Nonsuicidal self-injury thoughts and behavioural characteristics: Associations with suicidal
thoughts and behaviours among community adolescents

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Abstract

Background: We consider whether nonsuicidal self-injury (NSSI) thoughts – in the absence of any NSSI behaviour – are associated with suicidal thoughts and behaviours among adolescents, before examining whether characteristics of NSSI behaviour are associated with greater suicidal thoughts and behaviours.

Methods: Adolescents ($n = 2,057$, M age =15.56) recruited from secondary schools reported their lifetime history of NSSI, suicidal thoughts and behaviours, NSSI characteristics, and NSSI functions. Receiver Operating Characteristic analysis test whether NSSI status and characteristics of NSSI behaviour are diagnostic of clinically elevated suicidal thoughts and behaviours (a score of 7 or higher on the Suicide Behaviours Questionnaire-Revised). Regression models test whether NSSI functions predict greater suicidality.

Results: Adolescents with NSSI thoughts and those with NSSI behaviour were more likely to report lifetime suicidal ideation and past-year suicide plan(s) than adolescents with no history of NSSI. In addition, adolescents with a history of NSSI were more likely to report a lifetime history of suicide attempt(s) as well as past-year suicide attempt(s) than adolescents with no history of NSSI. A greater number of NSSI methods, requiring medical assistance for NSSI injuries, and engaging in NSSI for self-punishment, anti-suicide, and sensation-seeking functions were associated with greater severity of suicidal thoughts and behaviours.

Limitations: Data are cross-sectional, limiting inferences about causality.

Conclusions: Findings emphasize the importance of NSSI thoughts and characteristics of NSSI behaviour in understanding the complex relationship between NSSI and suicidal thoughts and behaviours among adolescents.

Keywords: nonsuicidal self-injury; suicidal thoughts and behaviours; adolescent mental health; youth suicide.

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1. Introduction

Self-injury represents a significant mental health concern for adolescents. In a national sample of United States 13 to 18-year-olds, 12.1% of adolescents had experienced lifetime suicidal ideation, 4.0% had made a suicide plan, and 4.1% had made a suicide attempt (Nock et al., 2013). In addition to suicidal thoughts and behaviours, self-injury occurs in the form of Nonsuicidal Self-Injury (NSSI) in which a person deliberately and directly engages in self-injurious behaviours expressly *without* suicidal intent. NSSI most commonly manifests as cutting or scratching (Whitlock et al., 2011) and typically has its onset in early adolescence (Gandhi et al., 2018; Plener, Schumacher, Munz, & Groschwitz, 2015). Meta-analysis estimates 22.9% of adolescents internationally have engaged in NSSI (Gillies et al., 2018). Given the importance of adolescence as a key developmental period in self-injury prevention and intervention efforts (Wyman, 2014), understanding the association between NSSI and suicidal thoughts and behaviours among adolescents is critical.

Although NSSI and suicidal self-injury can be distinguished from each other by severity, frequency, the number of methods, and antecedent cognitive states (Muehlenkamp & Kerr, 2010), they are related. NSSI and suicidal thoughts and behaviours demonstrate high comorbidity (Klonsky, May, & Glenn, 2013; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006), and meta-analysis estimates suggest that adults with a history of NSSI are over four times more likely to subsequently make a suicide attempt (Ribeiro et al., 2016). Among adolescents, engaging in NSSI predicts the transition from suicidal ideation to suicide attempts (Mars et al., 2019), and NSSI frequency predicts weaker suicidal ideation remission following

inpatient care (Prinstein et al., 2008). However, it is not the case that all those who engage in NSSI go on to experience suicidal thoughts and behaviour; approximately half of young adults with a history of NSSI report no history of suicidal ideation (Benjet, et al., 2017). Thus, understanding how characteristics of NSSI behaviour are differentially related to suicidal thoughts and behaviours is critical.

Given the considerable heterogeneity in NSSI frequency, methods, locations, and functions (Whitlock et al., 2011), a growing body of research has begun to assess whether specific NSSI characteristics are differentially associated with suicidal thoughts and behaviours. Among college student samples, greater NSSI lifetime frequency was associated with suicidal ideation and suicide plans, whereas NSSI frequency, NSSI scarring, having required medical treatment for NSSI injuries, and having engaged in NSSI to manage suicidal thoughts were associated with having made a suicide attempt (Burke et al., 2018; Paul, Tsypes, Eidlitz, Ernhout, & Whitlock, 2015). In addition, college students with earlier NSSI onset, more frequent NSSI, who had required medical treatment for NSSI, and endorsed autonomic positive reinforcement functions (i.e., *‘to feel something’*) had greater odds of subsequent suicide ideation (Kiekens et al., 2018).

Among young people receiving inpatient care, a greater number of NSSI methods, more frequent NSSI, the intensity of self-injury urges, and intrapersonal NSSI functions were associated with suicidal ideation (Victor, Styer, & Washburn, 2015), whereas a greater number of NSSI methods, a longer NSSI history, and an absence of physical pain during NSSI were associated with suicide attempts (Nock et al., 2006; Stewart et al., 2017). In contrast, cutting in concealed (versus visible) body sites was unrelated to suicidal thoughts or plans among adolescents presenting to emergency departments for self-harm (Gardner, et al., 2020). However,

research investigating the associations between NSSI characteristics and suicidal thoughts and behaviours is limited to samples of college students (Burke et al., 2018; Kiekens et al., 2018), or adolescents receiving clinical care for their self-injury (Nock et al., 2006; Stewart et al., 2017; Gardner, et al., 2020; Victor, Styer, & Washburn, 2015), leaving unknown how well these findings may generalize to community adolescents.

