Variation in Nonsuicidal Self-Injury: Identification and Features of Latent Classes in a College Population of Emerging Adults

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Prior studies of nonsuicidal self-injury (NSSI) suggest the existence of multiple NSSI typologies. Using data from 2,101 university students, this study employed latent class analysis to investigate NSSI typologies. Results show a good fitting 3-class solution with distinct quantitative and qualitative differences. Class 1 was composed largely of women using 1 form to engage in superficial tissue damage with moderate (<11) lifetime incidents. Class 2 was composed predominantly of men using 1 to 3 forms to engage in self-battery and light tissue damage, with low (2–10) lifetime incidents. Class 3 was composed largely of women using more than 3 self-injury forms and engaging in behaviors with the potential for a high degree of tissue damage with moderate to high numbers of lifetime incidents. All 3 classes were at elevated risk for adverse conditions when compared to no-NSSI respondents. We conclude that NSSI typologies exist and may warrant differential clinical assessment and treatment.

Awareness of nonsuicidal self-injury (NSSI; the deliberate destruction of body tissue without suicidal intent) in clinical and nonclinical populations is increasing. As a result, clinicians and first responders in community settings, such as secondary school teachers, counselors, social workers, and nurses, report increasing contact with individuals who engage in NSSI but little or no

formal training in NSSI treatment (Heath, Toste, & Beettam, 2006; Whitlock, Eells, Cummings, & Purington, 2007). The need to better understand and treat NSSI has led to the empirical study of prevalence and correlates of NSSI in both clinical and nonclinical samples. A growing body of research shows NSSI to be common in contemporary adolescent and emerging adult populations, with rates from studies of community adolescents estimated at between 10% and 15% (Hawton & Rodham, 2006; Laye-Gindhu & Schonert-Reichl, 2005; Muehlenkamp & Gutierrez, 2004; Ross & Heath, 2002) and from college samples ranging from 17% to 35% (Gratz, 2001; Whitlock, Eckenrode, & Silverman, 2006).

Despite the growing convergence around NSSI prevalence, there remain important differences across

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studies with regard to correlates of NSSI. For example, although it is largely accepted that NSSI is a behavior with an origin in early adolescence, some studies have documented an age of onset in early to middle child-hood among some individuals (see Yates, 2004, for review). Similarly, a recent college population study found that almost 40% of self-injuring individuals report an average age of onset in late adolescence or early adulthood (Whitlock et al., 2006). Similarly, many studies report that female individuals are more likely to engage in NSSI than male (Laye-Gindhu & Schonert-Richl, 2005; Rodham, Hawton, & Evans, 2004; Whitlock et al., 2006), whereas others find that male individuals are equally likely to self-injure as female, particularly among nonclinical samples (Garrison, Addy, McKeown, & Cuffe, 1993; Gratz, 2001; Klonsky, Oltmanns, & Turkheimer, 2003; Muehlenkamp & Gutierrez, 2004). These variations may be accounted for by the type of behaviors studied, the sample popu-lation, or the frequency of the behavior. For example, in a sample of community adolescents, Muehlenkamp, Yates, and Alberts (2004) found that boys and girls dif-fered in the form of NSSI reported. Boys were more likely to engage in self-battery, whereas girls were more likely to report cutting and severe scratching. Similar results were reported by Whitlock et al. (2006) in their study of college students. The same study found that the frequency of NSSI varied by gender as well, with men and women equally likely to endorse a single act of NSSI, but women significantly more likely than men to report repeated acts of NSSI.

Findings with regard to race and NSSI are also mixed, with some studies suggesting that it may be more common among Caucasians (Bhugra, Singh, Fellow-Smith, & Bayliss, 2002) and others showing similarly high rates in minority samples (Marshall & Yazdani, 1999; Whitlock et al., 2006). Although parallels between NSSI and eating disorders have led some to speculate that NSSI is likely to be most prevalent among middle-and upper-income individuals (Strong, 1999), no exist-ing research supports this contention. Indeed, other researchers have reported NSSI in low income popula-tions as well (Favazza & Conterio, 1989).

Studies of NSSI characteristics in community popula-tions show considerable variation in the frequency and forms of NSSI behaviors reported as well. For example, reported lifetime NSSI frequency varies dramatically, from single incidents to hundreds of incidents (Laye-Gindhu & Sconert-Reichl, 2005). Similarly, although nonclinical samples often endorse a greater number of low-lethality NSSI forms than clinical samples (see Skegg, 2005), community studies show that individuals use a myriad of forms which vary dramatically in the capacity to cause tissue damage. Although cutting is one of the most common and well-documented NSSI

forms, Whitlock et al. (2006) identified the presence of more than 16 forms in a college population. Moreover, several studies have shown that the number of forms used by an individual varies significantly, from 1 to over 10 (Laye-Gindhu & Schonert-Reichl, 2005; Whitlock et al., 2006).

The lack of a coherent set of findings from prior NSSI studies could be the result of variation in NSSI definitions (Claes & Vandereycken, 2007; Linehan, 2000) but could also be because of the existence of dif-ferent subgroups or classes of self-injurers. There now appears to be broad agreement about what behaviors constitute NSSI (e.g., cutting, burning, self-hitting; Claes & Vandereycken, 2007; Walsh, 2006), but little is known about potential subgroups that might exist within this broad typology. Indeed, the heterogeneity of NSSI characteristics identified among self-injurers in both clinical and nonclinical settings led Walsh to propose a typology of NSSI for clinicians. Walsh pos-ited that most individuals engaging in NSSI can be classified into specific groups based on characteristics of the NSSI including the frequency of the behavior (episodic vs. repetitive), forms used (indirect; i.e., dam-age is accumulated over time such as with substance abuse vs. direct; i.e., cause immediate tissue damage such as with cutting), and extent of damaged caused by the act (common/low lethality vs. major/high lethal-ity). Walsh theorized that there may be important thera-peutic distinctions among these potential NSSI groups.

