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Risk and Protective Factors for Self-Harm in a Population-Based Sample of Transgender Youth

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Abstract

This study sought to identify factors distinguishing transgender/gender non-conforming (GNC) adolescents across three groups: no self-harm, non-suicidal self-injury (NSSI) only, and NSSI and suicide attempt (NSSI + SA). Data were from the 2016 Minnesota Student Survey. The final analytic sample included 1,635 transgender/GNC students in grades 9 and 11. Logistic regression analyses determined factors that best distinguished transgender/GNC students who reported self-harm (NSSI only or NSSI + SA) from those who reported no self-harm, and transgender/GNC adolescents who reported NSSI + SA from those who reported NSSI only. Final models were developed over 3 stages of analysis that tested associations of variables within risk factor, protective factor, and health-risk behavior domains to self-harm. Over half (51.6%) of transgender/GNC adolescents reported past-year self-harm behavior. Factors that consistently distinguished transgender/GNC youth who reported self-harm from those who reported no self-harm included reports of a mental health problem, depression, running away from home, and substance use (alcohol or marijuana use). Factors that distinguished the NSSI + SA group from the NSSI only group were reports of a mental health problem, physical or sexual abuse, relationship violence, bullying victimization, less parent connectedness, lower grades, lower levels of perceived school safety, and running away from home. Clinicians and school personnel need to be prepared to address risk factors and enhance protective factors that may reduce the likelihood this population of vulnerable youth will engage in NSSI and/or attempt suicide.

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Keywords

adolescent; self-harm; self-injury; suicide; transgender

Transgender youth are those for whom internal gender identity does not match their birth-assigned sex (Connolly, Zervos, Barone, Johnson, & Joseph, 2016). These young people also may identify with many other labels such as gender non-conforming, genderqueer, gender fluid, or gender non-binary. These terms refer to gender identities that are not exclusively masculine or feminine. In contrast, for cisgender youth, their assigned sex at birth aligns with their gender identity. Two population-based surveys, the 2012 New Zealand Adolescent Health Survey (Clark et al., 2014) and 2016 Minnesota Student Survey (Eisenberg et al., 2017), found that 1.2% and 2.7% of high school students identified as transgender/gender non-conforming (GNC), respectively. These estimates are not exactly comparable, as the Minnesota estimate included students who indicated they were unsure of their gender, whereas an additional 2.5% of participants in the New Zealand Survey indicated they were unsure about their gender. Most research on transgender youth comes from small, convenience samples of young people seeking services at community-based clinics. Still, the limited existing research suggests transgender youth demonstrate increased risk of mental health problems (Arcelus, Claes, Witcomb, Marshall, & Bouman, 2016; Clark et al., 2014; Connolly et al., 2016; Grossman & D'Augelli, 2007; Reisner et al., 2015; Spack et al., 2012; Veale, Watson, Peter, & Saewyc, 2017; Walls, Laser, Nickels, & Wisneski, 2010). Thus, additional research on this vulnerable population is critically needed (Haas et al., 2010; Institute of Medicine, 2011; O'Brien, Putney, Hebert, Falk, & Aguinaldo, 2016).

Non-suicidal self-injury (NSSI; i.e., deliberate destruction of body tissue without suicidal intent and not socially sanctioned) is associated with several deleterious health outcomes such as high levels of emotional and interpersonal distress, impaired academic performance, substance use, and disordered eating behavior (Kiekens et al., 2016; Nixon & Heath, 2009). In addition, NSSI increases risk of suicidal behavior (Joiner, Ribeiro, & Silva, 2012; Muehlenkamp & Kerr, 2010; Whitlock & Knox, 2007). Approximately 18.0% of adolescents from the general community report engaging in NSSI (Muehlenkamp, Claes, Havertape, & Plener, 2012). Suicide ranks as the second leading cause of death among adolescents (Heron, 2016), and 8.6% of youth report a recent suicide attempt (Centers for Disease Control and Prevention [CDC], 2016). In contrast, between 20.6% and 54.8% of transgender adolescents report self-injury, and 9.3%–31.0% have attempted suicide (Connolly et al., 2016; Eisenberg et al., 2017). Further, transgender youth often demonstrate increased risk for these self-harm behaviors, compared to lesbian/gay and bisexual youth (Walls et al., 2010). However, epidemiological research on transgender youth and their mental health status in the United States represents a nascent field of inquiry because few population-based surveys of adolescents include a question regarding transgender identity (O'Brien et al., 2016).

Researchers and practitioners need to understand factors that uniquely identify transgender/GNC youth who engage in self-harm behaviors (NSSI and/or a suicide attempt) from those who do not, using population-based samples. Previous research highlighted

several factors that differentiated male and female adolescents from the general community who engaged in self-harm from those who reported no self-harm, as well as self-injurers who attempted suicide from those who reported NSSI only (Taliaferro, Muehlenkamp, Borowsky, McMorris, & Kugler, 2012). This information on a general population of young people provided critical details for practitioners to use in the prevention/reduction of self-harm among adolescents. Further, researchers have identified several risk and protective factors associated with NSSI and suicidality among adolescent lesbian, gay, bisexual, and transgender (LGBT) samples, though most research in this area does not examine gender minorities separate from sexual minorities (Mustanski & Liu, 2013; Taliaferro & Muehlenkamp, 2017). To our knowledge, only two studies have examined risk factors associated with NSSI and suicide attempt among transgender adolescents. Specifically, Arcelus et al. (2016) found that, for transgender youth, being assigned female at birth and greater general psycho-pathology was associated with current NSSI. Grossman and D'Augelli (2007) identified suicidal ideation, parental verbal and physical abuse, and lower body esteem as significant factors associated with a suicide attempt among transgender youth.