In addition to NSSI behaviour, thoughts of engaging in NSSI are conceptualized as a component of self-injurious thoughts and behaviours (Nock, 2010). However, despite evidence that NSSI thoughts and behaviour are separable phenomena (Kiekens et al., 2020; Nock, Prinstein, & Sterba, 2009), little research has investigated adolescent NSSI thoughts in the *absence* of any NSSI behaviour. The ideation-to-action framework of suicidal thoughts and behaviours argues that the factors which underlie ideation may differ from those which underlie action (Klonsky & May, 2014), highlighting the need to consider NSSI thoughts as distinct from NSSI behaviours. Investigating the relationship between NSSI thoughts and suicidal thoughts and behaviours may also provide insight into the mechanisms which underlie the association between NSSI behaviour and suicidality. For example, NSSI thoughts and NSSI behaviour may both share elevated psychological distress, but the psychophysiological aversiveness of injury (e.g., pain, the sight of blood) is unique to NSSI behaviour (Franklin, Hessel, & Prinstein, 2011; Glenn & Klonsky, 2010). Among college undergraduate students, 2.1% reported experiencing NSSI thoughts in the absence of NSSI behaviour, with similar rates by gender (Kiekens et al., 2018). Students who experienced NSSI thoughts had 3.0 times greater odds of subsequent suicidal ideation, and 3.3 greater odds of a subsequent suicide plan (Kiekens et al., 2018). However, it is currently unclear whether this relationship between NSSI thoughts and suicidal thoughts and behaviours extends to community adolescents.

The aims of the present study are three-fold. First, we considered whether NSSI thoughts (in the absence of any NSSI behaviour) are associated with suicidal thoughts and behaviours among adolescents. Second, we aimed to replicate the relationship between NSSI behaviour and suicidal thoughts and behaviour among a large sample of New Zealand community adolescents. Finally, we assessed whether characteristics of NSSI behaviours (e.g., requiring medical attention, NSSI functions, and number of methods) are associated with suicidal thoughts and behaviours.

2. Method

Data are drawn from the Youth Wellbeing Study, a longitudinal survey¹ administered annually following a cohort of Year 9 (typically aged 12-13) students throughout secondary school, with new students invited to participate at each wave. We used a convenience sampling procedure but solicited participation from schools across a range of socio-economic communities. Seventeen secondary schools in the greater Wellington region and upper South Island took part in the study between 2012 and 2016. Students aged 13 to 15 took home an information pack and consent form for parents and caregivers. 1,451 students returned a completed parental consent form, 75.5% with parental permission to participate. All participants under 16 provided written assent ($n = 1,096$), and those 16 or older provided written consent ($n = 1,120$). Participants completed the survey in classrooms under the supervision of research team member(s) during a class period. All participants were provided with contact details for community support services. Participants who reported clinically elevated suicidal thoughts and behaviours were followed-up through their schools' pastoral care department, with the support of

¹ Each time point measured only lifetime NSSI thoughts, so we are unable to conduct prospective analyses assessing change in NSSI thoughts over time.

clinical psychologists within the research team. Ethical approval for this study was granted by the New Zealand National Health and Disability Ethics Committee.

2.1. *Participants*

This data set combines data from all participants who completed the survey at least once, using their most recent data point. 2,216 adolescents participated in at least one wave of the survey, of which 2,057 (795, 244, 396, and 622 from waves 1 through 4 respectively), completed the items necessary to allow classification of their NSSI, suicidal ideation and behaviour (7.2% missing responders). This represents approximately half of the young people enrolled in the relevant year groups across the participating schools. 54.9% of participants identified their gender as female, 43.9% as male, and 0.3% identified as transgender. 76.3% identified their primary ethnicity as Pākehā/New Zealand European, 6.5% as Māori (indigenous peoples of New Zealand), 3.9% as Pasifika (indigenous peoples of the Pacific Islands), 9.8% as a non-listed ethnicity, and 3.5% of participants reported that they could not choose a primary ethnicity. Participants ranged in age from 13 to 18 years old ($M = 15.56$, $SD = 1.21$).

2.2. *Measures*

Nonsuicidal self-injury thoughts and behaviours were assessed with the Deliberate Self-Harm Inventory (DSHI; Gratz, 2001). All participants were invited to respond to an initial screening question indicating whether they had a lifetime history of NSSI, a lifetime history of NSSI ideation only, or no NSSI history. Participants who indicated a lifetime history of NSSI thoughts or behaviours were then directed to complete a revised version of the short Deliberate Self-Harm Inventory (DSHI; Gratz, 2001) which begins with the statement “*Have you ever deliberately (but without wanting to kill yourself)...*” followed by a list of 13 common NSSI methods (e.g. “*..cut wrists, arms, or other areas of your body*”) to which participants respond on

a 5-point scale ranging from 0 (*“I’ve never thought about doing this”*) to 4 (*“I’ve done this many times”*); modified to include the option *‘1 – I have thought about doing this, but have never done it’*). See Table 1 for both the screening question and the DSHI items. DSHI scores have demonstrated convergent validity with other NSSI measures, as well as internal consistency and adequate test-retest over up to four weeks (Gratz, 2001). DSHI scores demonstrated good internal consistency within this sample ($\alpha = 0.79$). Participants were considered to have a history of NSSI if they reported engaging in at least one of the 13 behaviours and were considered to have a history of NSSI thoughts if they reported thinking about engaging in one or more behaviours but reported no engagement in any of the behaviours.

