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Nonsuicidal Self-injury in a College Population: General Trends and Sex Differences

Janis Whitlock, MPH, PhD; Jennifer Muehlenkamp, PhD; Amanda Purington, MPS; John Eckenrode, PhD; Paul Barreira, MD, MPA; Gina Baral Abrams, MPH, MSW; Tim Marchell, PhD; Victoria Kress, PhD; Kristine Girard, MD; Calvin Chin, PhD; Kerry Knox, PhD

Abstract. Objective: To describe basic nonsuicidal self-injury (NSSI) characteristics and to explore sex differences. **Methods**: A random sample from 8 universities were invited to participate in a Web-based survey in 2006–2007; 38.9% ($n = 14{,}372$) participated. Analysis assessed sex differences in NSSI prevalence, practices, severity, perceived dependency, and help-seeking; adjusted odds ratios for NSSI characteristics were calculated by sex status. **Results**: Lifetime NSSI prevalence rates averaged 15.3%. Females were more likely than males to self-injure because they were upset (adjusted odds ratio [AOR] = 1.6; 95% confidence interval [CI] = 1.3–2.1) or in hopes that someone would notice them (AOR = 1.6, 95% CI = 1.1–2.7). Males were 1.6 times (95% CI = 1.2–2.2) more likely to report anger and 4.0 times (95% CI = 2.3–6.8) more likely to report intoxication as an initiating factor. Sexual orientation predicted NSSI, particularly for women (Wald $F = 8.81$, $p \leq .000$). Only 8.9% of the NSSI sample reported disclosing NSSI to a mental health professional. **Conclusions**: NSSI is common in college populations but varies significantly by sex and sexual orientation. NSSI disclosure is low among both sexes.

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Nonsuicidal self-injury (NSSI) is common among community populations of youth and poses an overlooked public health challenge on college campuses. Defined as behaviors in which an individual intentionally harms the body without overt suicidal intent and for reasons that are not socially sanctioned, NSSI typically entails behaviors such as cutting, burning, scratching, and self-battery.[1,2] Studies within adolescent samples show markedly high lifetime NSSI prevalence rates of 12% to 47%,[2–10] whereas lifetime rates among college students have been estimated at 17% to 38%.[11–15] Although the severity and lethality of NSSI varies by individual and population, its link with suicide behavior, psychological distress, disordered eating, and other forms of mental illness[7,16–18] is well documented and points to the need for increased understanding of NSSI characteristics and intervention and prevention opportunities.

Although basic epidemiological and clinical characteristics of NSSI, such as lifetime frequency, age of onset, affected body parts, and form (eg, cutting, burning, etc) are well-studied,[10,11,17,19] very large and notable gaps in knowledge remain. For example, little is known about the external and internal contexts that contribute to the adoption of NSSI, specific routines and habits, contexts within which individuals injure themselves more severely than intended, perceived dependency, and trends in disclosure and help-seeking. Establishing knowledge in these areas is critical in moving beyond clinical treatment and into early intervention and prevention, since despite its prevalence, it is rare for NSSI to attract clinical attention until it is quite advanced and difficult to treat.

The role of sex and sexual orientation in NSSI is similarly underexplored but of high importance, because both areas have been identified as highly salient in intervention and prevention efforts.[11,20] Although many studies show NSSI to be more common in females,[3,5,11,21,22] a number of studies show no difference in prevalence in males and females.[4,15,23–25] Moreover, only limited research has examined sex differences in NSSI characteristics. The studies that do exist are often limited by inclusion of suicide behavior as part of NSSI[3] and by the assessment of a restricted range of NSSI behaviors.[26] Similarly, although the evidence supporting NSSI as an emotion-regulating behavior is strong,[3,19,27,28] there is little understanding of how the psychological functions underlying NSSI vary by sex. Previous studies identify arms, hands, wrists, thighs, and stomach as the primary sites for NSSI activity,[11,26] but, as with function, there exists little understanding of whether males and females are likely to present with differential wound locations. Moreover, no findings related to sex have been reported on NSSI initial motivation, routines and habits, unintended severity, perceived dependency, or disclosure and help-seeking. Equally understudied are differences in NSSI prevalence by sexual orientation, despite multiple indications that these differences may be marked and may interact with sex.[11,20]

Given sex-related differences in disorders related to NSSI, such as suicide behavior and disordered eating,[29] it is likely that there are sex differences in NSSI behaviors with important implications for its detection and treatment as well as for intervention and prevention. This study analyzes data from the largest study conducted in a college population to describe basic NSSI characteristics and to explore sex differences.

METHODS

Sample

A random sample of 36,900 students from 8 colleges and universities in the Northeast and Midwest was invited to participate in a Web-based "Survey of Student Well Being" (SSWB) in the Fall of 2006 and early Winter of 2007. Five of the 8 schools were private, 1 was a mix of public and private, and 2 were public. All but 2 are located in largely urban areas. School size and population varied considerably, ranging from fewer than 2,000 undergraduates to over 11,000 undergraduates. The sample was randomly drawn by each university registrar using specialized software. The demographic profile of those invited matched the student population of these universities. Invitees were sent an e-mail containing descriptive information and a link to the survey.