A gap in the literature involves research examining both risk and protective factors, as well as co-occurring health-risk behaviors, that differentiate groups of transgender/GNC youth to better understand factors that might predict which high-risk adolescents are most vulnerable to involvement in self-harm behaviors (O'Brien et al., 2016). Discerning which factors best differentiate suicide attempters from those at high-risk of suicidal behavior, i.e., those who engage in NSSI, can assist clinicians and school personnel with identifying and assessing youth who may demonstrate an increased likelihood of attempting suicide, as well as inform interventions with transgender/GNC youth engaging in self-injurious behavior to prevent possible suicide attempts. The current study sought to address gaps in the literature using a large, population-based sample of transgender/GNC adolescents. Two research questions guided the analysis:

RQ₁: What factors distinguish transgender/GNC adolescents who engage in self-harm from those who report no self-harm behavior?

RQ₂: What factors differentiate transgender/GNC adolescents who report current NSSI and a suicide attempt from those who report NSSI, but no history of a suicide attempt?

This study used the Minority Stress Theory and aspects of the Interpersonal-Psychological Theory of Suicidal Behavior as a conceptual framework. The Minority Stress Theory speculates that stigma, prejudice, and discrimination create hostile and stressful social environments that may contribute to mental health problems among minority populations, and connectedness to important individuals and/or institutions may buffer the impact of stressors experienced from identification with a sexual minority group (Meyer, 2003). According to the Interpersonal-Psychological Theory of Suicidal Behavior, an individual will demonstrate greater risk of suicide if he/she feels burdensome to his/her family, friends, and/or society, and feels a low sense of belonging or high social alienation (Joiner, 2005). Thus, consistent with these theories and previous research on sexual minority youth (Hatzenbuehler, Birkett, Van Wagenen, & Meyer, 2014; Mustanski & Liu, 2013; Taliaferro

& Muehlenkamp, 2017), we expected some unique social-environmental risk and protective factors, such as teasing because of one's gender or gender expression, lower levels of perceived connectedness to non-parental adults, and less perceived safety at school, to emerge as significant factors to distinguish transgender/GNC youth who engaged in self-harm from those who did not. Still, given the paucity of research on this population, the current study remained exploratory.

METHODS

Study Design and Sample

The Minnesota Student Survey is an anonymous population-based survey conducted every 3 years with students in grades 5, 8, 9, and 11 by the Departments of Education, Health, Human Services, and Public Safety (Minnesota Center for Health Statistics, n.d.). All public school districts are invited to participate, and in 2016, 85% of districts had at least one eligible grade participate. Key questions about gender identity were only included on the high school survey (grades 9 and 11, i.e., ages 14–15 and 16–17), which restricted the current study to these grades. In 2016, 71% of 9th grade and 61% of 11th grade students participated in the survey, resulting in a total sample of 81,885 students. Passive parental consent was used, and students voluntarily agreed to participate. The analytic sample included 2,168 transgender/GNC students, which represented 2.7% of the total sample. Students who did not fit into one of the three defined self-harm groups described below or did not answer both self-harm questions were excluded from the analyses ($n = 533$, 24.6%). The excluded students did not differ from the final analytic sample (i.e., 1,635 transgender/GNC students categorized into a self-harm group) regarding assigned sex, grade, or school location. However, they were significantly more likely than the final analytic sample to be non-white (47.4% vs. 39.3%; $\chi^2 = 10.8$, $p < .01$) and receive free/reduced-price lunch (48.7% vs. 35.6%; $\chi^2 = 28.3$, $p < .001$). The University of Central Florida's Institutional Review Board approved this secondary data analysis.

Measures

Self-harm groups were created based on students' responses to two items: 1) NSSI: "During the last 12 months, how many times did you do something to purposely hurt or injure yourself without wanting to die, such as cutting, burning, or bruising yourself on purpose?" (0 times to 20 or more times); and 2) suicide attempt (SA): "Have you ever actually attempted suicide (no; yes, during the last year; yes, more than a year ago). Based on previous research suggesting researchers examine current NSSI behavior among adolescents and the timing assessed within items for most of the independent variables, self-harm groups were based on past-year behavior. The group classifications were as follows: no self-harm (no NSSI or SA ever), NSSI only (NSSI one or more times in the past year, no SA ever), and NSSI + SA (NSSI and SA in the past year). Researchers have used similar items in epidemiological studies with community samples of adolescents (Taliaferro & Muehlenkamp, 2017; Taliaferro et al., 2012).

Students' assigned sex was assessed with the item: "What is your biological sex?" (male/female), and gender identity was determined by the question: "Do you consider yourself

transgender, genderqueer, genderfluid, or unsure about your gender identity?" (yes/no). This two-item approach is based on recommended, validated measures (The Williams Institute, 2013; Reisner et al., 2014), with modifications appropriate for a population-based adolescent health survey and to include newer terms used by adolescents to reflect a non-binary gender identity.

Independent variables fell into three domains: risk factors, protective factors, and health-risk behaviors (Table 1). Measures reflected items commonly used in other population-based studies of adolescents (CDC, 2016; Harris et al., 2009; Taliaferro et al., 2012). All variables were theoretically derived—risk factors and health-risk behaviors from research on correlates of suicidality (Jacobson & Gould, 2007; Shain & the Committee on Adolescence, 2016), and protective factors from a resiliency framework positing these factors reduce vulnerability to suicidality (Borowsky, Ireland, & Resnick, 2001; Taliaferro & Muehlenkamp, 2014; Taliaferro et al., 2012). Covariates included sex assigned at birth (female vs. male), grade (9th vs. 11th grade), race/ethnicity (dichotomized to white vs. non-white), free/reduced-price lunch ("Do you currently get free or reduced-price lunch at school?") as a proxy estimate of socioeconomic status, and geographic location of school (Twin Cities Metropolitan area vs. other areas in Minnesota).