Likewise, Joiner's (2006) model of suicidal behavior assumes that there are important differences among individuals who vary in their frequency, form, and severity of NSSI and that these differences could help identify individuals at risk for suicide. Joiner theorized that NSSI and suicide may share common risk factors and that some suicidal individuals acquire the capacity to engage in high lethality behavior (i.e., suicide) by engaging in increasingly severe NSSI over time. He further proposes that individuals who attempt suicide are likely to have engaged in various forms of direct (e.g., cutting) or indirect (e.g., disordered eating) self-injury with increasing frequency and severity. This, in turn, fosters habituation to pain and fears of harm or death and ultimately enhances propensity for suicide.

Although not widely tested, Joiner's (2006) idea that NSSI may lead to increased vulnerability for suicide has received some empirical support. Studies have documen-ted that individuals who attempted suicide were more likely to have longer histories of, and use a greater num-ber of methods of, NSSI than those without a suicide attempt (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Whitlock & Knox, 2007). It is also clear, however, that the majority of individuals who engage in NSSI do not exhibit any suicidality (Muehlenkamp & Guiterrez, 2004; Nock et al., 2006; Whitlock & Knox,

2007). Thus, the conditions under which NSSI is linked to more lethal behaviors, such as suicide, are unclear but may vary as a function of NSSI characteristics.

Considered together, the available data and theory suggest that there may be different types of self-injurious individuals in community populations that differ in terms of primary NSSI characteristics (e.g., frequency, form, function, age of onset) and demographic characteristics (gender, race, socioeconomic status [SES], and age of onset). It also suggests that although these classes may be conceptualized along a severity continuum based primarily on NSSI features, they may differ significantly in other ways as well such as in secondary NSSI characteristics (practices and routines) and psychosocial correlates, and treatment history. Based on these expectations, we hypothesized that (a) multiple NSSI typologies can be identified based on primary NSSI characteristics that can be generally conceptualized along a continuum of least to most severe; (b) these typologies would have distinct differences in demographic composition; and (c) the typologies would also show significant variation in secondary NSSI characteristics, psychosocial correlates, and help-seeking.

METHODS

Participants

Participants were drawn from a simple random sample of 8,300 undergraduate and graduate students from two northeastern universities. Invitees were selected by the university registrars using software designed to draw a true random sample from the student population. The only requirement was that the respondent be 18 years of age at the time the sample was drawn. The number of invitees was based on an anticipated 30% response rate, as this is typical of current survey research (Krosnick, Holbrook, & Pfent, 2003), and a 10% positive self-injury rate. All invitees were sent an advance postcard inviting them to participate in a Web-based "Survey of College Mental Health and Wellbeing," in the spring of 2005. Soon after, each received a personalized e-mail with a link to the survey. By more obliquely advertising the purpose of the survey we aimed to reduce bias noted in similar studies of depression when the survey purpose is clearly stated (Hunt, Auriemma, Ashara, & Cashaw, 2003). We employed multiple response enhancement strategies (incentives, follow-up reminders, personalized invitations) and a Web-based survey format that allowed concealment of NSSI questions unless triggered by positive response to the NSSI screening question with the intention of reducing response bias as well. To assess respondent honesty, we asked respondents to indicate the degree of care, thoroughness, and honesty at the survey close using a Likert-type scale (e.g., "I answered the questions on this survey honestly") and systematically looked for inconsistencies in responses within the self-injury data using three overlapping question sets designed to detect inconsistencies in responses.

A total of 3,069 (36.9%) individuals completed the survey. Cases in which more than 90% of the responses were missing ($n = 115$) or in which NSSI status was indeterminable ($n = 77$) were omitted, resulting in 2,877 (34.6%) retained for analysis. With the exception of the male-to-female respondent ratio (56.3% vs. 47.6%), the final sample was representative of the population from which it was drawn. Two thirds (66.7%) of the sample was Caucasian, 3.7% was non-Hispanic Black, 4.3% was Hispanic, and 17.4% Asian/Asian American. Ten percent were categorized as "other." Father's highest education level was used as an indicator of SES; 4.1% of the sample had fathers with less than a high school education, 7.2% completed high school, 10.7% had some college, 19.7% had completed college, and 58.4% possessed some postgraduate education. Participant ages ranged from 18 to 43. For the purposes of these analyses, only those 24 and younger were included ($n = 2,101$). Among these, 50.9% were younger than 20 and 49.1% were between the ages of 20 and 24. To assesses typologies of individuals for whom NSSI may have become habitual, analyses of self-injurious students were restricted to the 282 (13.4%) who reported two or more episodes of NSSI behavior.