Response rates from each university ranged from 20% to 48%, with a total of 14,372 respondents (38.9%). This is consistent with response rates from studies with similar populations.[26] Respondents were largely undergraduate students, but 2 schools included graduate students as well. Cases in which NSSI status was not determinable due to missing data ($n = 812$; .05%) were excluded. To better reflect the extent of NSSI in the young adult population, analyses were limited to young adult respondents (under age 25). A total of 11,529 respondents were retained for analysis. The sample was representative of the overall student population across all 8 universities in terms of ethnicity, age, and socioeconomic status (SES), although more females than males participated (57.6% vs 41.7%). Representativeness was established by comparing study sample demographics (sex, race/ethnicity, and SES) to the student population universe from which the sample was drawn.

Study Design and Questionnaire

The survey was administered on a secure Internet server and required 15 to 30 minutes to complete. The study was approved by all participating universities' Committee for Human Subjects. All participants provided online consent before taking the survey and were free to discontinue at any time. Multiple response enhancement strategies (eg, incentives, follow-up reminders, personalized invitations) were employed. Links to local mental health resources were provided throughout the survey.

Assessment of NSSI and Correlates

NSSI was assessed using the Non-suicidal Self-injury Assessment Tool, developed for a previous study.[11] An initial screening question for self-injurious behavior, "Have you ever done any of the following *with the purpose of intentionally hurting yourself*?", is followed by a list of 19 NSSI behaviors. Participants were then asked a series of closed-ended questions that assessed general NSSI characteristics: age of onset and cessation, lifetime frequency, last time individual self-injured, psychological functions (eg, stress relief), motivations for initiating NSSI (eg, self-anger), body areas affected (eg, arms, legs), routines and habits (eg, self-injure in private setting only), perceived dependency (eg, inability to control urge to self-injure), unintended severity (eg, self-injured more severely than expected), and help-seeking and disclosure (eg, saw a mental health professional). These questions were created through a review of the literature, including existing scales, as well as in-depth interviews conducted with individuals with a history of self-injury as well as mental health providers with experience in this area. In order to better understand differences in NSSI function category by sex, function items were grouped into 6 categories based on function similarity: (a) affect regulation, (b) social response, (c) sensation-seeking, (d) self-punishment, (e) self-control, and (f) uncontrolled urge.

In order to better understand the relationship between NSSI and suicide, suicidal intent is not screened out in the preliminary NSSI assessment stage; rather, this is accomplished through assessment of function. Included in the list of NSSI function were items that assessed suicidal intent. Individuals who indicated that they use the behaviors assessed in the NSSI screening question as a means of practicing or attempting suicide were removed from the NSSI sample ($n = 28$).

Demographic characteristics assessed included sex, age, sexual orientation, international student status, race/ethnicity, and father's education level (used as a proxy for SES). These items are reported in more detail in a paper reporting results from another college study using the SSWB.[11] The sexual orientation variable was patterned after Kinsey's conceptualization of a continuum of attraction (eg, "Are you sexually attracted to or aroused by: only males, mostly males, more to males but significantly to females," etc). Response categories were collapsed to create a 5-category sexual orientation variable (eg, heterosexual orientation, mostly heterosexual orientation, bisexual, mostly gay/lesbian, gay/lesbian).

Statistical Analyses

All analyses were weighted to account for the greater number of female respondents using the complex samples module of SPSS version 15 (SPSS, Chicago, Illinois). Generalized linear models were constructed to examine the relationship between NSSI and all correlates. Logistic regressions were computed for dichotomous outcomes and negative binomial regressions were computed for count outcomes. For all models, sexual orientation, ethnicity, and international student status were included as covariates. Table 1 provides descriptive statistics for the sample as a whole and by sex. The effect of sex in the multivariate models is reported either as an odds ratio or as a factor change in the number of events (continuous variables), as appropriate (exp[B]).

RESULTS

Overall NSSI Prevalence by Demographic Characteristics

The overall sample contained significantly more females than males and over half (64.3%) were Caucasian (see Table 1). The majority (90.5%) were attending college as domestic students, and most of the students reported that their fathers had a college education. Nearly three-quarters (76.1%) of the sample reported being exclusively heterosexual, whereas the remainder reported greater variability in sexual attraction.

