by gender, or highlight ways in which the current diagnostic criteria may fail to capture male NSSI and its correlates adequately. For example, prior research has shown that females are more likely than males to view their NSSI as problematic [17], making them more likely to meet the impairment criterion necessary for a DSM diagnosis. Similarly, males in our sample were more likely to be diagnosed with an unspecified or “other” primary diagnosis than females, suggesting that the current diagnostic classification system is not fully capturing the types of problems and difficulties faced by male self-injurers. These results are particularly noteworthy given that all patients were enrolled in a partial hospitalization program for NSSI; that is, even in a sample that already has high clinical severity and impairment, significant gender differences were found. Understanding symptom severity and impairment in self-injuring males may require focusing on constructs that are not typically

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related to NSSI in female-dominant samples, such as physical aggression [30] or substance use [51].

These results suggest that males who seek treatment for clinically severe NSSI may differ in clinical presentation from females, which is important for understanding how to approach assessment and treatment. Of potential importance is the lower level of psychopathology and impairment relative to females, which could result in clinicians minimizing or overlooking the assessment of NSSI with males, even though males are likely to have equally severe NSSI as females. Knowing that males begin NSSI at a later age and present with lower self-reported levels of psychopathology underscores the importance of conducting thorough assessments of NSSI with males regardless of age or reported distress. Further, the fact that males endorse fewer urges and less internally motivated functions for NSSI may suggest that their experience of NSSI as a primary coping strategy differs from the experience of females who engage in NSSI. For example, males may use a wider variety of maladaptive coping strategies compared to females, thus rendering NSSI a less salient strategy to mitigate distress. The finding that males were more likely to have a diagnosis of a substance use disorder indirectly supports the hypothesis that males may resort to additional maladaptive coping strategies for distress.

Underlying personality and other types of pathology are other factors that may partly explain some of the gender differences found in the present study. For instance, NSSI is strongly associated with, and is a diagnostic criterion for, BPD [37], and underlying general personality traits (e.g., elevated neuroticism, impulsivity, low conscientiousness) appear to play a large role in NSSI [52, 53]. Factors associated with elevated BPD traits (e.g., affective instability, emotion dysregulation, impulsivity, relationship difficulties, engagement in self-damaging behaviors) might increase one's propensity to engage in NSSI. In the present study, females reported slightly elevated BPD symptoms in comparison to males, which may have influenced some of the results (e.g., lower quality of life, higher overall psychopathology, history of sexual abuse among females).

In this sample, controlling for BPD symptoms did not change the direction of any of the gender differences noted above, and in most cases did not change the statistical significance of our findings. In particular, gender differences with respect to NSSI methods, body locations, internal (intrapersonal) functions, prevalence of DSM-5 NSSI Disorder diagnosis, overall psychopathology, and history of emotional or sexual abuse all remained statistically significant when BPD was included as a covariate. In contrast, recent NSSI craving, suicidality, and quality of life no longer showed statistically significant differences between males and females when controlling for BPD (ps = .09 to .10). Future studies should further examine gender differences in personality pathology and general personality traits among individuals who engage in NSSI.

In spite of the observed clinical differences, particularly with respect to internally focused NSSI functions, our results regarding the pre-post effect of treatment (question 3) suggest that males and females benefit to a similar degree from partial hospitalization (PHP) treatment. These findings not only support this level of acute care for NSSI, but also the utility of treatments based on Emotion Regulation Group Therapy (ERGT) [35] for both

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males and females, a promising result given that ERGT was originally designed for adult females with BPD. Future research can expand on this work by identifying particular components or characteristics of treatment that are more or less effective for males compared to females.

Several limitations to this work should be considered. First, data were collected as part of routine clinical care, which impacted both the available measures and the data collected. Given limits on patients' time and energy, especially during admission and discharge where patients are expected to complete a large volume of paperwork, many constructs were assessed using brief or single item measures, limiting the ability to evaluate nuances within the data and to evaluate internal consistency for some measures. Additionally, not all patients completed all items or measures, either due to skipping items or changes in assessment measures over time. Limitations on staff time and availability may prevented staff from following-up on missing data. As a result of data not being completely missing at random, it is possible that biases in missing data may have impacted results. With the exception of the diagnoses of mental health conditions, the results are also limited to self-report measures, which have known disadvantages (e.g., potential bias, reliance on retrospective recall, demand characteristics). It is possible that using structured interviews, informant-report methods, or ecological momentary assessment methods might have yielded different results. This is especially important to consider given that there may be gender differences in patients' comfort reporting symptoms of psychopathology in a treatment context.