Data Analysis

Analyses were performed in three stages using SAS 9.4. First, general linear modeling was used to examine relationships between self-harm groups and each independent variable separately, controlling for covariates. Variables that demonstrated a significant difference between groups ($p < .05$) were entered into logistic regression models. Second, variables that showed a significant difference between groups were then entered into initial logistic regression models. This second stage involved examining all variables comprising one domain (risk factors, protective factors, and health-risk behaviors) together as a block of variables (i.e., each domain tested separately). For the third stage, independent variables not reaching the level of significance from each domain tested during the second stage were eliminated, and remaining variables were entered simultaneously into logistic regression models to determine factors that best characterized the self-harm groups (NSSI only or NSSI + SA, as relevant). All analyses controlled for sex assigned at birth, grade, race/ethnicity (white vs. non-white), free/reduced-price lunch, and school location. We calculated a Bonferroni-adjusted confidence interval using .05 as the overall alpha to reduce the likelihood of a Type 1 error because the approach required repeating analyses to contrast the different groups. Continuous variables entered into the logistic regression models were standardized on a 0 to 1 scale to make interpretations of odds ratios for the variables more comparable on the same metric. Thus, odds ratios for non-dichotomous and multi-item scales represented the odds of reporting NSSI only or NSSI + SA in the past year, depending on the model tested, for those at the highest end of the scale when compared with those at the lowest end of the scale. Effect sizes were calculated using Cohen's d (small = .20, medium = .50, and large = .80.) to further compare and contrast the impact of specific variables on distinguishing between groups (Cohen, 1988).

RESULTS

Among the sample of transgender/GNC students, 32.0% were assigned male and 68.1% were assigned female at birth. Almost 59.0% were in grade 9. Transgender/GNC students reported their race/ethnicity as non-Hispanic White (58.7%), Black (6.5%), Asian (8.5%), Hispanic (11.9%), Native American (2.1%), Pacific Islander (0.5%), and mixed race (11.8%). Approximately 38.8% of students received free/reduced-price lunch at school. Just over half (54.8%) of the sample attended school in the Twin Cities Metropolitan area, as opposed to throughout greater Minnesota.

Overall, 33.6% ($n = 550$) of transgender/GNC students reported NSSI only and 18.0% ($n = 295$) reported NSSI +SA during the previous year. Table 2 presents the prevalence of self-harm by demographic characteristics. Compared with assigned males, assigned females were significantly more likely to report NSSI. Students in grade 9 and those who received free/reduced-price lunch were more likely to report NSSI than students in grade 12 and those who did not receive free/reduced-price lunch. We did not find a significant difference in NSSI by race/ethnicity or by school location in Minnesota.

First-stage general linear modeling analyses determined that the three groups differed on most of the independent variables (Table 3). Therefore, all but a few variables that did not show a significant difference between certain groups at this stage were included in subsequent analyses. Second stage analyses involved testing variables from the three risk factor, protective factor, and negative health behavior domains separately (Table 4). Not surprisingly, analyses that examined risk factors highlighted mental health issues (i.e., depression and/or long-term mental health problems) as leading factors, as ranked by odds ratios and effect sizes, to differentiate students who engaged in self-harm from those who reported no NSSI or suicide attempt, as well as to distinguish self-injurers who attempted suicide (NSSI + SA) from those who did not (NSSI only). Further, physical or sexual abuse emerged as an important risk factor that differentiated between all the groups across the analyses ($OR = 1.62\text{--}2.74$, $d = .38\text{--}.82$), being the victim of teasing because of one's gender/gender expression differentiated students who engaged in any self-harm (NSSI only or NSSI +SA) from those who did not ($OR = 1.58\text{--}2.00$, $d = .36\text{--}.55$), and relationship violence ($OR = 2.19\text{--}3.24$, $d = .63\text{--}.96$) and bullying victimization ($OR = 2.01\text{--}2.15$, $d = .56\text{--}.61$) distinguished self-injurers who attempted suicide from students who did not attempt suicide (NSSI +SA vs. no self-harm and NSSI only groups).

The analysis examining effects of protective factors yielded three variables that distinguished the NSSI only group from the no self-harm group: lower levels of school engagement ($OR = 0.28$, $d = 1.05$), and less connectedness to both non-parental adults ($OR = 0.31$, $d = .96$) and parents ($OR = .43$, $d = .68$). Lower levels of connectedness to parents ($OR = 0.10$, $d = 2.13$) and non-parental adults ($OR = 0.16$, $d = 1.59$) also represented the top two protective factors to characterize the NSSI +SA group from the no self-harm group, followed by school safety and academic achievement. The leading protective factors to differentiate the NSSI + SA group from the NSSI only group included lower levels of perceived school safety ($OR = 0.13$, $d = 1.82$) and parent connectedness ($OR = 0.15$, $d = 1.66$).

Finally, the co-occurring negative health-risk behavior that showed the largest and most consistent effect distinguishing between groups of transgender/GNC students across all three analyses was running away from home (OR = 2.47–5.58, $d = .73$ –1.48). The use of alcohol and bullying perpetration also distinguished the NSSI only group from the no self-harm group, and use of marijuana was another factor that differentiated between the NSSI + SA group and no self-harm group.

Findings from Third-Stage Logistic Regression Analyses

In the third and final stage of analysis, each model was specified separately, and only those variables that were statistically significant in the previous stage were retained (i.e., variables could be in one model, but not others) to answer our two research questions. The first two columns of Table 5 provide evidence to answer RQ₁, regarding factors that distinguished transgender/GNC adolescents who engaged in self-harm from those who reported no self-harm behavior. Specifically, reports of a mental health problem, depression, being the victim of teasing because of one's gender/gender expression, running away from home, and alcohol use differentiated students who reported NSSI only from those who reported no self-harm. The leading factors to differentiate the groups were a mental health problem (OR = 2.82, $d = .84$) and depressive symptoms (OR = 2.55, $d = .76$), followed by alcohol use (OR = 2.26, $d = .65$). The variables that distinguished the vulnerable group who reported NSSI +SA from peers who reported no self-harm were similar to the NSSI only group, but also uniquely included physical or sexual abuse, relationship violence, bullying victimization, lower levels of connectedness to non-parental adults, academic achievement, and marijuana use. The leading factors were a mental health problem (OR = 6.51, $d = 1.61$) and running away from home (OR = 5.46, $d = 1.46$), followed closely by lower levels of connectedness to non-parental adults (OR = 0.21, $d = 1.32$) and marijuana use (OR = 4.42, $d = 1.25$).