Of the 11,529 individuals included in these analyses, 1,776 (15.3%; 95% confidence interval [CI] 14.6–16.1) reported NSSI at some point in their lives. The prevalence rate for the previous 12 months was 6.8% ($n = 789$). Adjusted odds ratios (AORs) comparing demographic characteristics of those with and without NSSI history are shown in Table 1. Females were 1.8 times (95% CI = 1.6–2.0) more likely than males to report NSSI (18.9% vs 10.9%) but were not significantly more likely to report self-injury within the past 12 months. International students were slightly less likely to report NSSI (AOR = .7; 95% CI = .5–.9). The mean age of those reporting NSSI was 20.3 years ($SD = 1.8$) and did not differ from the overall study sample (20.5; $SD = 1.9$). Compared with their Caucasian counterparts, Asian/Asian Americans were slightly less likely to report NSSI (AOR = .8; 95% CI = .7–.9).

There were no other demographic differences in NSSI prevalence other than sexual orientation. Individuals with sexual orientations other than exclusively heterosexual were at significantly elevated risk for NSSI. Compared to heterosexuals, individuals characterized as *mostly* heterosexual were 2.6 times (95% CI = 2.2–3.0) more likely to report NSSI. Comparable statistics for individuals characterized as bisexual are as follows: 3.8 times (95% CI = 3.1–4.6); for individuals characterized as mostly gay or lesbian: 2.3 times (95% CI = 1.6–3.5); and for individuals characterized as gay or lesbian: 1.7 times (95% CI = 1.1–2.5). There was a significant interaction between sexual orientation and sex (Wald $F = 8.81$, $p \leq .000$). Tests for simple effects showed that the relationship between NSSI and sexual orientation was confined largely to females. Other than the significant difference between heterosexual males and mostly heterosexual males (AOR = 2.1; 95% CI = 1.5–2.8), there were no statistically significant differences in NSSI status among males by heterosexual status. Heterosexual females were 1.5 times (95% CI = 1.3–1.8; 13.5% female vs 9.7% male) more likely to report any NSSI than their male counterparts, mostly heterosexual females 2.1 times (95% CI = 1.6–2.8; 29.5% vs 19.5%), bisexual females 6.2 times (95% CI = 3.7–10.4; 49.4% female vs 13.7% male), mostly gay females 5.5 times (95% CI = 2.2–13.6; 22.9% vs 10.4%), and lesbians 2.4 times (95% CI = 1.1–5.5; 49.0% female vs 13.1% male). There were no other demographic differences in NSSI prevalence.

NSSI Characteristics in the NSSI Sample and by Sex

Table 2 shows lifetime frequency, dominant form, and number of forms used across the NSSI sample and by sex. Demographic characteristics held constant in these analyses are those that emerged from the first analysis as significant and include sexual orientation and race/ethnicity. Analyses for this section include only individuals with a history of any NSSI (the "NSSI sample"). The average age of onset was 15.2 years, with 22.7% indicating that they initiated NSSI between the ages of 18 to 22; 7% ($n = 124$) started at age 10 or younger. Of the 19 NSSI behaviors presented, those endorsed by more than 10% of the NSSI sample are shown in Table 2. Most ($n = 1,534$; 86.4%) NSSI sample respondents indicated having engaged in NSSI more than once and nearly half ($n = 760$; 42.8%) indicated having engaged in NSSI on 6 or more occasions. Over half (63.3%) of those with repeat NSSI experience reported using more than 1 form of the behavior.

Adjusted odds ratios of NSSI frequency, form, and number of forms used comparing males and females are also shown in Table 2. Females were significantly more likely than males to report over 20 NSSI incidents (AOR = 1.7; 95% CI = 1.1–2.8), and to report scratching (AOR = 2.5; 95% CI = 1.9–3.2) and cutting (AOR = 2.7; 95% CI = 2.1–3.5). Males were 3.4 times (95% CI = 2.6–4.5) more likely than females to say that they had punched an object with the intention of hurting themselves.

Table 3 shows psychological NSSI function by category, initial reason for self-injuring (7 of 18 endorsed by > 2% of the NSSI sample), primary body parts affected (8 of 19

TABLE 1. Characteristics of Study Participants and Logistic Regression of Male and Female Self-injury on Primary Demographic Characteristics[a]