Second, characteristics of our sample may limit generalizability of our findings. Because all data were collected from patients in a partial hospitalization program, the average clinical severity of NSSI was likely much higher than in a non-clinical sample. Accordingly, it is important to highlight that these results reflect potential gender differences within clinical populations, and may have limited generalizability to nonclinical populations. Additionally, roughly three-quarters of patients were adolescents; it is possible that adults seeking NSSI treatment may differ from the adolescents comprising the majority of this sample. Patients were primarily non-Hispanic white ethnicity and drawn from the Midwestern United States; it will be valuable to replicate this research in other samples that differ in ethnic, racial, geographic, and other demographic characteristics. Similarly, while the present study included a relatively large sample of males, the vast majority (87.97%) of the sample identified as female. To some extent, such a gender discrepancy can be expected for reasons discussed above (e.g., overrepresentation of females in clinical settings [15], males less likely to report NSSI and consider it a problem [17, 33]). A larger, more proportionate male sample could allow for better identification of gender-related differences. Further, we focused only on patients self-identifying as male or female; these results cannot necessarily be applied to individuals who identify as transgender, gender non-conforming, or agender. Additionally, our outcome results are limited to a specific treatment model at a specific hospital; other types of treatments for NSSI may not perform equally well for both genders, and our results should not be interpreted to mean that all treatments for NSSI work equally well for males and females.

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In spite of these limitations, this study provides important information for researchers and clinicians regarding gender differences in NSSI. First, we extended previous research examining NSSI characteristics between genders, concluding that NSSI characteristics do not differ greatly between males and females with clinically severe NSSI. Despite few NSSI-specific differences, clinically impaired males who engage in NSSI report less severe psychopathology than clinically impaired females who engage in NSSI. In the future, it will be important to evaluate other correlates of NSSI that might be elevated in males, such as aggression. Finally, this is the first study to evaluate how gender relates to treatment outcomes for NSSI, suggesting that males and females benefit equally from treatment, at least at the acute level of care. These results can help clinicians consider a variety of relevant factors when assessing and treating self-injuring patients, as well as provide researchers studying NSSI with a variety of future directions to investigate the association between NSSI and gender.

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Highlights

- Nonsuicidal self-injury (NSSI) features are largely similar for males and females.
- Males engaging in NSSI often report less psychopathology than females using NSSI.
- Males and females appear to respond equally well to acute care treatment for NSSI.
- These results have implications for screening, assessment, and treatment of NSSI.

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Table 1

Demographic and clinical characteristics by gender

Variable	Women *M*(*SD*) or *n*(%)	Men *M*(*SD*) or *n*(%)	*d*	*p* value
Age	17.86 (6.89)	17.35 (5.60)	−.08	.16
Ethnicity			.02	.68
Non-Hispanic White	2272 (84.34%)	316 (85.18%)		
Hispanic	256 (9.50%)	35 (9.43%)		
African American	78 (2.90%)	9 (2.43%)		
Other/Multiple	58 (2.15%)	2 (0.54%)		
Asian American	22 (0.82%)	9 (2.43%)		
Native American	8 (0.30%)	0 (0.00%)		
Adjustment Disorder	13 (0.44%)	4 (1.0%)	.05	.14
Substance Use Disorder	12 (0.41%)	4 (1.0%)	.06	.11
Anxiety Disorder	84 (2.85%)	8 (2.0%)	−.03	.33
Bipolar Spectrum Disorder	316 (10.71%)	34 (8.48%)	−.05	.17
Depressive Disorder	2187 (74.14%)	285 (71.07%)	−.05	.19
Eating Disorder	30 (1.02%)	1 (0.25%)	−.05	.13
Impulse Control Disorder	9 (0.31%)	1 (0.25%)	−.01	.85
Unspecified Mood Disorder	295 (10.0%)	56 (13.97%)	.08	.01
Other Disorder	4 (0.14%)	8 (2.0%)	.20	< .001
Number of Diagnoses	2.37 (1.05)	2.43 (1.12)	.06	.23

Note: The statistical test for ethnicity involved a comparison between Caucasian and all non-Caucasian patients. Positive Cohen's *d* values indicate higher values or prevalence in men. Of the 3351 patients total (male $n = 401$), 286 (male $n = 30$) had missing ethnicity information, which we did not impute due to complexities in imputing categorical data; no data were missing for primary diagnosis or age.