Participants with a history of NSSI were also invited to report the functions of their NSSI using the Inventory of Statements About Self-Injury (ISAS: Klonsky & Glenn, 2009). The ISAS begins with the statement *“When I self-injure, I am”* followed by 39 items describing functions of NSSI such as *“releasing emotional pressure that has built up inside of me”*. Participants indicate how relevant each item is to their self-injury, responding on a 3-point Likert scale ranging from *‘0 – not relevant’* to *‘2 – very relevant’*. Three items each are totalled to create scores for Affect Regulation, Interpersonal Boundaries, Self-Punishment, Self-Care, Anti-Dissociation/Feeling Generation, Anti-Suicide, Sensation-Seeking, Peer-Bonding, Interpersonal Influence, Toughness, Marking Distress, Revenge, and Autonomy functions (range: 0- 6), grouped into two superordinate clusters of Intrapersonal functions and Interpersonal functions. The ISAS has previously demonstrated good internal consistency (Klonsky & Glenn, 2009) and has been validated for use in adolescent samples (Kortge, Meade, & Tennant, 2013). Both the Intrapersonal ($\alpha = .77$) and Interpersonal ($\alpha = .78$) subscales showed adequate internal consistency within this sample. Participants who indicated a history of NSSI were also invited to

report how frequently they had required medical treatment for their self-injury, using the response options '*never*', '*once*', '*a few times*', or '*many times*'.

Suicidal ideation and behaviours were assessed with the Suicide Behaviours Questionnaire-Revised (SBQ-R; Osman et al., 2001). All participants were invited to respond to the first SBQ-R question assessing lifetime severity of suicidal ideation and/or behaviour, with all participants who reported *any* suicidal ideation directed to complete the remaining three SBQ-R items assessing the frequency of past-year ideation, whether they had told anyone of their suicidal ideation or their intent to act, and the likelihood of a future suicide attempt. SBQ-R scores have demonstrated adequate internal consistency within adolescent samples (Osman et al., 2001), including the current sample ($\alpha = .78$). Participants were also invited to complete three items to index the past-year incidence of suicide attempts and suicide plans, as well as the past two-week incidence of suicidal ideation. See Table 2 for all items and response options.

2.3. *Statistical Analyses*

We calculated the number of NSSI methods a person reported engaging in at least once. Given evidence that the combination of NSSI frequency and the number of NSSI methods best predict clinical severity (Ammerman, Jacobucci, Turner, Dixon-Gordon, & McCloskey, 2019), a measure of NSSI severity was created by averaging participant responses to the 13 items (i.e., capturing both the number of NSSI methods and the frequency of engagement). To capture the complete spectrum of NSSI severity, participants who indicated that they had never thought about or engaged in NSSI were assigned a score of zero (possible range 0 – 4). Responses to the SBQ-R were scored as directed by Osman et al. (2001), with higher scores indicating greater severity of suicidal thoughts and behaviours. Participants whose SBQ total score was seven or

higher (possible range of 3 – 18) were classified as having clinically elevated suicidal thoughts and behaviours (Osman et al., 2001).

We calculated Pearson Chi-Square tests to investigate relationships between lifetime NSSI status and clinically elevated suicidal thoughts and behaviours status. Multivariate Analysis of Variance (ANOVAs) examined potential differences in NSSI severity, number of NSSI methods, and suicidal thoughts and behaviours severity by gender. A one-way ANOVA compared the severity of suicidal thoughts and behaviours by lifetime NSSI status, and Pearson's correlations assessed whether NSSI severity and requiring medical assistance for NSSI were associated with the severity of suicidal thoughts and behaviours. Receiver Operating Characteristic (ROC) analysis assessed whether lifetime NSSI status, NSSI severity, and the number of NSSI methods were diagnostic of clinically elevated suicidal thoughts and behaviours. Finally, regression models test whether NSSI functions predict severity of suicidal thoughts and behaviours, and clinically elevated suicidal thoughts and behaviours. Participant data was included in analyses for which they had complete responses (e.g., listwise deletion). Alpha was set at .05 and all analyses were conducted using SPSS version 26.

3. Results

3.1. Prevalence of nonsuicidal and suicidal self-injury

On the initial NSSI screening question, 68.5% ($n = 1,409$) of participants reported that they had never thought of hurting themselves on purpose, while 9.6% ($n = 198$) reported NSSI thoughts, and 21.9% ($n = 450$) had engaged in NSSI behaviour at least once. In contrast, 3.6% of participants reported NSSI thoughts (in the absence of any behaviour) on the DSHI, and 26.0% reported a lifetime NSSI history. Among participants reporting a lifetime history of NSSI thoughts or behaviour, cutting was the most common NSSI method; 65.8% of participants had

cut themselves at least once and 23.0% had thought about doing so. Burning was the second most common method participants thought about engaging in (14.6%), although scratching was the second most common method (48.7%) participants reported engaged in (see Table 1). Most adolescents with a lifetime NSSI history had engaged in multiple NSSI methods; 24.2% reported engaging in only one method, 17.2% two methods, 14.8% three methods, 15.2% four methods, and 27.9% reported engaging in five or more NSSI methods. The majority (79.0%) of adolescents reported that they had never required medical treatment for their NSSI, 13.2% reported requiring medical treatment “once”, 6.8% “a few times”, and 1.0% reported requiring medical treatment “many times”. Among who reported NSSI thoughts only, 44.1% reported thinking about engaging in one method, 22.1% two methods, 23.5% three methods, 4.4% four methods, and 5.9% five or more NSSI methods.

[INSERT TABLE 1 APPROX. HERE]

On the initial suicidal thoughts and behaviours screening question, 62.9% ($n = 1294$) of participants reported “never” having thought about or attempted to kill themselves, and a further 20.4% ($n = 419$) reported experiencing ideation as “just a passing thought”. Table 2 gives the percentage of the total sample who endorsed each item. Overall, the sample had a mean SBQ-R score of 3.63 ($SD = 4.02$), with 19.3% ($n = 397$) of participants meeting the clinical cutoff for elevated suicidal thoughts and behaviours. Notably, 8.4% ($n = 172$) of participants indicated having made a suicide plan in the past year, 2.0% ($n = 41$) indicated that they had made a suicide attempt in the past year, and 2.9% ($n = 59$) of participants had seriously thought about killing themselves in the last two weeks.