	Total ($n = 11,529$)		No-NSSI sample ($n = 9,733$)		NSSI sample ($n = 1,776$)		NSSI sample ($n = 1,776$)		Multivariate model[b]	
Characterisitics	*n*	%	*n*	%	*n*	%	OR	95% CI	OR	95% CI
Sex										
Male	4,809	41.7	4,287	44.0	522	29.4	1.0		1.0	
Female	6,639	57.6	5,385	55.3	1254	70.6	1.9[c]	1.7–2.1	1.8[c]	1.6–2.0
Age										
18–20	6,705	58.2	5,879	60.4	1,046	58.9	1.0		1.0	
21–25	4,824	41.8	3,854	39.6	730	41.1	1.0	0.9–1.1	1.0	0.9–1.2
International student status										
Domestic	1,0436	90.5	8,761	90.0	1,655	93.2	1.0		1.0	
International	954	8.3	850	8.7	103	5.8	0.6[c]	0.5–0.7	0.7[d]	0.5–0.9
Race/Ethnicity										
Non-Hispanic white	7,418	64.3	6,211	63.8	1,193	67.2	1.0		1.0	
Asian/Asian American	1,764	15.3	370	3.8	226	12.7	0.8[c]	0.6–0.9	0.8[c]	0.7–0.9
Hispanic	561	4.9	477	4.9	83	4.7	1.0	0.7–1.2	1.0	0.7–1.3
African American/Black	427	3.7	1,538	15.8	57	3.2	0.8	0.6–1.1	0.8	0.6–1.2
Other	1,299	11.3	1,087	11.2	210	11.8	1.0	0.8–1.2	1.0	0.9–1.2
Father education										
Less than high school	353	3.1	303	3.1	50	2.8	1.0		1.0	
High school	1,014	8.8	847	8.7	169	9.5	1.2	0.8–1.7	1.2	0.8–1.8
Some post-high school	1,530	13.3	1,268	13.0	265	14.9	1.3	0.9–1.8	1.4	1.0–2.0
College graduate	8,416	74.4	7,134	73.3	1,293	72.8	1.1	0.8–1.5	1.2	0.8–1.6
Sexual orientation										
Heterosexual	8,782	76.1	7,743	79.6	1,028	57.9	1.0		1.0	
Mostly straight	1,665	14.4	1,213	12.5	447	25.2	2.8[c]	2.5–3.2	2.6[c]	2.2–2.9
Bisexual	497	4.3	309	3.2	186	10.5	4.0[c]	3.3–4.9	3.8[c]	3.1–4.6
Mostly gay/lesbian	152	1.3	113	1.2	39	2.2	2.1[c]	1.4–3.1	2.3[c]	1.6–3.5
Gay/lesbian	267	2.3	227	2.3	41	2.3	1.3	0.9–1.9	1.7[c]	1.1–2.5

Note. NSSI = nonsuicidal self-injury.
[a]Derived from multivariate logistic regression analysis with all demographic characteristics above entered as predictors of dichotomously coded NSSI. Univariate and multivariate models reported as odds ratios (ORs) and confidence intervals (CIs).
[b]All effects were adjusted simultaneously for sex, international student status, age, race/ethnicity, father education status, and sexual orientation.
[c]$p < .001$.
[d]$p < .01$.

endorsed by > 10% of the NSSI sample), routines and habits, perceived dependency, unintended severity, and help-seeking patterns across the NSSI sample and by sex. Females were significantly more likely than males to endorse using NSSI to regulate affect (AOR = 1.6; 95% CI = 1.2–2.2), as a form of self-control (AOR = 1.8; 95% CI = 1.3–2.6), and because they experience an overwhelming urge (AOR = 1.4; 95% CI = 1.1–2.0). Males were 1.4 times (95% CI = 1.1–1.9) more likely than women to endorse functions related to stimulation (eg, "to get a rush or surge of energy").

Females were significantly more likely to report damage to their arms (AOR = 1.5; 95% CI = 1.2–1.9), wrists (AOR = 3.8; 95% CI = 2.8–5.1), thighs (AOR = 2.1; 95% CI = 1.5–2.9), and calves/ankles (AOR = 3.6; 95% CI = 2.3–5.5). Males were 2.1 times (95% CI = 1.6–2.7) more likely than females to report damage to hands. Sex differences were also evident in initial motivation for NSSI. Although females were more likely to report being upset (AOR = 1.6; 95% CI = 1.3–2.1) or hoping someone would notice their self-injury (AOR = 1.6; 95% CI = 1.1–2.7), males were 1.6 times (95% CI = 1.2–2.2) more likely to report being angry at someone and 4.0 times (95% CI = 2.3–6.8) more likely to report being drunk or high the first time they self-injured.

Males and females also show significant differences in NSSI routines and habits. Females were more likely to report injuring in private (AOR = 2.5; 95% CI = 1.9–3.2), going through phases marked by high and low NSSI activity (AOR = 2.1; 95% CI = 1.5–3.1), and having friends who self-injure (AOR = 1.4; 95% CI = 1.1–2.1). Males were more likely to report sometimes injuring in the presence of others (AOR = 2.4; 95% CI = 1.5–3.6), letting others cause injuries (AOR = 3.6; 95% CI = 1.9–6.9), or injuring another person as part of a routine (AOR = 4.4; 95% CI = 2.2–7.5).