RQ₂ sought to identify factors associated with increased risk for a suicide attempt among transgender/GNC students who self-injure. A mental health problem, physical or sexual abuse, relationship violence, bullying victimization, less parent connectedness, lower grades, lower levels of perceived school safety, and running away from home were associated with increased likelihood that youth who engaged in NSSI also attempted suicide. The leading factors to differentiate the NSSI + SA from the NSSI only group were parent connectedness (OR = 0.18, $d = 1.47$) and school safety (OR = 0.30, $d = .99$).

DISCUSSION

This study sought to address gaps in the literature regarding NSSI among transgender/GNC adolescents, and factors associated with increased and decreased risk of self-injury. Over half the youth in this population-based sample reported NSSI during the previous year, with one-third reporting current NSSI without a history of a suicide attempt and 18% reporting NSSI + SA. This finding supports the limited research demonstrating high rates of self-harm behavior among transgender/GNC adolescents (Connolly et al., 2016; Eisenberg et al., 2017), as well as research showing many youth in general who self-injure also report attempting suicide (Taliaferro et al., 2012). Healthcare providers, school personnel, and mental health practitioners must inquire about a history of suicidality and evaluate current

risk of suicide among transgender/GNC youth who engage in NSSI, and prevention programming must target this vulnerable population, to prevent possible death by suicide.

Consistent with previous research (Arcelus et al., 2016), we found that birth-assigned females were more likely to report NSSI than those assigned male at birth. This finding is similar to studies of more general samples of youth in which females often demonstrate greater prevalence of NSSI than males (Kaminski et al., 2010; Taliaferro et al., 2012). To our knowledge, researchers have not examined additional demographic characteristics among transgender/GNC adolescents who self-injure. Still, our findings showing higher levels of NSSI among younger students and those who received free/reduced-price lunch are consistent with previous research (Taliaferro et al., 2012).

Regarding RQ₁, factors that consistently distinguished transgender/GNC youth who reported NSSI (NSSI only and NSSI + SA) from those who reported no self-harm included a mental health problem, depression, running away from home, and substance use (alcohol or marijuana use). Most of these findings are consistent with previous research on NSSI and suicidal behavior among adolescents (Arcelus et al., 2016; Grossman & D'Augelli, 2007; Taliaferro & Muehlenkamp, 2014, 2015; Taliaferro et al., 2012). However, the finding regarding substance use was distinct in comparison to a similar analysis with adolescents from the general population (Taliaferro et al., 2012) and suggests transgender/GNC youth who engage in self-harm may self-medicate by consuming alcohol or marijuana. Alternatively, some transgender/GNC youth may possess risk-taking personality characteristics that increase the likelihood of engaging in multiple co-occurring health-risk behaviors. Future research should examine in greater depth the role of substance use for transgender/GNC adolescents, possibly through qualitative research and/or person-centered analyses that generate risk behavior profiles associated with self-harm.

Several factors were associated with increased likelihood that transgender/GNC adolescents who engaged in NSSI also attempted suicide, yet the two factors that yielded the strongest effects were parent connectedness and school safety. The importance of parent connectedness on reducing risk of a suicide attempt among self-injuring youth was demonstrated in research among a general sample of males (Taliaferro et al., 2012), and was shown to reduce risk of repetitive NSSI as well as a suicide attempt among bisexual and questioning adolescents (Taliaferro & Muehlenkamp, 2017). School safety also emerged as an important protective factor to mitigate risk of suicidality among gay/lesbian youth (Taliaferro & Muehlenkamp, 2017), yet was not as important among a general sample of adolescents (Taliaferro et al., 2012). Perceived school safety might mitigate the risk of self-harm associated with bullying victimization and being teased because of one's gender/gender expression found in this study and previous research showing 43.3% of LGBT students felt unsafe at school because of their gender expression (Kosciw, Greytak, Giga, Villenas, & Danischewski, 2016). Further, we identified connectedness to non-parental adults (i.e., other adult relatives and/or adults in one's community) as an especially important protective factor for the high-risk group of transgender/GNC adolescents who engaged in NSSI and attempted suicide during the previous year. This finding is consistent with results gleaned from population-based samples of female youth (Taliaferro et al., 2012) and adolescents who reported questioning their sexual orientation (Taliaferro &

Muehlenkamp, 2017). Overall, findings regarding the importance of feeling connected to and safe at/with school and supportive adults in transgender/GNC adolescents' lives support the Minority Stress Theory and Interpersonal-Psychological Theory of Suicidal Behavior. To prevent NSSI and suicidality among this vulnerable population of young people, we must ensure they feel a sense of belonging, purpose, and safety.