Procedures

The survey was administered on a secure Internet server and required 10 to 25 min to complete. The Web-based survey allowed for complex skip patterns viewable only by those for whom the questions were relevant. The survey also allowed participants to immediately make the screen go blank if they were interrupted. Links to local resources were placed on the bottom of every page, and a "distraction" toggle allowed anyone who needed a break to see an unrelated Web page. The study was approved by Committee for Human Subjects at both institutions. All participants provided online assent before taking the survey and were free to discontinue at any time by closing their Web browser. The survey included four broad conceptual domains: (a) sociodemographic characteristics, (b) mental health indicators including a detailed section on NSSI, (c) risk and protective factors, and (d) help-seeking and treatment history.

Measures

NSSI. To assess the presence of NSSI, all respondents received a screening question for self-injurious behavior: "Have you ever done any of the following with the intention of hurting yourself?" They were then presented with a list of 16 self-injurious behaviors

selected from existing NSSI surveys (Mann, Waternaux, Hass, & Malone, 1999), a review of existing literature, and interviews with mental health providers and self-injurers. They were also asked to estimate the lifetime number of NSSI incidents based on six possible responses: once, 2 to 5 times, 6 to 10 times, 11 to 20 times, 21 to 50 times, and more than 50 times. For the sake of parsimony in the Latent Class Analysis (LCA), lifetime NSSI frequency was collapsed into three categories: 2 to 10 incidents, 11 to 50 incidents, and more than 50 incidents. To ensure that such reduction did not increase error, we first ran the analysis with all levels included. The expanded model did not change the results found of the more parsimonious three-level model and did add additional error. Because of this, we opted to use the three-level version of the NSSI frequency variable.

A dummy variable was created to reflect the total number of different NSSI forms used: one, two to three, and more than three. Using a slightly modified version of the lethality continuum postulated by Skegg (2005), another dummy variable was created by collapsing the 16 NSSI forms into three discrete categories ordered by potential degree of tissue damage. The first group consisted of behaviors with the potential for superficial tissue damage (e.g., scratching or pinching to the point that bleeding occurs or marks remain on the skin; intentionally preventing wounds from healing). The second group included behaviors likely to cause bruising or light tissue damage such as punching or banging oneself or other objects (with the express intention of hurting the self), sticking sharp objects into the skin (not including tattooing, body piercing, or needles used for medication use), and self-bruising. The last group comprised behaviors with the potential of severe tissue damage such as cutting or carving the body, burning areas of the body, breaking bones, dripping acid onto skin, and ingesting a caustic substance(s) or sharp object(s).

Self-injurious respondents were also asked questions assessing (a) age of onset, (b) NSSI function, (c) current versus past NSSI, (d) addictive properties of NSSI, (e) perception that NSSI interfered with life, (f) unintended physical consequences, (g) routines and practices, and (h) treatment history. Age of onset was assessed with a single item that asked, "How old were you the first time you intentionally hurt yourself?" Nine response options were collapsed into three levels for the current analysis: childhood or early adolescence (<13), middle adolescence (13–16), or late adolescence (>16). NSSI function was assessed through an item that asked respondents to select all options that best completed the statement "I intentionally hurt myself . . . ." Respondents were presented with 17 possible options (e.g., "to relieve stress or pressure" and "to shock or get back at someone") that were grouped into categories based on

the four dimensions suggested by Nock and Prinstein (2004): social positive, social negative, automatic positive, and automatic negative.

Current versus past NSSI status was determined using an item that asked respondents to estimate the length of elapsed time since their last NSSI incident. They were presented with seven options (e.g., "less than 1 week ago" or "between 6 months and 1 year ago"). Anyone indicating that it had been less than 1 year was categorized as having current NSSI status.

NSSI addiction characteristics were assessed using a four-item Likert-type scale. The items were based on common features of addiction (Shadel, Shiffman, Niaura, Nichter, & Abrams, 2000) and include measures such as "I have had to intentionally hurt myself more deeply and/or in more places on my body over time to get the same effect" and "When I have the urge to intentionally hurt myself it is hard to control it." All items loaded above .7 on a single confirmatory factor analysis, and Cronbach's alpha was .78. Perceived life interference was a binary coded variable based on responses to five items that assessed degree of perceived interference with life. Respondents endorsing one or more of the life interference items (e.g., "The fact that I intentionally hurt myself interferes with relationships which are important to me" and "The fact that I intentionally hurt myself interferes with my ability to complete school work or work obligations") were coded as 1 and those endorsing the item "It does not interfere with my life in any way" were coded as 0. The unintended physical consequences variable was similarly coded based on an item that read, "Have you ever intentionally hurt yourself more severely than you expected?"

The NSSI section of the survey also included a series of binary coded questions (yes/no) on NSSI practices and routines, three of which are included here: "I have friends who self-injure"; "I tend to go through periods in which I self-injure, then periods in which I do not"; and "I have a regular routine I follow when I self-injure." Respondents were also asked to respond to a series of formal and informal help-seeking items, such as "Have you ever gone to a therapist (e.g., psychologist, psychiatrist, social worker) to explore an issue you yourself were having (not including family or couples' therapy)?" "To the best of your knowledge, have you ever been diagnosed with any of the following:" (followed by a list such as depression, post traumatic stress disorder, etc.), and "Have you ever been prescribed medication for a mental health problem you were having?" Individuals responding that they had been diagnosed with any of the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. [*DSM–IV*]; American Psychiatric Association, 1994) disorders listed were coded as having received a diagnosis.