Just under half (41.2%) of all NSSI sample respondents reported either 1 of the 2 NSSI perceived dependency measures. Females were 1.9 times (95% CI = 1.3–2.7) more

TABLE 2. Logistic Regression of Male and Female Self-injury on Primary NSSI Characteristics[a]

	Total ($n = 1,776$)		Female ($n = 1,254$)		Male ($n = 522$)		Mutivariate model[b]	
Characterisitics	*n*	%	*n*	%	*n*	%	OR	95% CI
Lifetime frequency								
Once	236	13.30	159	12.60	82	15.60	1.0	—
2–5 times	775	43.60	530	42.30	245	46.90	1.1	0.7–1.5
6–10 times	240	13.50	155	12.40	85	16.40	0.8	0.5–1.3
11–20 times	197	11.10	152	12.10	45	8.70	1.7	0.9–2.8
Over 20 times	324	18.20	259	20.70	65	12.50	1.7[e]	1.1–2.8
Age of onset (*M*, *SD*)	15.2	0.12	15.2	0.13	15.3	0.28	1.0	0.8–1.2
Dominant form[c]								
Scratch	906	51.00	728	58.10	178	34.10	2.5[e]	1.9–3.2
Cut	698	39.30	572	45.60	126	24.10	2.7[d]	2.1–3.5
Banged or punched objects	466	26.20	237	18.90	229	43.90	0.3[d]	0.2–0.4
Punched or banged oneself	288	14.50	193	15.40	95	18.20	0.8	0.5–1.0
Bitten self	303	17.00	211	16.20	92	17.60	0.8	0.6–1.1
Carved words or symbols	209	11.70	154	12.30	55	10.50	1.1	0.7–1.6
Number of forms used (*M*, *SD*)	2.4	0.05	2.5	0.07	2.3	0.90	1.1	0.9–1.2[f]

Note. NSSI = nonsuicidal self-injury.
[a]Derived from multivariate logistic regression analysis with primary NSSI characteristics. entered as predictors of dichotomously coded NSSI. All multivariate models were conducted with sexual orientation, international student status, and ethnicity held constant. OR denotes odds ratio, and CI denotes confidence interval.
[b]Base = males.
[c]Respondents could select more than one so proportions will total greater than 100%.
[d]$p < .001$.
[e]$p < .01$.
[f]Reported as a factor change in the number of events (exp[*B*]).

likely to report difficulty controlling the urge to self-injure and 1.9 times (95% CI = 1.4–2.6) more likely to believe that NSSI is a problem in their lives.

Just over 1 in 5 of the NSSI sample (21.1%) indicated that they had injured themselves more severely than expected. Of these ($n = 351$), 20.2% indicated that they were under the influence of drugs and alcohol when this occurred, with males significantly more likely (AOR = 1.9; 95% CI = 1.1–3.1) to report this condition. Of those who reported injuring themselves more severely than expected, over one-third (39.6%) felt they should have sought medical care but did not (7.8% of the NSSI sample). Five percent of the NSSI sample reported seeking medical treatment for injuries; this did not vary by sex.

With regard to disclosure and help-seeking, 22.6% of the NSSI sample reported that no one knew about their NSSI; no significant difference was found by sex. Over half (52.3%) had been to therapy for any reason, with females 2.0 times (95% CI = 1.6–2.6) more likely than males to do so. Only 8.9% of the NSSI sample reported disclosing NSSI behavior to a mental health professional; this did not significantly vary by sex.

COMMENT

Findings from the current study support the contention that NSSI is a widespread behavior in adolescent and young adult populations,[10,11,17,21] as suggested by the lifetime prevalence rate of 15.3% and previous year rate of 6.8% in this sample. These rates are comparable to other studies[3,5,11,15,21,24,30] and suggest that NSSI exists at epidemic proportions in community populations of youth. Although often written off as an immature and attention-seeking behavior, the presence of NSSI in college populations (22.7%) and the relationship between NSSI and suicide[4,23,29] suggest that NSSI may serve as a harbinger of more lethal behaviors for the current generation of youth and may thus serve as an important indicator for early intervention.

Adding to the set of studies that document a difference in NSSI by sex, females in this study were nearly twice as likely to report NSSI than males (18.9% vs 10.9%),[3,11,31,32] and to report more lifetime incidents of NSSI. Males were, however, equally likely as females to report self-injury in the past year, a finding consistent with studies reporting no difference in male and female self-injury rates on college campuses.[15]

Similarly notable was the strong connection between NSSI and sexual orientation. Although the general trend is consistent with previous studies,[11,20] finding an interaction between sexual orientation and sex is novel. In addition to showing nonheterosexual women at much greater risk for NSSI when compared to heterosexual women, results showed that women in all sexual orientation categories are significantly more likely to report NSSI than their male counterparts. Although the relationship between sexual orientation and

TABLE 3. Logistic Regression of Male and Female Self-injury on Secondary NSSI Characteristics and Help-Seeking[a]