[INSERT TABLE 2 APPROX. HERE]

We next consider whether lifetime NSSI status, NSSI frequency, number of NSSI methods, and suicidal thoughts and behaviours differ by gender² and age. A greater proportion of young women reported a lifetime history of NSSI thoughts (4.8%) and NSSI behaviour (37.7%) than did young men (1.8% and 12.5%, respectively; $\chi^2(2, n = 1920) = 179.53, p < .001$). In contrast, participants with a lifetime history of NSSI, or NSSI thoughts did not differ in age from those with no NSSI history ($F(2, 1926) = 0.32, p = .724$). A multivariate ANOVA examining the effect of gender on suicidal thoughts and behaviours severity, NSSI severity, and the number of NSSI methods indicated a significant multivariate effect ($F(3, 1969) = 36.84, p < .001$). Specifically, young women reported greater suicidal thoughts and behaviours severity (Female: $M = 4.21, SD = 4.41$; Male: $M = 2.85, SD = 3.33$; $F(1, 1971) = 56.44, p < .001, \eta^2_p = .03$), greater NSSI severity (Female: $M = 0.31, SD = 0.56$; Male: $M = 0.10, SD = 0.31$; $F(1, 1971) = 110.31, p < .001, \eta^2_p = .05$), and more NSSI methods (Female: $M = 1.29, SD = 2.20$; Male: $M = 0.41, SD = 1.35$; $F(1, 1971) = 105.96, p < .001, \eta^2_p = .05$) than did young men. In contrast, age was uncorrelated with suicidal thoughts and behaviours severity, NSSI severity, and the number of NSSI methods (r 's $< .00$ to $.01, p$'s $> .562$).

3.2. *Association between nonsuicidal self-injury and suicidal ideation and behaviour*

We next test whether adolescents who have experienced NSSI thoughts or have engaged in NSSI behaviour are more likely to report having experienced suicidal ideation or to have engaged in suicidal behaviours. Table 3 reports the results of binomial logistic regressions with gender and lifetime nonsuicidal self-injury status entered as predictor of lifetime suicidal

² Seven participants identified as transgender. Given the small number, these participants were not included in the gender analyses reported here. Four (57.1%) transgender participants reported an NSSI history.

thoughts and behaviours, and past year suicide plans and attempts. Adolescents with a lifetime history of NSSI were more likely to report lifetime suicidal ideation (OR = 13.70, 95% CI [10.44, 17.98]) and lifetime suicide attempt(s) (OR = 105.25, 95% CI [47.69, 232.30]) than those with no history of NSSI. Adolescents with a lifetime history of NSSI were also more likely to report having made a suicide plan in the past year (OR = 24.22, 95% CI [14.76, 39.74]) and a suicide attempt in the past year (OR = 59.75, 95% CI [14.04, 254.26]) than those with no history of NSSI. In contrast, adolescents with a lifetime history of NSSI thoughts were more likely to report lifetime suicidal ideation (OR = 7.36, 95% CI [4.37, 12.38]) than those with no history of NSSI, with a statistical trend to suggest that they were also more likely to report lifetime suicide attempt(s) (OR = 6.00, 95% CI [0.72, 50.32]). Adolescents with a lifetime history of NSSI thoughts were also more likely to report having made a suicide plan in the past year (OR = 7.56, 95% CI [3.06, 18.65]) than those with no history of NSSI, with a statistical trend to suggest that they were also more likely to report having made a suicide attempt in the past year (OR = 9.45, 95% CI [0.84, 106.72]). The severity of suicidal thoughts and behaviours also varied significantly by lifetime NSSI status ($F(2, 1994) = 619.33, p < .001$), with SBQ-R scores greatest for participants who had an NSSI lifetime history ($M = 7.74, SD = 4.89$), lower for participants who had experienced NSSI thoughts ($M = 4.99, SD = 3.56$), and lowest for participants who reported no history of NSSI thoughts or behaviours ($M = 2.03, SD = 2.19$; post-hoc tests indicated all NSSI group significantly differed from each other, ps all $< .001$).

[INSERT TABLE 3 APPROX. HERE]

ROC analysis indicated that the Area Under the Curve (AUC) for clinically elevated suicidal thoughts and behaviours predicted by lifetime NSSI status was .80 ([95%CI .77, .82], $p < .001$); 82.2% of adolescents who scored *less* than the cutoff for clinically elevated suicidal

thoughts and behaviours reported never having thought about or engaged in NSSI, while 74.3% of those who scored *more* than the clinical cutoff reported a lifetime history of NSSI, and 4.7% reported a lifetime history of NSSI thoughts. Moving beyond NSSI status to account for the large variability in NSSI thoughts and behaviours, correlational analyses revealed a positive association between the severity of an adolescent's NSSI thoughts and behaviours and the severity of their suicidal thoughts and behaviours ($r = .63, p < .001$).

3.3. Association between characteristics of nonsuicidal self-injury and suicidal thoughts and behaviours

Next, we consider whether characteristics of an adolescent's NSSI predict their suicidal thoughts and behaviours. Among adolescents with a history of NSSI, the more times they reported requiring medical treatment for NSSI was positively associated with greater severity of suicidal thoughts and behaviours ($r(486) = .32, p < .001$). ROC analyses indicated that, among adolescents with a lifetime history of NSSI, the number of NSSI methods (AUC = .69 [95%CI .65, .74], $p < .001$) was strongly associated with reporting suicidal thoughts and behaviours at or above the clinical cutoff. Specifically, 58.4% of young people who met or exceeded the cutoff for clinically elevated suicidal thoughts and behaviours reported four or more NSSI methods, while 75.6% of young people below the clinical cutoff reported engaging in less than four NSSI methods.