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Table 2

Logistic regressions of NSSI methods and body locations on gender

NSSI Methods	More common in	*OR* [95% CI]	*p* value
Block 1			
Cut	Females	1.03 [0.69, 1.53]	.88
Scratch/Rub/Pinch	Females	1.62 [1.22, 2.16]	.001
Burn/Brand	Males	1.47 [1.07, 2.00]	.02
Draw blood	Males	1.19 [0.80, 1.77]	.39
Insert/Embed	Males	1.30 [0.85, 1.97]	.22
Hit self	Females	1.02 [0.74, 1.40]	.92
Bang head/limb	Females	1.02 [0.72, 1.46]	.90
Prevent healing	Females	1.07 [0.76, 1.49]	.70
Fall down	Females	1.05 [0.57, 1.93]	.87
Carve	Females	1.22 [0.90, 1.66]	.21
Break limbs	Males	1.06 [0.54, 2.06]	.87
Gouge	Males	1.10 [0.61, 2.0]	.75
Ingest/Swallow	Females	1.23 [0.73, 2.07]	.44
Make medical condition worse	Females	1.24 [0.83, 1.87]	.30
NSSI Body Locations			
Block 1			
Stomach/Abdomen	Females	2.39 [1.65, 3.46]	< .001
Arms	Males	1.51 [0.94, 2.44]	.091
Breasts/Chest/Torso	Males	2.51 [1.56, 4.03]	< .001
Face	Females	1.07 [0.61, 1.86]	.82
Feet	Females	1.53 [0.80, 2.93]	.20
Genitals/Rectum/Anus	Males	2.47 [0.47, 12.99]	.29
Hands	Females	1.01 [0.71, 1.43]	.96
Legs	Females	1.77 [1.34, 2.34]	< .001

Note: For ease of interpretation, all odds ratios have been converted to be greater than or equal to 1, regardless of the direction of the effect, by taking the reciprocal (1/*OR*) of odds ratios below 1.
The direction of the effect can be found in the column labeled “More common in”.

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Table 3

NSSI characteristics and phenomenology by gender

Variable	Higher levels in	*t* value	*p* value
Social functions	Females	−0.09	.93
Internal functions	Females	−7.20	< .001
Past Week Impulsivity	Females	−1.79	.07
Past Week Frequency	Males	0.63	.53
Past Week Severity	Males	0.14	.89
Past Week Craving	Females	−3.52	< .001
DSM 5 NSSI Disorder	Females	−4.40	< .001
Rituals with NSSI	Females	−1.92	.06
Dissociation with NSSI	Females	−0.43	.67
NSSI as anti-suicide	Females	−1.82	.07
NSSI is a problem	Females	−2.44	.02
Desire to stop NSSI	Males	0.09	.93
Substances before NSSI	Males	0.72	.47
NSSI age of onset	Males	1.61	.11

Note: Positive *t* values indicate higher values or prevalence in men.

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Table 4

NSSI correlates by gender

Variable	Higher levels in	*t* value	*p* value
Quality of life	Males	3.65	< .001
Overall psychopathology	Females	−5.67	< .001
BPD symptoms	Females	−3.28	.001
Suicidality	Females	−3.23	.001
Emotional abuse	Females	−3.75	< .001
Physical abuse	Females	−1.40	.16
Sexual abuse	Females	−4.93	< .001

Note: Positive *t* values indicate higher values or prevalence in men.

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Table 5

Fixed effects of gender and days in treatment on NSSI treatment outcomes

	Gender		Days in treatment	
Variable	***t* value**	***p* value**	***t* value**	***p* value**
NSSI craving	2.07	.04	1.31	.19
Psychopathology	1.49	.14	0.58	.57
Quality of life	−1.50	.13	−1.32	.19
BPD symptoms	0.99	.32	0.08	.94
Suicidality	0.95	.34	0.69	.49

Note: Positive *t* values indicate higher values or prevalence in men.