Schools can use findings from this study to support bullying prevention policies that specifically include teasing other students about their gender/gender expression. School personnel must ensure transgender/GNC youth feel safe and protected at school, which likely involves creating inclusive and accepting environments (e.g., Gay-Straight Alliances), as well as implementing and enforcing bullying and harassment prevention policies based on sexual orientation or gender identity (Hatzenbuehler et al., 2014; Kosciw et al., 2016; Poteat, Sinclair, DiGiovanni, Koenig, & Russell, 2012). Clinicians working with transgender/GNC youth are encouraged to inquire about experiences of bullying and teasing, and assess for NSSI and suicide risk among those who report these experiences. Further, healthcare and school professionals working with transgender/GNC youth are encouraged to help these young people identify supportive adults in their lives. In particular, transgender/GNC adolescents who engage in NSSI might benefit from improved family communication and parent-child relationships that serve as resources to cope with stressors and negative life events, and thus, prevent suicidal behavior. To prevent NSSI and suicidality among transgender/GNC youth, parents must understand the importance of ensuring their children do not feel like a burden, and instead feel a strong sense of belonging and worth (Baams, Grossman, & Russell, 2015; Muehlenkamp, Hilt, Ehlinger, & McMillan, 2015). Recent research suggests a lack of, yet need for, communication between school mental health professionals and parents, as well as school guidelines and policies, to improve support of everyone in the school community (i.e., staff, parents, and students) involved in addressing adolescent NSSI (Kelada, Hasking, & Melvin, 2017). Our findings also suggest that, similar to sexual minority youth, connections to prosocial adults aside from one's parents may represent an important source of support for gender minority youth (American Psychological Association, 2012). Supportive adults could help transgender/GNC adolescents excel in scholarly pursuits and achieve their full academic potential, another protective factor identified in the current study, which may help instill a sense of purpose and reason for living within these youth that prevents self-harm behavior.

This study includes several limitations and strengths. One limitation involved some of the survey measures. The measure assessing transgender/GNC identity represented a weakness, as the item wording did not permit us to distinguish between students who were unsure of their gender identity and those who actively identify as transgender/GNC. The item assessing suicide attempts did not include a definition of the behavior; thus, some students may have misinterpreted some of their suicide-related behaviors as attempts. Other variables were measured using a single or a few items, and the reliability of these measures might not be as high as multi-item scales that measure the constructs. In addition, data were obtained through self-report and originated from a cross-sectional survey, precluding us from making causal inferences. Further, our sample may have included fewer transgender/GNC youth than actually attend Minnesota schools, given these youth are more likely to be absent from school on any given day due to experiences of harassment and bullying (Kosciw et al.,

2016). Still, the very large sample size yielded an adequate number of transgender/GNC adolescents to examine multiple risk factors, protective factors, and co-occurring health-risk behaviors in relationship with relatively low base-rate behaviors. Although findings are generalizable to transgender/GNC youth in only one state, the population-based nature of these data provides much needed insight into the epidemiology of NSSI among transgender/GNC adolescents. Finally, the breadth of measures allowed for analyses to identify factors that best distinguished transgender/GNC youth who engage in NSSI, which fills an important gap in the literature.

CONCLUSION

Transgender/GNC adolescents are underrepresented in population health and suicide prevention research (McManama, Putney, Hebert, Falk, & Aguinaldo, 2016). To advance knowledge about NSSI and suicide risk among transgender/GNC youth, future research should assess the behavior among nationally representative samples. We encourage the CDC to include items regarding gender identity and NSSI in the Youth Risk Behavior Survey. Another gap to address involves the conduct of longitudinal studies to determine developmental trajectories of NSSI and processes leading to suicidal behavior among transgender/GNC youth who self-injure. With over half of transgender/GNC youth reporting current self-injurious behavior, the need for additional research and prevention programming with gender minority youth is urgent (McManama et al., 2016). Clinicians and school personnel who encounter transgender/GNC adolescents are well-positioned to address factors that increase risk of self-harm behavior (e.g., mental health problems, history of abuse, relationship violence, bullying and teasing victimization, running away from home, and substance use). They also should enhance protective factors that may reduce the likelihood transgender/GNC youth will engage in NSSI and/or attempt suicide such as facilitating connections to prosocial adults within and outside one's family, implementing policies and practices that ensure students' feel safe at school, and encouraging academic excellence.

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TABLE 1

Independent Variables

Variable	Description of variable	No. items (α or r)
<i>Risk factors</i>		
Family substance use	Live with anyone who drinks too much alcohol, uses illegal drugs, or abuses prescription drugs (yes vs. no)	2
Physical health problem	Physical disability or long-term health problem lasting 6 months or more (yes vs. no)	1
Mental health problem	Mental health, behavioral, or emotional problems lasting 6 months or more (yes vs. no)	1
Positive screen for depression	On a 4-point scale, over the past two weeks, how often been bothered by little interest or pleasure in doing things; feeling down, depressed, or hopeless (summed score ranges from 0–6, dichotomized at validated cut-point of 3 vs. less than 3 ^a)	2
Physical or sexual abuse	Parent or other adults at home ever hit, kicked, or physically hurt you; any adult or person outside of family ever touched you sexually or forced you to touch them sexually; or any older or stronger family member ever touched you or had you touch them sexually (yes vs. no)	3
Relationship violence	Boy/girlfriend in a dating or serious relationship ever called you names or put you down verbally; or hit, slapped, or physically hurt you on purpose (yes vs. no)	2
Witness to family violence	Parents or other adults in your home ever slapped, hit, kicked, punched, or beat each other up (yes vs. no)	1
Bullying victim	On a 5-point scale, during the last 30 days, how many times students at school pushed, shoved, slapped, hit, or kicked you when weren't kidding around; threatened to beat you up; spread mean rumors or lies about you; or excluded you from friends, other students, or activities (dichotomized to never vs. once or more)	4
Teasing victim	On a 5-point scale, during the last 30 days, how often students harassed or bullied you because of your gender or gender expression (dichotomized to never vs. once or more)	2
<i>Protective factors</i>		
Parent connectedness	Can talk to father/mother about problems; how much feel parents care about you	3 ($\alpha = .65$) ^b
Connectedness to other adults	On a 5-point scale, how much feel other adult relatives and adults in your community care about you	2 ($r = .54$) ^c
Friend caring	On a 5-point scale, how much feel friends care about you	1
Sport participation	On a 5-point scale, during a typical week, how often participate in sports teams	1
Involvement in other school activities	On a 5-point scale, during a typical week, how often participate in schools sponsored activities or clubs that are not sports	1
Religious activities	On a 5-point scale, during a typical week, how often participation in religious activities	1
Physical activity	During the last 7 days, on how many days physically active for a total of at least 60 minutes per day	1
School engagement	On a 4-point scale, how often care about doing well in school, paying attention in class, or going to class unprepared; how much agree if something interests me, I try to learn more, I think things I learn at school are useful, being a student is one of the most important parts of who I am	6 ($\alpha = .67$) ^b
School plans – college	Main thing plan to do right after high school (dichotomized to no college vs. college)	1
Academic achievement	Describe grades in school this year (dichotomized to mostly Cs or less vs. mostly As and Bs)	1
Teacher/school adult relationships	On a 4-point scale, how much agree adults at school treat students fairly, adults at school listen to students, school rules are fair, teachers at my school care about students, most teachers at school are interested in me as a person; how much feel teachers/other adults at school care about you	6 ($\alpha = .86$) ^b
School safety	On a 4-point scale, feel safe at school	1