Suicidality and trauma history. Lifetime suicidality was measured using a binary response item that asked, "Have you ever seriously considered suicide or attempted suicide?" Individuals who answered affirmatively were asked to select any of eight statements that applied to them. For purposes of these analyses, these statements were clustered into the three following categories: ideation (e.g., "I thought seriously about it"), plan or gesture (e.g., "I had a general plan but did not carry it out," "I wrote a suicide note but did not leave it where it could be found"), and attempt (e.g., "I made a serious attempt but no medical intervention occurred"). Participants with multiple responses were placed into only one of these categories based on their most severe response selection.

A binary variable reflecting the presence of four *DSM–IV* characteristics of disordered eating was coded positively if respondents indicated that they had ever repeatedly: severely restricted eating, binged or purged, overexercised to lose or manage weight, or used laxatives to lose or manage weight. Presence or absence of abuse history was measured using three questions developed for this study, "Have you ever been in a physically abusive relationship (including family relationships, romantic relationships, acquaintances, or friendships)?" "Have you ever experienced genital touching or penetration against your will?" and "Have you ever been in a relationship that was emotionally abusive (including family relationships, romantic relationships, acquaintances, or friendships)?"

Statistical Analyses

The first set of analyses used LCA to identify subpopulations of NSSI membership using several features of NSSI behavior. LCA can be best understood as a categorical analogue of factor analysis and is particularly appropriate for data with a limited number of levels. An LCA solution is most optimal when classes are as homogenous as possible and differences between classes are as large as possible (Hagenaars & McCutcheon, 2002). Various forms of the unobserved latent class variable were fitted to the data using Latent GOLD, version 4.0 (Statistical Innovations, Inc., 2005). Conventional goodness-of-fit statistics were used in the model choice process, and bivariate residuals were examined to ensure that the assumption of local independence between observed variables was not violated (Magidson & Vermunt, 2000).

The first model used lifetime number of NSSI incidents, number of NSSI forms used, potential degree of tissue damage inflicted, age of onset, and function. Covariates included in the first LCA model included: gender, race, age, and SES. We first computed only a single latent class and added one class after another

checking for model fit and significance until the model which best fit the data was determined. Model fit was determined by evaluation of the Consistent Akaike's information criteria (Akaike, 1974), the Bayesian information criterion, which has a more stringent penalty for the number of extra parameters (Kass & Wasserman, 1995), and the entropy score. Lower Consistent Akaike's information criteria and Bayesian information criterion values indicate improvement of the model relative to the model with one less class. Higher entropy scores reflect better fit. We also evaluated the difference between the log-likelihood of the previous and the current class.

LCA resulted in the creation of three distinct classes; thus, a single variable was created to represent these classes and was included as the dependent variable in multinomial logistic regression analyses. The independent variables included in the analyses include measures of NSSI practices not included in the classification model, as well as psychosocial variables and treatment history. Both unadjusted and adjusted models including gender, race, age, and SES were conducted. To assess the extent of difference in each class with no NSSI, the final analysis used binary and multinomial logistic analyses to compare respondents who reported no NSSI with each of the classes. Because population parameters for key demographic characteristics were known, all analyses were weighted to control for gender differences between the sample and the population and to equalize differences in response rates in each university.

RESULTS

Class Descriptions

Iterative comparisons of fit for a one- to four-cluster solution using variables added stepwise showed best fit when only lifetime number of NSSI incidents, number of NSSI forms used, and potential degree of tissue damage inflicted were used. Neither age of onset nor function contributed significantly to the model. Examination of the LCA results using reported lifetime NSSI prevalence, number of forms used, and degree of tissue damage inflicted showed a three-class solution to best fit. Gender was the only covariate to remain in the final model. Examination of bivariate residuals showed all less than two except those between gender and NSSI form, so gender was entered as a direct effect in the final model. Latent Gold allows categorical independent variables to be entered as nominal or ordinal. Examination of a one- to four-class solution with all nominal versus ordinal permutations of the independent variable showed that a three-class solution with all variables entered as ordinal and gender entered as nominal had the lowest Consistent

Akaike's information criteria and Bayesian information criterion values and a lower log-likelihood than the critical chi-square for the previous class. Examination of the bootstrapped p value of $\dot{L}^2$, which relaxes the assumption that the $\dot{L}^2$ statistic significant follows a chi-square distribution, showed a significant difference compared to a model with one less class. The low classification error (11%) confirmed the model fit.

Table 1 shows the observed class membership proportion and conditional probabilities in each class. Class 1 was composed largely of women (74%) with fewer than 11 lifetime NSSI incidents, most of whom used only one form of NSSI, which caused largely superficial damage. We termed Class 1 "superficial NSSI." Class 2 was composed largely of individuals with fewer than 11 lifetime NSSI incidents and contained more men than women. Most reported using two to three NSSI forms, with 42% using only one form. Class 2 members used forms likely to cause a moderate or high degree of tissue damage. Unlike Class 1 and 3, Class 2 contained the most men (59%). We termed this class "moderate severity NSSI." Class 3 was composed largely of women (71%) reporting comparatively higher numbers of NSSI incidents than their Class 1 and 2 peers (81% reported 11 or more NSSI incidents). The majority of Class 3 members used more than three forms and most used forms capable of causing a high degree of tissue damage. The remainder (18%) used forms capable of causing bruising or light tissue damage. We termed this class "high severity NSSI."

In the final LCA model, the indicators of number of forms used and degree of tissue damage made the greatest contribution. The three-class model explained 64.9% of the variance in degree of tissue damage (Wald = 24.4, $p < .001$), 54.8% of the variance in number of forms used (Wald = 22.6, $p < .001$), and 22.5% of the variance in number of lifetime NSSI incidents (Wald = 15.6, $p < .001$).