Finally, we consider whether the functions of an adolescent's NSSI predicts their suicidal thoughts and behaviours. Table 4 reports liner regression and logistic regression testing respectively the 13 NSSI functions as predictors of: (i) suicidal ideation and behaviour severity, and (ii) clinically elevated suicidal thoughts and behaviours. Controlling for gender, anti-suicide and sensation-seeking functions of NSSI were uniquely associated with greater severity of

suicidal thoughts and behaviours, as well as greater odds of meeting the cutoff for clinically elevated suicidal thoughts and behaviours. In contrast, peer bonding was uniquely associated with less severe suicidal thoughts and behaviours and lower odds of meeting the cutoff for clinically elevated suicidal thoughts and behaviours. Anti-dissociation was uniquely associated with greater severity of suicidal thoughts and behaviours but was unrelated to exceeding the cutoff for clinically elevated suicidal thoughts and behaviours. Similarly, toughness was uniquely associated with less severe suicidal thoughts and behaviours but was unrelated to exceeding the cutoff.

[INSERT TABLE 4 APPROX. HERE]

4. Discussion

Despite evidence that NSSI thoughts are distinct from NSSI behaviour (Kiekens et al., 2020; Nock et al., 2009), little research has considered NSSI thoughts that occur in the absence of any NSSI behaviour. In addition, despite mounting evidence that engaging in NSSI is associated with greater suicidal thoughts and behaviours (Kiekens et al., 2018; Mars et al., 2019; Ribeiro et al., 2016), questions remain regarding whether characteristics of NSSI behaviour are associated with suicidal thoughts and behaviours among community adolescents. In this study, we consider whether experiencing NSSI thoughts is associated with suicidal thoughts and behaviours among adolescents, before examining whether characteristics of NSSI behaviour are associated with greater suicidality.

Consistent with classifications of self-injurious thoughts and behaviours (Nock, 2010), 3.6% of our sample of community adolescents reported having experienced NSSI thoughts in the absence of any NSSI behaviour extending previous research which found that 2.1% of college

undergraduates reported NSSI thoughts (Kiekens et al., 2018). It is worth noting that a greater proportion (9.6%) of adolescents reported experiencing NSSI thoughts on the screening item than who were identified on DSHI as experiencing thoughts in the absence of NSSI behaviour, consistent with previous research that found that emerging adults were less likely to report NSSI behaviour on a single-item than on a checklist of behaviours (Robinson & Wilson, 2020). Given the paucity of research investigating NSSI thoughts, future research is needed to investigate the best way to assess NSSI thoughts which occur in the absence of NSSI behaviour.

Compared to those with no history of NSSI, adolescents who had experienced NSSI thoughts were more likely to also report suicidal ideation and having made a suicide plan in the past year, with a statistical trend to suggest that NSSI thoughts may also be associated with a lifetime suicide attempt or a past year suicide attempt. In contrast, extending previous research with clinical and community adolescents (Klonsky et al., 2013; Nock et al., 2006), community adolescents who report a lifetime history of NSSI disproportionately more likely to report greater lifetime suicidal thoughts and attempts, as well as a past-year suicide plan and past year suicide attempt. Notably, neither lifetime NSSI behaviour or NSSI thoughts distinguished between adolescents with a past year suicide plan and those with a past year suicide attempt. Future research should use longitudinal designs to better establish the factors which predict that transition over time from suicide plans to suicide attempts among community adolescents.

However, it is also currently unclear the extent to which the group of adolescents reporting lifetime NSSI is comprised of those who are currently considering engaging in NSSI behaviour, versus those who considered NSSI in the past but ultimately decided against doing so. Regardless of this distinction, greater understanding of lifetime NSSI thoughts is critical. Adolescents who have experienced NSSI thoughts and decided against NSSI behaviour are key

in testing some of the theorized barriers preventing NSSI (positive view of the self, aversion to self-injury stimuli, aversiveness of physical pain, and social norms; Hooley & Franklin, 2018). In contrast, adolescents currently considering NSSI behaviour represent a critical target for NSSI prevention efforts.

Moving beyond lifetime NSSI status, characteristics of an adolescent's NSSI behaviour were associated with their suicidal thoughts and behaviours. Extending research in college samples where medical treatment for NSSI injuries were associated with both suicidal attempts (Burke et al., 2018) and suicide ideation (Kiekens et al., 2018), in the current sample the more times an adolescent had required medical treatment for their NSSI injuries, the greater the severity of their suicidal thoughts and behaviours. This pattern of results highlights the importance of including suicide risk assessment as a standard component of care when treating a person's NSSI injuries. Many medical staff hold largely negative attitudes towards people who present to clinical settings with self-inflicted injuries, particularly in the case of repeat presentations (Saunders, Hawton, Fortune, & Farrell, 2012). Notably, attitudes appear to differ by suicidal intent, with staff reporting more positive and sympathetic responses towards those who present following a suicide attempt compared to NSSI (Saunders et al., 2012). Given that the frequency of NSSI medical treatment is associated with increased suicidal thoughts and behaviours, and that this medical treatment may occur in the context of stigmatization, addressing the knowledge needs of medical staff to better enable them to respond to self-injury presentations is warranted.