Variable	Description of variable	No. items (α or r)
Neighborhood safety	On a 4-point scale, feel safe going to and from school, and feel safe in my neighborhood	2 ($r = .53$) ^c
<i>Health-risk behaviors</i>		
Run away from home	On a 5-point scale, during the last 12 months, how often ran away from home (dichotomized to 0 times vs. 1 or more times)	1
Bullying perpetrator	On a 5-point scale, during the last 30 days, how many times at school you pushed, shoved, slapped, hit, or kicked someone when weren't kidding around; threatened to beat someone up; spread mean rumors or lies about someone; or excluded someone from friends, other students, or activities (dichotomized to never vs. once or more)	4
Violence perpetrator	On a 5-point scale, during the last 12 months, how often hit or beat up another person (dichotomized to never vs. once or more)	1
Skipped school	On a 5-point scale, during the last 30 days times skipped or cut a full day of school or classes (dichotomized to none vs. once or more times)	1
Cigarette smoking	On a 6-point scale, during the last 30 days, on how many days smoke a cigarette (dichotomized to 0 days vs. 1 or more days)	1
Alcohol use	On a 7-point scale, during the last 30 days, on how many days drank one or more drinks of an alcoholic beverage (dichotomized to 0 days vs. 1 or more days)	1
Binge drinking	On a 7-point scale, during the past 30 days, on how many days had 5 or more drinks of alcohol in a row (dichotomized to 0 days vs. 1 or more days)	1
Prescription drug misuse	On a 6-point scale, during the last 12 months, on how many occasions used stimulants, ADHD/ADD drugs, pain killers, or tranquilizers that were not prescribed for you or you took only to get high (dichotomized to 0 times vs. 1 or more times)	4
Illegal drug use	On a 6-point scale, during the last 12 months, on how many occasions used LSD/PCP, MDMA, cocaine, heroin, or methamphetamine (dichotomized to 0 times vs. 1 or more times)	5
Multiple sexual partners	During the last 12 months, with how many different male/female partners had sexual intercourse (dichotomized to less than 3 partners vs. 3 or more partners)	2

Note.

^aPHQ-2 cut-point supported by previous research (Kroenke, Spitzer, & Williams, 2003).

^bCronbach's alpha coefficient was used to assess internal consistency.

^cPearson's correlation coefficient was used to assess the strength of the relationship between two variables.

TABLE 2

Prevalence of Current Self-Harm among Transgender/Gender Non-Conforming Youth

	Percentage (frequency)			Chi-square
	No self-harm	NSSI only ^a	NSSI +SA ^a	
Total	48.3 (790)	33.6 (550)	18.0 (295)	
Biological sex				84.05, $p < .0001$
Male	64.8 (332)	22.5 (115)	12.7 (65)	
Female	40.4 (447)	39.0 (432)	20.6 (228)	
Grade				15.15, $p = .0008$
#9 th	44.6 (433)	35.6 (346)	19.9 (193)	
#12 th	53.9 (357)	30.8 (204)	15.4 (102)	
Race/ethnicity				4.94, $p = .0845$
#White	46.8 (460)	35.9 (352)	17.3 (170)	
Non-white	50.1 (318)	30.6 (194)	19.4 (123)	
Free lunch?				9.71, $p = .0078$
#Yes	49.9 (298)	29.4 (170)	20.7 (120)	
#No	47.2 (494)	36.3 (380)	16.4 (172)	
School location				4.97, $p = .0833$
Twin Cities metro	48.0 (427)	35.6 (316)	16.4 (146)	
Greater Minnesota	48.7 (363)	31.4 (234)	20.0 (149)	

Note.

^aNSSI = non-suicidal self-injury; SA = suicide attempt.

TABLE 3

Percentages and Means from General Linear Modeling Tests Among Transgender/Gender Non-Conforming Students