	Total ($n = 1,776$)		Female ($n = 1,254$)		Male ($n = 522$)		Mutivariate model[b]	
Characterisitics[c]	*n*	%	*n*	%	*n*	%	OR	95% CI
Function								
Regulate negative affect		80.9		83.1		75.4	1.6[e]	1.2–2.2
Control		35.9		40.8		23.8	1.8[e]	1.3–2.6
Self-punishment		24.7		24.5		24.9	0.8	0.6–1.0
Physiological stimulation		24.1		22.6		27.7	0.6[f]	0.5–0.8
Solicit social response		21.7		23.5		17.2	1.2	0.9–1.6
Overwhelming urge		16.9		18.8		12.2	1.4[g]	1.1–2.0
Primary body parts affected								
Arm	882	48.1	658	52.5	224	42.9	1.5[f]	1.2–1.9
Wrist	587	33.0	497	39.7	90	17.2	3.8[e]	2.8–5.1
Hands	586	32.9	360	29.0	226	44.2	0.5[e]	0.4–0.6
Thigh	399	22.4	327	26.1	72	13.7	2.1[e]	1.5–2.9
Stomach	257	14.4	194	15.7	63	12.3	1.2	0.9–1.7
Calves/Ankle	242	13.6	209	16.9	33	6.5	3.6[e]	2.3–5.5
Finger	192	10.8	132	10.6	60	11.7	0.8	0.6–1.2
Initial motivation								
Upset and decided to try it	658	37.0	513	40.9	145	27.8	1.6[e]	1.3–2.1
Angry at self	644	36.2	435	34.7	209	40.0	0.8	0.7–1.1
Accidentally discovered it	322	18.1	244	19.5	78	14.9	1.4	0.9–1.9
Angry at someone else	301	17.0	192	15.3	109	20.9	0.6[e]	0.4–0.8
So someone would notice	183	10.3	149	11.9	34	6.5	1.6[g]	1.1–2.7
To shock or hurt someone	83	4.7	66	5.3	17	3.3	1.2	0.6–2.2
Because of being drunk or high	77	4.3	30	2.4	47	9.0	0.2[e]	0.1–0.4
Routines and habits								
Always injures in private	1,131	63.7	879	70.1	252	48.2	2.5[e]	1.9–3.2
Does not feel much pain when injuring	468	26.3	356	28.4	112	21.5	1.3	0.9–1.7
Experiences phases of high and low self-injury activity	332	18.7	272	21.7	60	11.5	2.1[e]	1.5–3.1
Sometimes injures while under the influence of drugs and/or alcohol	328	18.4	187	14.9	141	27.1	0.4[f]	0.3–0.7
Has friends who self-injure	310	17.5	247	19.7	63	12.1	1.4[g]	1.1–2.1
Prefers to be in a particular room or place	182	10.2	149	11.9	33	6.3	1.8[f]	1.2–2.9
Sometimes injures in the presence of others	186	8.8	94	7.5	64	12.3	0.4[f]	0.3–0.6
Follows a regular routine	118	6.6	96	7.7	22	4.2	1.6	0.9–2.8
Has injured another as part of a self-injury routine	69	3.9	35	2.8	34	6.5	0.2[e]	0.1–0.5
Sometimes lets others cause injuries	58	3.7	31	2.5	27	5.2	0.3[e]	0.1–0.5
Perceived dependency[d]								
Is difficult to control the urge to self-injure	448	25.2	345	27.5	103	19.7	1.9[e]	1.3–2.7
Believes self-injury is a problem in his/her life	655	36.9	500	39.9	155	29.6	1.9[e]	1.4–2.6
Unintended severity								
Hurt more severely than expected	351	20.0	240	19.2	114	21.9	0.6[e]	0.5–0.9
Of those hurt more severely than intended ($n = 351$), under the influence of drugs or alcohol when injury occurred	71	20.2	41	17.1	30	26.3	0.5[e]	0.3–0.9
Have inured self so badly should have been seen by a medical professional	139	7.8	95	7.6	44	8.4	1.9	0.6–1.5
Have sought medical treatment for injuries caused	89	5.0	70	5.6	19	3.6	2.2[e]	1.1–4.4
Disclosure and help-seeking								
No one knows about self-injury practices	403	22.6	266	21.2	137	26.2	1.1	0.7–1.8
Has been to therapy for any reason	941	52.3	724	57.7	217	41.6	2.0[e]	1.6–2.6
Of those who have been to therapy for any reason ($n = 941$), has discussed self-injury with mental health professional	159	16.9	158	16.8	160	17.0	0.9	0.5–1.8

Note. NSSI = nonsuicidal self-injury.
[a]Derived from multivariate logistic regression analysis with secondary NSSI characteristics entered as predictors of dichotomously coded NSSI. All multivariate models were conducted with sexual orientation, international student status and ethnicity held constant. OR denotes odds ratio, and CI denotes confidence interval.
[b]Base = males.
[c]Respondents could select more than one so proportions will total greater than 100%.
[d]Sum of subgroup numbers may not be equal to total *N* as a result of missing data.
[e]$p < .001$.
[f]$p < .01$.
[g]$p < .05$.

suicide has been documented in some studies, gay males rather than females are typically found to be at elevated risk.[33,34] As with the link between suicide and sexual orientation, the mechanisms for explaining risk may not result from sexual orientation, per say, but from risk factors accrued as a result of minority sexual orientation status.[35] This finding does, however, provide additional evidence that the risk factors for suicide and NSSI may differ by sexual orientation.