In a similar manner to frequency of medical treatment, the number of NSSI methods an adolescent had engaged in was also positively associated with their suicidal thoughts and behaviours. This finding extends previous research with young adults receiving clinical care

which found positive associations between the number of NSSI methods and recent suicidal ideation (Victor et al., 2015) and the number of lifetime suicide attempts (Nock et al., 2006). More specifically, the current study found that engaging in four or more different NSSI methods was associated with experiencing suicidal thoughts and behaviours at or above the clinical cutoff. In a similar manner, among adolescents receiving inpatient care those who reported having made suicide attempt(s) reported engaging in an average of 3.69 NSSI methods, while those who reported suicide ideation had engaged in 2.75 methods, and adolescents with no suicidal ideation reported an average of 2.65 NSSI methods (Stewart et al., 2017). Thus, a growing body of research suggests that variability in lifetime NSSI methods may be a marker of elevated suicide thoughts and behaviours. One possibility is that this variability reflects a pattern of escalating NSSI behaviour over time. Perhaps in cases where a young person engages in one NSSI method chronically, over time they habituate to the psychophysiological reinforcers of the behaviour, leading them to engage in other NSSI methods to achieve the same functions. Given that certain NSSI methods are more (or less) accessible in some settings (i.e., burning oneself requires access to a heat source), a second possibility may be that once a young person begins to rely on NSSI to manage their distress they may seek out alternative NSSI methods available in different settings. Establishing the mechanism(s) by which variability in NSSI methods is associated with greater suicidal thoughts and behaviours represents an important avenue for future research.

Consideration of the lifetime function(s) an adolescent endorses for their NSSI behaviours also provides information about their history of suicidal thoughts and behaviours. Within this sample, community adolescents who reported using NSSI to avoid suicidal thoughts and urges also reported experiencing more severe suicidal ideation and behaviour and had 2.32 greater odds of reporting clinically elevated suicidality. In a similar manner, undergraduate

students who engaged in NSSI to manage suicidal thoughts were more likely to have made a suicide plan and attempt (Burke et al., 2018; Paul et al., 2015), and among young people receiving inpatient care the anti-suicide function of NSSI had the strongest positive association with past-week suicidal ideation (Victor et al., 2015). This relationship between anti-suicide functions of NSSI and suicidal thoughts and behaviours is perhaps unsurprising given that engaging in NSSI to avoid suicide presupposes suicidal ideation.

Extending work in a young adult sample where engaging in NSSI to “feel something” was associated with the onset of suicide ideation, plans, and attempts (Kiekens et al., 2018), adolescents who engaged in NSSI for sensation-seeking functions reported greater suicidal thoughts and behaviours and had greater odds of meeting the cutoff for clinically elevated suicidality. Previous research has also found that sensation-seeking functions are prospectively associated with persistent NSSI from adolescence to emerging adulthood (Kiekens et al., 2017), and that trait levels of risk seeking are associated with lifetime NSSI status and number of NSSI acts (Korr, Jenkins & Conner, 2013). Given that poorer risk perception mediates the association between greater trait sensation-seeking and greater adolescent risk-taking behaviours (Doran et al., 2011; Zhang, Zhang, Shang, 2016), adolescents who endorse NSSI sensation-seeking functions may engage in more suicidal thoughts and behaviours because they perceive these as less risky. In contrast, adolescents who engaged in NSSI to bond with peers reported less severe suicidal thoughts and behaviours and had lower odds of meeting the clinical cutoff. One potential explanation for this negative association is that engaging in NSSI to bond with peers indicates social connection and a motivation to extend relationships, whereas suicidal thoughts and behaviours are associated with a withdrawal from relationships and lack of connection (Ribeiro & Joiner, 2009).

4.1. Clinical implications

Recent meta-analytic evidence suggests that psychosocial interventions, particularly Dialectical Behaviour Therapy for Adolescents, are effective at reducing adolescent self-injury and suicidal ideation (Kothgassner, Robinson, Goreis, Ougrin, & Plener, 2020). However, public mental health resources are finite, and thus the high prevalence of self-injury and suicidal ideation raises questions about how to assess risk and allocate resources based on need so that those most at risk of negative outcomes receive the most resource-intensive treatment. Basing these considerations on suicidal ideation alone is likely to prove ineffective and to easily exhaust the health system- it is not feasible to actively monitor one third of New Zealand adolescents. The current study suggests that considering an adolescent's NSSI history, as well as the characteristics of their NSSI behaviour, provides clinically meaningful information about their history of suicidal thoughts and behaviours. This study suggests that when a young person reports multiple NSSI methods, a greater number of occasions of NSSI requiring medical treatment, and/or engaging in NSSI for self-punishment, anti-suicide, and sensation-seeking reasons, increased attention *should be* paid to their suicidal thoughts and behaviours. Similarly, where a client is increasing the number of methods over the course of therapy and escalating in their NSSI severity in a manner that increases need for medical intervention, the clinician may expect increased suicidal ideation, intent, and behaviour. This would necessitate scaling up the level of intervention, and/or the type of therapy being delivered, as well as consideration of the intrapersonal and/or interpersonal factors that have created these changes for the client and how these may be addressed.