Class Differences

To further explore similarities and differences in the nature of NSSI classes, we compared classes on current versus past NSSI engagement, secondary NSSI characteristics, psychosocial correlates, and treatment history. Table 2 shows the results of these analyses. Overall, examination of between-class variations partially confirmed our expectation that classes will show significant variation in NSSI characteristics and psychosocial correlates. Although some differences between Class 1 and 2 approached significance, it is Class 3 that emerges as most distinct in the areas examined. In contrast to both Class 1 and 2, Class 3 members were significantly more likely to report unintended NSSI severity, addiction, friends who self-injure, disordered eating, suicidality, and having received medication for a *DSM–IV* condition. They were also significantly more likely than Class 2 to report perceiving that NSSI interferes with their life, having a particular NSSI routine, injuring in phases, a history of sexual, physical, and

TABLE 1
Class Membership Proportions and Conditional Probabilities for the Best Fitting LCA Solution

	Proportion (Conditional Probability of Class Membership)[a]			
Items Used in the LCA	Total % (n) by Variable Across All Classes	Class 1: Superficial NSSI[b]	Class 2: Moderate Severity NSSI[c]	Class 3: High-Severity NSSI[d]
Indicators in the LCA Reported Lifetime NSSI Incidents				
2–10	67.0 (189)	.64 (.15)	.93 (.57)	.43 (.28)
11–50	23.0 (65)	.28 (.17)	.06 (.12)	.36 (.71)
>50	9.9 (28)	.07 (.14)	.00 (.01)	.19 (.85)
No. of Forms Used				
1	30.5 (86)	.83 (.42)	.42 (.57)	.01 (.02)
2–3	42.6 (120)	.15 (.05)	.55 (.54)	.39 (.41)
>3	27.0 (76)	.00 (.00)	.03 (.04)	.59 (.95)
Damage Inflicted by Form				
Superficial Tissue Damage	14.8 (42)	.94 (.97)	.01 (.02)	.00 (.00)
Self-Battery and Light Tissue Damage	30.0 (85)	.05 (.02)	.51 (.71)	.18 (.27)
Severe Tissue Damage	55.1 (156)	.00 (.00)	.47 (.36)	.81 (.64)
Covariates in the LCA				
Gender				
Men	40.4 (114)	.26 (.09)	.59 (.60)	.28 (.30)
Women	59.6 (197)	.74 (.18)	.41 (.29)	.71 (.52)

Note. $N = 282$. LCA = Latent Class Analysis; NSSI = nonsuicidal self-injury. [a]Proportions sum to 100 within a column for a category. Conditional probabilities sum to 100 across indicator level. [b]No. in class = 42, class prevalence = 14.8. [c]No. in class = 107, class prevalence = 38.0. [d]No. in class = 133, class prevalence = 42.7.

TABLE 2
Prevalence and Characteristics of the Three Classes of NSSI

	% (N) or M (SD)^a of NSSI Severity			OR (95% CI) (Adjusted)^b		OR (95% CI)^c
	Class 1^d	Class 2^e	Class 3^f	Class 2 vs. Class 1	Class 3 vs. Class 1	Class 3 vs. Class 2
NSSI Characteristics						
Current NSSI Activity^c	45.0 (19)	37.0 (51)	59.4 (77)	.7 (0.3–1.7)	1.9 (0.9–3.9)	2.7** (1.6–4.6)
Perceive NSSI as Addictive	2.1 (.9)	1.8 (1.0)	2.7 (1.1)	.9 (0.6–1.3)	2.5** (1.6–3.7)	2.9** (2.1–3.9)
Hurt More Severely than Intended^d	9.8 (4)	10.4 (11)	43.1 (57)	1.0 (0.3–3.2)	6.6** (2.3–18.9)	6.6** (3.2–13.5)
Perceived Life Interference^d	26.3 (11)	13.5 (14)	42.0 (56)	.8 (0.1–1.9)	2.1 (0.9–4.7)	5.0** (2.5–9.9)
Follow a Regular Routine^d	4.8 (2)	1.9 (2)	16.4 (22)	.4 (0.1–2.6)	3.5 (0.8 –15.4)	9.4** (2.2–40.4)
Self–Injure in Phases^d	14.6 (6)	8.3 (9)	31.6 (42)	.5 (0.2–1.5)	2.4 (0.0–6.2)	4.9** (2.2–10.9)
Have Friends Who Self–Injure^d	9.8 (4)	17.6 (19)	42.1 (56)	1.8 (0.6–5.6)	6.9** (2.4–19.8)	3.7** (2.0–6.9)
Psychosocial Correlates^d						
Any Suicidality	28.6 (12)	31.8 (34)	63.2 (84)	1.2 (0.5–2.6)	4.6** (2.1–10.0)	4.0** (2.3–6.9)
History of Disordered Eating	39.0 (16)	27.1 (29)	57.9 (77)	.6 (0.3–1.3)	2.2* (1.1–4.6)	3.8** (2.2–6.7)
History of Physical Abuse	7.5 (3)	6.1 (6)	20.0 (27)	.8 (0.2–3.2)	3.1 (0.9–10.9)	4.1** (1.5–11.1)
History of Sexual Abuse	17.9 (8)	8.9 (10)	33.9 (45)	.4 (0.1–1.2)	2.4 (1.0–5.7)	5.6** (2.6–12.4)
History of Emotional Abuse	51.4 (22)	45.1 (48)	61.5 (82)	.8 (0.4– 1.7)	1.6 (0.8–3.4)	2.0* (1.1–3.5)
Been in Therapy for Any Reason	46.3 (19)	40.8 (44)	61.5 (82)	.8 (0.4–1.4)	1.9 (0.9–3.9)	2.4** (1.4–4.0)
Has Received a Clinical Diagnosis	23.8 (10)	13.1 (14)	40.3 (53)	.5 (0.2–1.2)	2.2 (1.0–4.9)	4.5** (2.3–.8.8)
Has Received Medication for Mental Disorder	14.3(6)	9.3 (10)	35.1 (47)	.6 (0.2–2.0)	3.7* (1.4–9.8)	5.7** (2.6–12.3)