	No self-harm (n = 790)	NSSI only (n = 550)	NSSI + SA (n = 295)
<i>Risk factors</i>			
Family substance use	17% ^a	27% ^b	38% ^c
Physical health problem	20% ^a	25% ^b	33% ^c
Mental health problem	36% ^a	68% ^b	86% ^c
Positive screen for depression	38% ^a	69% ^b	79% ^c
Physical or sexual abuse	19% ^a	35% ^b	57% ^c
Relationship violence	10% ^a	18% ^b	38% ^c
Witness to family violence	8% ^a	13% ^b	25% ^c
Bullying victim	42% ^a	58% ^b	80% ^c
Teasing victim	35% ^a	55% ^b	72% ^c
<i>Protective factors</i>			
Parent connectedness (range: 1–5)	3.89 ^a	3.55 ^b	2.98 ^c
Connectedness to other adults (range: 1–5)	3.31 ^a	2.83 ^b	2.32 ^c
Friend caring (range: 1–5)	3.92 ^a	3.68 ^b	3.16 ^c
Sport participation (range: 1–5)	1.89 ^a	1.67 ^b	1.62 ^b
Involvement in other school activities (range: 1–5)	1.95 ^a	2.01 ^a	2.00 ^a
Religious activities (range: 1–5)	1.33 ^a	1.29 ^a	1.26 ^a
Physical activity (range: 1–8)	3.81 ^{ab}	3.57 ^a	3.92 ^b
School engagement (range: 1–4)	3.14 ^a	2.97 ^b	2.82 ^c
School plans (college plans)	59% ^a	55% ^{ab}	50% ^b
Academic achievement (A/B grades)	75% ^a	69% ^b	53% ^c
Teachers/school adult relationships (range: 1–4)	2.86 ^a	2.67 ^b	2.44 ^c
School safety (range: 1–4)	3.20 ^a	3.03 ^b	2.56 ^c
Neighborhood safety (range: 1–4)	3.36 ^a	3.21 ^b	2.93 ^c
<i>Health-risk behaviors</i>			
Run away from home	5% ^a	15% ^b	38% ^c
Bullying perpetrator	22% ^a	33% ^b	40% ^c
Violence perpetrator	8% ^a	14% ^b	25% ^c
Skipped school	12% ^a	16% ^a	28% ^b
Cigarette smoking	6% ^a	12% ^b	37% ^c
Alcohol use	11% ^a	25% ^b	42% ^c
Binge drinking	4% ^a	11% ^b	26% ^c
Marijuana use	10% ^a	21% ^b	46% ^c
Prescription drug misuse	6% ^a	12% ^b	29% ^c
Illegal drug use	3% ^a	8% ^b	20% ^c
Multiple sexual partners	21% ^a	27% ^a	40% ^b

Note. All models controlled for biological sex, grade, race/ethnicity (white vs. non-white), free-lunch status, and school location.

Across rows, groups with different letters were significantly different at $p < .05$. Values with identical superscripts were not significant ($p > .05$).

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TABLE 4
Odds Ratios, 98.34% Confidence Intervals, and Effect Sizes from Preliminary Logistic Regression Analyses

	NSSI only vs. no self-harm	d	NSSI + SA vs. no self-harm	d	NSSI + SA vs. NSSI Only	d
<i>Risk factors</i>						
Family substance use	1.33 (0.89, 1.98)	.22	1.36 (0.81, 2.29)	.24	1.09 (0.71, 1.67)	.07
Physical health problem	1.01 (0.69, 1.48)	.01	1.22 (0.74, 2.02)	.16	1.19 (0.77, 1.82)	.14
Mental health problem	2.79 (1.99, 3.92)**	.83	6.41 (3.70, 11.08)**	1.62	2.94 (1.68, 5.16)**	.88
Positive screen for depression	2.80 (2.01, 3.88)**	.84	3.53 (2.14, 5.84)**	1.04	1.13 (0.70, 1.84)	.10
Physical or sexual abuse	1.62 (1.10, 2.39)*	.38	2.74 (1.68, 4.47)**	.82	1.73 (1.15, 2.61)*	.43
Relationship violence	1.32 (0.83, 2.10)	.22	3.24 (1.88, 5.58)**	.96	2.19 (1.40, 3.42)**	.63
Witness to family violence	1.05 (0.60, 1.84)	.04	1.45 (0.74, 2.81)	.29	1.39 (0.81, 2.37)	.26
Bullying victim	1.10 (0.77, 1.56)	.07	2.01 (1.18, 3.43)*	.56	2.15 (1.33, 3.50)**	.61
Teasing victim	1.58 (1.11, 2.24)*	.36	2.00 (1.21, 3.31)**	.55	1.21 (0.77, 1.90)	.15
<i>Protective factors</i>						
^a Parent connectedness	0.43 (0.19, 0.96)*	.68	0.10 (0.03, 0.26)**	2.13	0.15 (0.06, 0.44)**	1.66
^a Connectedness to other adults	0.31 (0.14, 0.67)**	.96	0.16 (0.06, 0.47)**	1.59	0.42 (0.14, 1.24)	.70
^a Friend caring	0.99 (0.54, 1.82)	.01	0.61 (0.28, 1.32)	.39	0.58 (0.29, 1.18)	.43
^a Sport participation	0.85 (0.55, 1.30)	.13	1.14 (0.61, 2.14)	.10	–	–
^a Involvement in other school activities	–	–	–	–	–	–
^a Religious activities	–	–	–	–	–	–
^a Physical activity	–	–	–	–	2.14 (1.13, 4.03)*	.61
^a School engagement	0.28 (0.08, 0.93)*	1.05	0.34 (0.06, 1.81)	.88	1.12 (0.25, 5.05)	.09
School plans (college plans)	–	–	1.29 (0.82, 2.04)	.20	–	–
Academic achievement (A/B grades)	0.96 (0.67, 1.38)	.03	0.49 (0.30, 0.78)**	.57	0.47 (0.30, 0.73)**	.60
^a Teachers/school adult relationships	0.98 (0.34, 2.78)	.02	2.00 (0.51, 7.79)	.55	2.83 (0.75, 10.73)	.84
^a School safety	1.08 (0.46, 2.54)	.06	0.23 (0.08, 0.66)**	1.23	0.13 (0.05, 0.37)**	1.82
^a Neighborhood safety	0.64 (0.23, 1.80)	.35	0.54 (0.16, 1.85)	.49	1.18 (0.36, 3.89)	.13
<i>Health-risk behaviors</i>						