4.2. Limitations and future research directions

Our findings should be interpreted in the context of several limitations. First and foremost, the cross-sectional nature of this study prevents us from drawing causal inferences about the temporal nature of the relationship between nonsuicidal and suicidal thoughts and behaviours. One possibility is that NSSI behaviour may provide a ‘gateway’ to suicidal behaviour by laying a foundation for future suicidal behaviour. The Interpersonal-Psychological Theory of Suicide (Joiner, Ribeiro, & Silva, 2012) argues that people who chronically self-injure become de-sensitized to the psychophysiological aversiveness of injury (e.g., habituate to physical pain and the sight of blood). So, in the context of feeling like a burden to, and disconnected from others, people who have previously hurt themselves develop an ‘acquired capability’ that makes it easier to move from suicidal ideation to attempts (Joiner et al., 2012). A second possibility is that adolescents who experience suicidal thoughts may subsequently engage in NSSI to manage these thoughts or urges (Klonsky & Glenn, 2009). Finally, a third potential explanation is that NSSI and suicidal thoughts and behaviours share similar underlying psychological mechanisms, such as body regard; whereby feeling unappreciative and/or disconnected from one’s body may contribute to the development of both NSSI and suicidal thoughts and behaviours. To isolate the relative contribution of these three different mechanisms for the relationship between NSSI and suicidal thoughts and behaviours, longitudinal research tracking the development of both suicidal and nonsuicidal thoughts and behaviours are needed.

Second, analyses investigating the associations between lifetime NSSI status and past-year suicide plans and suicide attempts rely on small sample sizes and should be interpreted with caution. Third, due to ethics committee concerns of iatrogenic risk, two-step procedures were used in assessing both NSSI and suicidal thoughts and behaviours. All participants first complete a screening question and only those who indicate self-injury thoughts or behaviour complete

additional items. Although screening items are common (Chan et al., 2018; Garisch & Wilson, 2010), they likely under-estimate the true prevalence of self-injurious behaviours, especially for young men and those who engage in NSSI methods other than cutting (Robinson & Wilson, 2020). Finally, feedback from school mental health professionals and the study's clinical team suggested the cutoff score for clinically elevated suicidal thoughts and behaviours (Osman et al., 2001) over-identified students, particularly those whose suicidal thoughts and behaviours were historical. However, in the case of identifying community adolescents who may be at elevated risk for suicide, an over-liberal criterion for follow-up assessment was preferable to one that was over-conservative.

Despite these limitations, the current study suggests that considering an adolescent's NSSI thoughts (in the absence of any lifetime NSSI behaviour), as well as the characteristics of their NSSI behaviour provides clinically meaningful information about their suicidal thoughts and behaviours. In particular, if a young person reports multiple NSSI methods, requiring medical treatment for their injuries, and/or using NSSI to avoid suicide and/or to generate excitement or exhilaration, then increased attention should be paid to their suicidal thoughts and behaviours. Future research should establish the mechanism(s) by which NSSI thoughts and NSSI characteristics are associated with suicidal thoughts and behaviours in order to better understand the complex relationship between suicidal and nonsuicidal forms of self-injury.

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Table 1

Lifetime nonsuicidal self-injury status and engagement in specific nonsuicidal self-injury methods.

	Lifetime NSSI Status (<i>n</i> = 2057)		
	No NSSI	NSSI thoughts	NSSI history
<i>Screening question (total sample):</i>			
Please indicate whether you have had thoughts about hurting yourself on purpose (but not actually done this), whether you have hurt yourself on purpose (e.g. cut, burnt, scratched or carved your skin, etc.), or whether you have never done this.	68.5%	9.6%	21.9%
	Specific NSSI methods (<i>n</i> = 591)		
	No engagement in this method	NSSI thoughts	NSSI history
<i>Deliberate Self-Harm Inventory (lifetime NSSI thoughts and/or behaviour only):</i>			
'Have you ever deliberately (but without wanting to kill yourself)...	11.2%	23.0%	65.8%
...cut your wrist, arms, or other areas of your body?			
...burned yourself with a cigarette, lighter or matches?	65.3%	14.6%	20.1%
...carved words, pictures, designs or other marks onto your skin (not including tattoos or tā moko)?	63.6%	7.8%	28.6%
...severely scratched yourself, to the extent that scarring, or bleeding occurred?	38.7%	12.5%	48.7%
...bitten yourself, to the extent that you broke the skin?	70.7%	9.3%	20.0%
...rubbed sandpaper on your body?	91.9%	2.7%	5.4%
...dripped acid onto your skin?	95.9%	2.5%	1.5%
...used bleach, or oven cleaner to scrub your skin?	96.6%	1.7%	1.7%
...stuck sharp objects such as needles, pins, staples, etc. into your skin (not including tattoos or tā moko, ear or body piercing, or needles for drug use)?	61.9%	8.1%	29.9%
...rubbed glass into your skin?	86.5%	4.4%	9.1%
...broken your own bones?	91.0%	6.8%	2.2%
...punched yourself, or banged your head against something, to the extent that caused a bruise to appear?	51.4%	10.3%	38.2%
...prevented wounds from healing?	64.5%	8.1%	27.4%

Note: Only participants who indicated a history of NSSI thoughts or behaviours on the NSSI screening question were instructed to complete the Deliberate Self-Harm Inventory.

Table 2

Proportion of total sample reporting suicidal thoughts and behaviours.

Proportion of total sample reporting suicidal thoughts and behaviours:							
Screening Question SBQ-R 1: Have you ever thought about or attempted to kill yourself?							
Never (1)	It was just a brief passing thought (2)	I have had a plan at least once to kill myself, but did not try to do it (3)	I have had a plan at least once to kill myself and really wanted to die (3)	I have attempted to kill myself, but did not want to die (4)	I have attempted to kill myself, and really hoped to die (4)		
64.1%	20.8%	7.4%	3.5%	1.7%	2.3%		
(NB. Participants who indicated no suicidal ideation on the screening question did not complete additional questions)	SBQ-R 2: How often have you thought about killing yourself in the past year?						
	Never (1)	Rarely (1 time) (2)	Sometimes (2 times) (3)	Often (3-4 times) (4)	Very often (5 or more times) (5)		
	11.9%	12.4%	8.6%	3.7%	3.1%		
	SBQ-R 3: Have you ever told someone that you were going to commit suicide, or you might do it?						
	No (1)	Yes, at one time, but did not really want to die (2)	Yes, at one time, and really wanted to die (2)	Yes, more than one, but did not want to do it (3)	Yes, more than one, and really wanted to do it (3)		
	29.1%	5.2%	0.8%	1.3%	1.3%		
	SBQ-R 4: How likely is it that you will attempt suicide someday?						
	Never (0)	No chance at all (1)	Rather unlikely (2)	Unlikely (3)	Likely (4)	Rather likely (5)	Very likely (6)
	15.8%	9.6%	7.3%	4.1%	2.4%	0.3%	0.1%
	In the last year, have you made a plan about how you would kill yourself						
	Yes 8.4%			No 91.6%			
In the last year, have you tried to kill yourself?							
	Yes 2.0%			No 98.0%			
In the last 2 weeks, have you seriously thought about killing yourself?							
	Yes 2.9%			No 97.1%			