Note. NSSI = nonsuicidal self–injury; OR = odds ratio.
^{a}Reported mean based on rational scales to render mean more interpretable. ^{b}All analyses adjusted for race and socioeconomic status; Base = Class 1. ^{c} Base 2 = Class 2. $^d n = 42$ (14.8%). $^e n = 107$ (38%). $^f n = 133$ (42.7%). ^{g}Coded binarily with base = has not engaged in NSSI for more than 1 year. ^{h}Coded binarily; frequency shown reflect endorsement (yes) responses; base variable for multinomial regression analyses = no.
$^*p < .05.$ $^{**}p < .01.$

emotional abuse and having received therapy and a clinical diagnosis. Class 3 was also the only class to have the majority of their members (59.4%) report that they currently engage in NSSI.

To assess differences between NSSI classes relative to non-self-injurious respondents, multinomial logistic analyses were conducted using no-NSSI as the base variable (see Table 3). These analyses show that, when compared to non-NSSI respondents, Classes 1 and 3 are disproportionately more likely to be women; Class 2 is disproportionately more likely to be men. Moreover, Class 3 is disproportionately more likely to report being Caucasian. Analysis of racial differences between no-NSSI and Class 3 show that it is the difference between Asian and Caucasian rates that drive these trends because Asians are significantly less likely to report

TABLE 3
Multinomial Logistic Regression of No–NSSI versus All NSSI Classes on Demographics and Psychosocial Correlates

	Odds Ratio (95% CI) (Adjusted)^a			
	% (N) or M (SD) of No-NSSI Group^b	Class 1 vs. No NSSI	Class 2 vs. No NSSI	Class 3 vs. No NSSI
Demographics				
Female^d	47.2 (858)	3.1** (1.5–6.2)	.6** (0.4–0.9)	3.4** (2.3–5.1)
Other Than Caucasian^d	34.9 (635)	.8 (0.4–1.6)	.9 (0.6–1.3)	.6** (0.4–0.8)
Socioeconomic Status^f	3.7 (0.7)	.8 (0.3–2.2)	.9 (0.3–1.4)	1.3 (0.7–1.9)
Psychosocial Correlates^f				
Suicidality	8.6 (156)	4.3** (2.1–8.8)	5.4** (3.5–8.5)	19.9** (13.3–30.3)
History of Disordered Eating	19.5 (355)	2.0** (1.1–3.9)	2.0** (1.2–3.1)	4.5** (3.0–6.6)
History of Physical Abuse	4.0 (73)	2.1 (0.7–6.7)	1.8 (0.7–4.3)	6.1** (3.6–10.4)
History of Sexual Abuse	6.5 (118)	2.5* (1.1–5.8)	1.8 (0.9–3.7)	5.9** (3.8–9.2)
History of Emotional Abuse	19.4 (353)	3.9** (2.0–7.5)	4.0** (2.6–6.3)	5.8** (3.9–8.7)
Has Been in Therapy	26.8 (487)	2.0* (1.1–3.7)	1.9** (1.3–2.9)	3.7** (2.6–5.5)

Note. NSSI = nonsuicidal self-injury; CI = confidence interval.
^{a} Adjusted for gender, race, and socioeconomic status; base = no NSSI. $^b n = 1,819$. ^{c}Base = female. ^{d}Base = Caucasian. ^{e}Entered as a continuous variable. ^{f}Coded binarily; base variable for multinomial regression analyses = no.
$^*p < .05.$ $^{**}p < .01.$

any self-injury (Adjusted Odds Ratio [AOR] = .4, 95% confidence interval [CI] = .2–.9); there were no statistically significant differences between Caucasians and other race groups (not shown).

Each class, when compared to the no-NSSI group, exhibited significantly more suicidality, characteristics of disordered eating, likelihood of having ever been in therapy, and history of emotional abuse. When compared to the no-NSSI group, Classes 1 and 3 reported more sexual abuse, but only Class 3 reported significantly greater physical abuse. To assess the possibility that NSSI and suicidality might be related because they share common risk factors, history of abuse was included in analysis of the relationship between NSSI and suicidality. Results (not shown in Table 3) showed that these variables very mildly attenuate the differences between NSSI classes and the no-NSSI group on suicidality but that these differences remain significant (Class 1 AOR = 3.1, 95% CI = 1.4–7.0; Class 2 AOR = 3.8, 95% CI = 2.2–6.6; Class 3 AOR = 17.0, 95% CI = 10.5–27.6).