Significant differences with regard to NSSI form help to explain the common conception that NSSI is a largely female behavior. Females were more likely to endorse scratching and cutting, whereas males were more likely to endorse punching objects with the overt intention of hurting oneself. In correspondence with this, females were more likely than males to report wrists, arms, and thighs as the dominant wound location, whereas males are significantly more likely to report hands as a primary wound location. These differences may explain why NSSI is so commonly identified as a female behavior, since cutting arms and wrists is the prototypical form.[1,2,31] Male-preferred forms of NSSI tend to present clinically as outward-focused aggression and may mask self-injurious intent.

Consistent with other recent studies,[5] close to a quarter of the NSSI sample (22.6%) indicated that nobody knew about their self-injury, and among those who had attended therapy for any reason only 16.9% actually disclosed NSSI to a health practitioner. Females were twice as likely as males to be in therapy but not to disclose NSSI once there. These findings raise a number of concerns regarding assessment of NSSI as well as the need to understand more about reluctance to disclose NSSI.

Collectively, our results suggest that treatment interventions for NSSI may need to be tailored by sex. Consistent with prior findings,[28,36,37] most respondents reported NSSI as a means of regulating affect, although females were more likely than males to endorse this reason for NSSI. Females were also more likely than males to endorse self-punishment and experiencing an uncontrollable urge as a reason for NSSI. Conversely, males were more likely than females to endorse sensation-seeking as a primary NSSI function. Males were also more likely than females to report initiating and engaging in NSSI during states of anger and while under the influence of drugs or alcohol. They were also more likely than females to engage in NSSI in a social context. This pattern of findings suggests that although both sexes would benefit from interventions aimed at improving emotion regulation, females may benefit from intervention aimed at enhancing self-concept and esteem, whereas males may benefit from those including impulse and anger control components.

Although this study constitutes the largest US study conducted to date on NSSI within a college population, it has some limitations. First, the response rate, although typical of Web-based surveys,[38] was not high enough to rule out unknown bias. Second, although drawn from a diverse set of colleges, the colleges were neither randomly selected nor representative of the US college population as a whole. Similarly, our findings may not generalize to the noncollege population of persons in this age group or to younger cohorts (although it is important to note that much of the NSSI data provided reflected behaviors in the secondary school years). Lastly, it is possible that non–college-bound youth may be at higher risk for NSSI, since studies have shown that self-harm that includes suicide attempts is more prevalent in those with less educational achievement and lower SES.[8,39]

Given the strong links between NSSI behavior to other adverse behaviors and conditions,[11,23,37] individuals in community-based settings, such as schools and youth-serving organizations are in an unique position to recognize signs of NSSI, thereby facilitating early mental health referrals. Findings also suggest that males should be routinely screened by health and mental health care providers for NSSI and that NSSI assessment should include questions about NSSI.

NOTE

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REFERENCES

1. Simeon D, Favazza AR. Self-injurious behaviors: phenomenology and assessment. In: Simeon D, Hollander E, eds. *Self-Injurious Behaviors: Assessment and Treatment.* Washington, DC: American Psychiatric Press; 2001:1–28.

2. Walsh BW. *Treating Self-Injury: A Practical Guide*. New York, NY: Guilford Press; 2006.

3. Laye-Gindhu A, Schonert-Reichl KA. Nonsuicidal self-harm among community adolescents: understanding the "whats" and "whys" of self-harm. *J Youth Adolesc*. 2005;34:447–457.

4. Muehlenkamp JJ, Gutierrez PM. Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. *Arch Suicide Res*. 2007;11:69–82.

5. Hawton K, Rodham K, Evans E, Weatherall R. Deliberate self harm in adolescents: self report survey in schools in England. *BMJ*. 2002;325:1207–1211.

6. De Leo D, Heller TS. Who are the kids who self-harm? An Australian self-report school survey. *Med J Aust*. 2004;181:140–144.

7. Klonsky D, Muehlenkamp JJ. Self injury: a research review for the practitioner. *J Clin Psychol In Session*. 2007;63:1045–1056.

8. Nada-Raja S, Morrison D, Skegg K. A population-based study of help-seeking for self-harm in young adults. *Aust N Z J Psychiatry*. 2003;37:600–605.

9. Patton GC, Harris R, Carlin JB, et al. Adolescent suicidal behaviors: a population-based study of risk. *Psychol Med*. 1997;27:715–724.

10. Lloyd-Richardson EE, Perrine N, Kierker L, Kelley ML. Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. *Psychol Med*. 2007;37:1183–1192.

11. Whitlock J, Eckenrode J, Silverman D. Self-injurious behaviors in a college population. *Pediatrics*. 2006;117:1939–1948.

12. Gratz KL. Measurement of deliberate self-harm: preliminary data on the deliberate self-harm inventory. *J Psychopathol Behav*. 2001;23:253–263.