Note. For the SBQ-R items, the score each response is allocated is provided in parentheses. A total score of 7 or more on the SBQ-R is deemed clinically elevated suicidality.

Table 3

Binomial logistic regressions of lifetime nonsuicidal self-injury status predicting lifetime suicidal thoughts and behaviours, and past year suicide plans and attempts.

Dependent variable: lifetime suicidality	No suicidality (<i>n</i> =1294) versus suicidal ideation (<i>n</i> =642)	No suicidality (<i>n</i> =1294) versus suicide attempt (<i>n</i> =82)	Suicidal ideation (<i>n</i> =642) versus suicide attempt (<i>n</i> =82)
Independent variable:	OR [95% CI]	OR [95% CI]	OR [95% CI]
No NSSI (<i>n</i> =1409)	<i>Reference</i>	<i>Reference</i>	<i>Reference</i>
NSSI thoughts only (<i>n</i> =198)	7.36 [4.37, 12.38]**	6.00 [0.72, 50.32]^	0.79 [0.10, 6.53]
NSSI behavior (<i>n</i> =450)	13.70 [10.44, 17.98]**	105.25 [47.69, 232.30]**	7.511 [3.48, 16.24]**
Dependent variable: past year suicide plan and attempt	No suicide plan and/or attempt (<i>n</i> =1822) versus suicide plan (<i>n</i> =172)	No suicide plan and/or attempt (<i>n</i> =1812) versus suicide attempt (<i>n</i> =41)	Suicide plan (<i>n</i> =147) versus suicide attempt (<i>n</i> =41)
Independent variable:	OR [95% CI]	OR [95% CI]	OR [95% CI]
No NSSI (<i>n</i> =1409)	<i>Reference</i>	<i>Reference</i>	<i>Reference</i>
NSSI thoughts only (<i>n</i> =198)	7.56 [3.06, 18.65] **	9.45 [0.84, 106.72]^	1.19 [0.09, 15.54]
NSSI behavior (<i>n</i> =450)	24.22 [14.76, 39.73]**	59.75 [14.04, 254.26]**	2.81 [0.61, 12.94]

Note. ^ $p < .10$, * $p < .05$, ** $p < .01$. Gender was included in these analyses but was not a significant predictor in any analysis and so is not presented here.

Table 4

Nonsuicidal self-injury (NSSI) functions as predictors of adolescent's suicidality severity, and clinically elevated suicidality.

NSSI Function	<i>M (SD)</i>	Suicidal ideation and behaviour severity (SBQ-R score)			Clinically elevated suicidality (SBQ-R cutoff)		
		<i>β</i>	95% CI	<i>p</i>	<i>OR</i>	95% CI	<i>p</i>
		<i>F</i> (14, 413) = 22.108, <i>p</i> <.001, <i>R</i> ² = 0.43			<i>χ</i> ² (14) = 156.42, <i>p</i> < .001, <i>R</i> ² = 0.41		
Gender (1= Male, 2= Female)		-.12	-.20, -.04	.004	0.45	0.25, 0.84	.011
<i>Intrapersonal Functions</i>							
Affect Regulation	3.30 (1.85)	<-.01	-.10, .08	.883	1.03	0.89, 1.20	.701
Anti-Dissociation	1.84 (1.82)	.16	.05, .25	.003	1.05	.088, 1.26	.589
Anti-Suicide	1.45 (1.85)	.49	.39, .59	<.001	1.98	1.59, 2.46	<.001
Marking Distress	1.20 (1.55)	-.02	-.11, .08	.695	1.11	0.89, 1.39	.349
Self-Punishment	2.84 (2.00)	.07	-.02, .17	.100	1.15	1.00, 1.32	.055
<i>Interpersonal Functions</i>							
Autonomy	0.44 (1.01)	.03	-.08, .12	.651	1.20	0.81, 1.78	.360
Interpersonal Boundaries	0.84 (1.30)	.04	-.06, .13	.430	1.18	0.90, 1.55	.227
Interpersonal Influence	0.46 (0.86)	.06	-.04, .16	.217	1.05	0.68, 1.63	.812
Peer Bonding	0.23 (0.75)	-.14	-.24, -.03	.011	0.48	0.29, 0.81	.006
Revenge	0.30 (0.87)	<-.01	-.09, .08	.858	0.83	0.57, 1.21	.335
Self-Care	0.87 (1.25)	<-.01	-.10, .09	.920	1.06	0.81, 1.41	.664
Sensation Seeking	0.58 (1.11)	.15	.06, .25	.001	1.75	1.22, 2.49	.002
Toughness	0.90 (1.31)	-.10	-.19, <.01	.046	0.94	0.72, 1.21	.616

Note. Significant estimates are bolded for ease of interpretation. Clinically elevated suicidality coded as 0 = below SBQ cut-off, 1 = above SBQ cut-off.