DISCUSSION

Growing concern about NSSI in community populations has led to questions about whether NSSI manifests uniformly in nonclinical populations. This study was intended to test four hypotheses. The first was based on our assumption that the data would show multiple NSSI typologies reflective of primary NSSI characteristics that could be generally conceptualized along a continuum of least to most severe. We also expected, however, that each class would show distinct differences in demographic composition and, related to this, significant variation in secondary NSSI characteristics, psychosocial correlates, and help-seeking.

The first hypothesis was fully supported. LCA showed a good fitting three-class model with quantitative and qualitative differences using three characteristics derived from variables describing lifetime NSSI frequency and form as well as gender. Although embodying some important qualitative differences, the resulting classes differed by severity when all contributing variables were taken into account. Of the primary NSSI characteristics examined, only two emerged as important in differentiating classes: form and lifetime frequency. Neither age of onset nor reported function contributed to class differences. In addition, results reveal classes that are generally ordered by severity, with the exception of Class 2, which exhibited lower lifetime frequency. Similarly, we found that as class severity increased so did risk for other disorders, such as suicidality and characteristics of disordered eating.

Our assumption that classes would vary by demographic composition was only partially verified. Of the demographic characteristics considered, only respondent gender contributed to class distinctions. There were no detectable class differences in race, age, or SES. The gender differences suggest that there may be important epidemiological and clinical variation by gender worthy of examination in datasets capable of accommodating separate analyses by gender. Although the forms used (e.g., self-battery) and lower relative lifetime frequency of NSSI may be to some degree attributable to the high number of men in Class 2, it is worth noting that as a group, Class 2 exhibited elevated risk for other serious conditions and history of abuse relative to Class 1 when compared to those with no self-injury history. Although this trend is also generally evidenced in the inter-NSSI class comparisons as well, low cell sizes in Class 1 limit statistical power and makes the confidence intervals too broad to detect true differences. From a clinical vantage point these results suggest that identification of NSSI frequency and form, in conjunction with client gender, may provide important preliminary information about risk of suicidality, disordered eating, and trauma history.

Although finding that classes may be ordered by severity raises questions about whether the LCA analysis simply captured a single class with non-normally distributed data, qualitative differences between classes suggest this is not so. For example, results suggest that a significant number of self-injurious men use moderate to high severity forms, but practice NSSI for relatively short periods or very infrequently over a longer period. These findings are consistent with past research (Muehlenkamp et al., 2004; Whitlock et al., 2006) and suggest that severity, and thus effective treatment of NSSI behavior, may differ for male and female individuals. Similarly, examination of the qualitative differences between classes also show that practitioner knowledge of form and lifetime frequency may provide information about the likelihood that a client has habituated to and ritualized NSSI in a manner that indicates a more complex clinical picture. This, in turn, may make treatment more complex and may require utilization of a multimodal comprehensive approach.

Our last assumption was that each class would show significant variation in secondary NSSI characteristics, psychosocial correlates, and help-seeking. Although we did find this, Class 3 emerged as the most distinct of the three classes. In many ways, Class 3 conforms most closely to the stereotypical image of a "self-injurer." Indeed, the female "cutter" is most likely to be found in this group and, in comparison to the other two classes, is the group most at risk for a variety of other adverse behaviors. Class 3 contained over twice as many women (69.5%) as men and was the only group in which

the majority of their members reported current NSSI status. Of particular clinical interest, Class 3 members were two times more likely to report suicdality than to report having been in therapy when compared to the other two classes. This in conjunction with the fact just nearly half (46.9%) believed that NSSI was not or is a problem in their life helps to explain why providers often report treatment of NSSI individuals can be difficult (Conterio & Lader, 1998; Walsh, 2006; Whitlock et al., 2007). It also underscores the importance of regular inquiry about potential suicidality when working with individuals who engage in more chronic self-injury. Last, because more than half (51.9%) of Class 3 members reported unintended physical consequences as a result of their NSSI, it is recommended that safety plans be developed for instances in which immediate medical treatment is needed. This is particularly important because self-injurious individuals who hurt themselves more than intended rarely seek medical treatment for their wounds (Whitlock et al., 2006).

Our findings also contain methodological implications for the study of primary and secondary NSSI characteristics. For example, although measurement of NSSI typically involves assessment of NSSI method, there has yet to be scholarly discourse on what other epidemiological traits might be considered primary or secondary and, related to this, which of these may be most salient in determining comorbidity with other conditions and treatment needs. Skegg (2005) opened the door to such conversation by ordering certain behaviors according to lethality on a continuum anchored by suicide on one end and low lethality NSSI. Similarly, Walsh (2006), based on extensive treatment experience with NSSI and other subthreshold *DSM–IV* risk behaviors, identified (a) frequency of the behavior (episodic vs. repetitive), (b) forms used (indirect vs. direct), and (c) extent of damaged caused by the act as the features likely to best differentiate broad classes of self-injury. It is worth noting that although we did not include in this study what he identifies as "indirect" behaviors as part of our NSSI forms, our results are largely consistent with Walsh's conceptualization. We do, however, accede that there may be other ways of conceptualizing and categorizing primary NSSI characteristics that may ultimately improve model fit.

The pattern of associations documented here is consistent with the proposition that suicidal individuals may develop tolerance for higher lethality behavior (i.e., suicide) by engaging in increasingly severe self-injurious behaviors over time (Joiner, 2006). The fact that all NSSI groups contained individuals who reported suicide attempts and that 31.4% of the high-severity NSSI group included individuals reporting no suicidality suggests that not all NSSI leads to suicide. It may also mean, however, that the same risk factors

that lead to higher NSSI severity may also render individuals likely to experience more severe psychopathology in general. Longitudinal study is needed to investigate the relationship of NSSI and suicide over time and the extent to which NSSI heightens risk for suicidality independent of common risk factors.