13. Gratz KL, Conrad SD, Roemer L. Risk factors for deliberate self-harm among college students. *Am J Orthopsychiatry*. 2002;72:128–140.

14. Polk E, Liss M. Psychological characteristics of self-injurious behavior. *Pers Individ Dif*. 2007;43:567–577.

15. Gollust SE, Eisenberg D, Golberstein E. Prevalence and correlates of self-injury among university students. *J Am Coll Health*. 2008;56:491–498.

16. Klonsky ED. Non-suicidal self-injury: an introduction. *J Clin Psychol In Session.* 2007;63:1039–1043.

17. Jacobson CM, Gould M. The epidemiology and phenomenology of non-suicidal self-injurious behavior among adolescents: a critical review of the literature. *Arch Suicide Res*. 2007;11:129–147.

18. Yates TM. The developmental psychopathology of self-injurious behavior: compensatory regulation in posttraumatic adaptation. *Clin Psychol Rev*. 2004;24:35–74.

19. Whitlock J, Muehlenkamp J, Eckenrode J. Variation in non-suicidal self-injury: identification and features of latent classes in a college population of emerging adults. *Clin Child Adolesc Psychol*. 2008;37:725–735.

20. Skegg K, Nada-Raja S, Dickson N, Paul C, Williams S. Sexual orientation and self-harm in men and women. *Am J Psychiatry*. 2003;160:541–546.

21. Ross S, Heath N. A study of the frequency of self-mutilation in a community sample of adolescents. *J Youth Adolesc*. 2002;3:67–77.

22. Yates TM, Tracy AJ, Luthar SS. Nonsuicidal self-injury among "privileged" youths: longitudinal and cross-sectional approaches to development process. *J Consult Clin Psychol*. 2008;76:52–62.

23. Muehlenkamp JJ, Gutierrez PM. An investigation of differences between self-injurious behavior and suicide attempts in a sample of adolescents. *Suicide Life Threat Behav*. 2004;34: 12–24.

24. Heath N, Toste JR, Nedecheva T, Charlebois A. An examination of non-suicidal self-injury among college students. *J Ment Health Counsel*. 2008;30:137–157.

25. Andover MS, Pepper CM, Gibb BE. Self-mutilation and coping strategies in a college sample. *Suicide Life Threat Behav*. 2007;37:238–243.

26. Lundh L, Karim J, Quilisch E. Deliberate self-harm in 15-year-old adolescents: a pilot study with a modified version of the Deliberate Self-Harm Inventory. *Scand J Psychol*. 2007;48:33–41.

27. Chapman AL, Gratz KL, Brown MZ. Solving the puzzle of deliberate self-harm: the experiential avoidance model. *Behav Res Ther*. 2006;44:371–394.

28. Nock MK, Prinstein MJ. A functional approach to the assessment of self-mutilative behavior. *J Consult Clin Psychol*. 2004;72:885–890.

29. Whitlock JL, Knox K. The relationship between self-injurious behavior and suicide in a young adult population. *Arch of Pediatr Adolesc Med*. 2007;161:634–640.

30. Muehlenkamp JJ, Hoff ER, Licht JG, Azure JA, Hasenzahl SJ. Rates of non-suicidal self-injury: a cross-sectional analysis of exposure. *Curr Psychol.* 2008;27:234–241.

31. Favazza AR. Self mutilation. In: Jacobs DG, ed. *The Harvard Medical School Guide to Suicide Assessment and Intervention*. San Francisco, CA: Jossey-Bass; 1999:125–145.

32. Conterio K, Lader W. *Bodily Harm: The Breakthrough Healing Program for Self Injurers*. New York, NY: Hyperion Press; 1998.

33. Remafedi G, French S, Story M, Resnick MD, Blum R. The relationship between suicide risk and sexual orientation: results of a population-based study. *Am J Public Health*. 1998;88:57–60.

34. Russell ST, Joyner K. Adolescent sexual orientation and suicide risk: evidence from a national study. *Am J Public Health*. 2001;91:1276–1282.

35. McDaniel JS, Purcell D, D'Augelli AR. The relationship between sexual orientation and risk for suicide: research findings and future directions for research and prevention. *Suicide Life Threat Behav*. 2001;31:84–105.

36. Klonsky ED. The functions of deliberate self-injury: a review of the evidence. *Clin Psychol Rev*. 2007;27:226–239.

37. Nock MK, Joiner TE, Gordon KH, Lloyd-Richardson E, Prinstein, MJ. Non-suicidal self-injury among adolescents: diagnostic correlates and relation to suicide attempts. *Psychiatry Res*. 2006;144:65–72.

38. Fricker S, Galesic M, Tourangeau R, Yan T. An experimental comparison of Web and telephone surveys. *Public Opin Q*. 2005;69:370–392.

39. Kreuter F, Presser S, Tourangeau R. Social desirability bias in CATI, IVR, and Web surveys: the effects of mode and question sensitivity. *Public Opin Q*. 2008;72:847–865.