	NSSI only vs. no self harm	d	NSSI + SA vs. no self-harm	d	NSSI + SA vs. NSSI Only	d
Run away from home	2.47 (1.42, 4.30)**	.73	5.58 (1.99, 15.61)**	1.48	2.78 (1.12, 6.91)*	.83
Bullying perpetrator	1.42 (1.01, 1.99)*	.28	1.08 (0.44, 2.61)	.06	0.47 (0.21, 1.06)	.60
Violence perpetrator	1.24 (0.74, 2.06)	.17	2.34 (0.74, 7.36)	.68	1.23 (0.47, 3.22)	.16
Skipped school	–		0.91 (0.36, 2.30)	.07	1.02 (0.41, 2.58)	.02
Cigarette smoking	1.11 (0.60, 2.07)	.08	1.22 (0.46, 3.26)	.16	1.76 (0.72, 4.29)	.45
Alcohol use	2.04 (1.21, 3.41)**	.57	2.51 (0.83, 7.62)	.74	0.84 (0.34, 2.06)	.14
Binge drinking	0.89 (0.42, 1.87)	.09	0.96 (0.28, 3.31)	.03	1.32 (0.46, 3.79)	.22
Marijuana use	1.60 (0.97, 2.64)	.37	2.75 (1.08, 7.01)**	.82	1.59 (0.69, 3.64)	.37
Prescription drug misuse	0.84 (0.43, 1.63)	.14	1.79 (0.60, 5.28)	.46	1.49 (0.56, 3.96)	.31
Illegal drug use	1.43 (0.60, 3.38)	.28	0.43 (0.12, 1.58)	.68	1.15 (0.35, 3.82)	.11
Multiple sexual partners	–		1.12 (0.46, 2.77)	.09	1.19 (0.52, 2.74)	.14

Note: All variables in each domain were entered simultaneously. Each domain was examined separately.

All models controlled for biological sex, grade, race/ethnicity (white vs. non-white), free/reduced-price lunch, and school location.

Missing values were not statistically significant in Stage 1 general linear modeling analyses.

^aFor non-dichotomous variables and multi-item scales, odds ratios represent the odds of reporting NSSI only or NSSI + SA, depending on the model, for those at the highest end of the scale when compared with those at the lowest end of the scale.

Effect sizes reflect Cohen's d (small = .20, medium = .50, large = .80).

* $p < .0166$ (Bonferroni adjustment was $\alpha = .05/3 = .0166$);

** $p < .001$. Bolded results were significant.

TABLE 5
Odds Ratios, 98.34% Confidence Intervals, and Effect Sizes from Final Logistic Regression Analyses

	NSSI only vs. no self-harm	d	NSSI + SA vs. no self-harm	d	NSSI + SA vs. NSSI Only	d
<i>Risk factors</i>						
Family substance use	–	–	–	–	–	–
Physical health problem	–	–	–	–	–	–
Mental health problem	2.82 (1.99, 3.99)**	.84	6.36 (3.39, 11.92)**	1.61	2.53 (1.40, 4.57)**	.75
Positive screen for depression	2.55 (1.82, 3.59)**	.76	2.70 (1.53, 4.78)**	.80	–	–
Physical or sexual abuse	1.35 (0.92, 1.99)	.24	1.89 (1.08, 3.29)*	.50	1.43 (0.93, 2.19)	.28
Relationship violence	–	–	1.91 (1.02, 3.57)*	.51	1.88 (1.17, 3.01)*	.50
Witness to family violence	–	–	–	–	–	–
Bullying victim	–	–	2.19 (1.17, 4.11)*	.63	1.66 (1.02, 2.70)*	.40
Teasing victim	1.42 (1.01, 2.00)*	.28	1.37 (0.77, 2.43)	.25	–	–
<i>Protective factors</i>						
^a Parent connectedness	0.77 (0.32, 1.88)	.21	0.37 (0.10, 1.36)	.80	0.18 (0.07, 0.46)**	1.47
^a Connectedness to other adults	0.47 (0.22, 1.00)	.60	0.21 (0.06, 0.71)*	1.32	–	–
^a Friend caring	–	–	–	–	–	–
^a Sport participation	–	–	–	–	–	–
^a Involvement in other school activities	–	–	–	–	–	–
^a Religious activities	–	–	–	–	–	–
^a Physical activity	–	–	–	–	1.61 (0.83, 3.12)	.38
^a School engagement	0.40 (0.12, 1.30)	.74	–	–	–	–
School plans (college plans)	–	–	–	–	–	–
Academic achievement (A/B grades)	–	–	0.56 (0.32, 0.98)*	.46	0.58 (0.38, 0.90)*	.43
^a Teachers/school adult relationships	–	–	–	–	–	–
^a School safety	–	–	0.59 (0.22, 1.66)	.42	0.30 (0.13, 0.68)**	.99
^a Neighborhood safety	–	–	–	–	–	–
<i>Health-risk behaviors</i>						

	NSSI only vs. no self-harm	d	NSSI + SA vs. no self-harm	d	NSSI + SA vs. NSSI Only	d
Run away from home	2.00 (1.09, 3.68) *	.55	5.46 (2.60, 11.50) **	1.46	1.93 (1.18, 3.16) *	.52
Bullying perpetrator	1.03 (0.71, 1.52)	.02	-	-	-	-
Violence perpetrator	-	-	-	-	-	-
Skipped school	-	-	-	-	-	-
Cigarette smoking	-	-	-	-	-	-
Alcohol use	2.26 (1.44, 3.54) **	.65	-	-	-	-
Binge drinking	-	-	-	-	-	-
Marijuana use	-	-	4.42 (2.35, 8.29) **	1.25	-	-
Prescription drug misuse	-	-	-	-	-	-
Illegal drug use	-	-	-	-	-	-
Multiple sexual partners	-	-	-	-	-	-

Note. All variables were entered simultaneously, and all models controlled for biological sex, grade, race/ethnicity (white vs. non-white), free/reduced-price lunch, and school location. Missing values were not statistically significant in preliminary analyses for Stages 1 and/or 2.

^aFor non-dichotomous variables and multi-item scales, odds ratios represent the odds of reporting NSSI only or NSSI + SA, depending on the model, for those at the highest end of the scale when compared with those at the lowest end of the scale.

Effect sizes reflect Cohen's d (small = .20, medium = .50, large = .80).

* $p < .0166$ (Bonferroni adjustment was $\alpha = .05/3 = .0166$);

** $p < .001$. Bolded results were significant.