Our findings also lend support to the growing body of theory and empirical data that suggests that for some adolescents, indicators of mental and emotional imbalance may be both subthrehsold and heterotypic (Kessler, Costello, Merikangas, & Ustun, 2001). It is well established that the first symptoms of adult psychiatric disorders can appear early in life (Bardone, Moffitt, Caspi, Dickson, & Silva, 1996). Although Class 3 clearly emerges as the group at greatest risk for comorbid adverse conditions overall, members of Class 1 and Class 2 are also at significantly higher risk of adverse conditions when compared to their no-NSSI peers. This suggests that even less severe NSSI forms, such as those exhibited by Class 1 and 2, may indicate concerning levels of distress.

Although our sample consists of older adolescents and emerging adults at different developmental stages than young adolescents, our findings are likely to apply to younger adolescents. Studies of NSSI in younger adolescents report comparable rates, frequencies, and number of forms of NSSI as in college student samples (Gratz, 2001; Laye-Gindhu & Schonert-Reichl, 2005; Ross & Heath, 2002; Whitlock et al., 2006). Associations between NSSI, depression, and suicidality are also similar in strength in both young and older adolescent samples (e.g., Muehlenkamp & Gutierrez, 2007; Nock et al., 2006; Whitlock et al., 2006). Similarly, this study included responses with variable reported age of onset. The fact that no differences were documented by age of onset suggests that although developmental stage may shape the way in which NSSI emerges and is maintained, there may be few other significant differences. Such similarities suggest that a similar taxonomy may be present among younger adolescents with similar associated risks. Additional research with young adolescents is needed to verify this assumption.

This study has important limitations. It must be noted that from a statistical perspective there exists little agreement about the extent to which LCA models capture true class differences rather than non-normal distributions in the data (Bauer & Curran, 2003a, b; Lubke & Neale, 2006; Muthén, 2003; Rindskopf, 2003). Use of LCA, though a powerful vehicle for identifying latent taxonomies, always entails some error because classes are rarely perfectly discrete. Derivation of LCA classes are also most successful when the observed variables contain few response levels. In the case of the observed NSSI form variable, creating a dummy variable with meaningfully different levels (by

tissue damage inflicted) meant combining forms that, in actuality, may imperfectly capture real differences. Similar studies are needed to determine whether these results are replicable. As with most community-based studies in which response rates are less than ideal, we cannot rule out systematic bias in the study sample. We did, however, take multiple steps to ensure that the NSSI questions were embedded into the survey in a way that did not alert potential respondents about their existence and nature. The response rate in this study was higher than reported for national surveys conducted on college campuses (American College Health Association, 2006) and weighted analyses were used to compensate for known demographic differences between the sample and the population from which it was drawn. Although we took multiple steps to minimize response bias, the sample was drawn from a college population and therefore has limited generalizability to the larger population of adolescents and emerging adults. Because it is well acknowledged that survey response rates have fallen in all populations (Krosnick et al., 2003), replication is likely to be the only way to validate these and other NSSI findings. It is also important to note that although survey researchers believe Web-based assessments to be among the best ways of assessing private behaviors (Krosnick, 2007), levels of variables used in these analyses may vary if assessed in other forms, such as through clinical interviews.

This study would also have been strengthened by inclusion of scales intended to capture psychiatric disorders known to be comorbid with NSSI, such as borderline personality disorder and posttraumatic stress disorder. Future studies aimed at disentangling the relationship between class membership and Axis I and II disorders would be helpful. Although limited differences by race and SES were identified in our analyses, populations containing more racial and SES diversity may yield different results. Last, 71% of the NSSI sample and 65.2% of the total sample identified themselves as Caucasian and 78.5% of our sample reported having fathers who had completed at least college. Of additional value would be research focused on further differentiating classes by suicide risk and treatment history and on longitudinally assessing links between childhood onset NSSI and adult outcomes.

Implications for Research, Policy, and Practice

To summarize, this study was able to identify seemingly robust classes of self-injurers that differed in primary NSSI characteristics and by gender. Subsequent analyses revealed class differences by NSSI practices, suicidality, disordered eating, history of trauma, and treatment history. Of greatest importance, however, are the clinical implications which suggest that NSSI presentation by

lifetime frequency and form can be both classified and indicative of differential risk for comorbid conditions. Although there is limited empirical evidence suggesting what treatment approach is most effective with NSSI, there appears to be consensus that cognitive-behavioral treatments have some efficacy (Muehlenkamp, 2006; Walsh, 2006). Our results suggest that different treatment approaches may be required for each NSSI class. For example, individuals in Class 1 have less frequent and severe NSSI as well as fewer comorbid psychiatric conditions. Individuals in this class may benefit from treatment that monitors NSSI risk but more directly targets corresponding psychopathology and environmental factors. In contrast, individuals who fall into Class 3 may require more comprehensive treatment approaches, such as dialectical behavior therapy (Linehan, 1993). Treatments such as dialectical behavior therapy that specifically target NSSI and corresponding suicidality as primary goals, in addition to teaching specific coping skills and modifying psychopathology, may be more beneficial to this group. Additional research on which treatments are most effective across NSSI classes and by gender would make a significant contribution to the current literature.

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