Article:
Carrier, C., Herbert, M., Cottrell, D. orcid.org/0000-0001-8674-0955 et al. (2 more authors) (2025) Patterns of Self-Harm Functions among Clinic-Referred Youth: Associations with Treatment Outcomes. Behaviour Research and Therapy, 193. 104843. ISSN: 0005-7967

https://doi.org/10.1016/j.brat.2025.104843

Patterns of Self-Harm Functions among Clinic-Referred Youth: Associations with Treatment Outcomes

Christina Carrier,[a,b] Monique Herbert,[a] David Cottrell,[c] Alexandra Wright-Hughes,[c] & Madison Aitken[a,b]

[a] Department of Psychology, York University, 4700 Keele Street, Toronto, M3J 1P3, Canada

[b] Cundill Centre for Child and Youth Depression, Centre for Addiction and Mental Health, 80 Workman Way, Toronto, M6J 1H4, Canada

[c] School of Medicine, Worsley Building, University of Leeds, Leeds, LS2 9JT, United Kingdom

Correspondence to:

Madison Aitken

Department of Psychology, York University, 4700 Keele Street, Toronto, ON M3J 1P3, Canada

aitken@yorku.ca

Acknowledgement:

MA was supported by the Cundill Centre for Child and Youth Depression at the Centre for Addiction and Mental Health. This research was funded by the UK National Institute for Health Research (NIHR) Health Technology Assessment (HTA) programme (project number 07/33). The views expressed in this publication are those of the authors and do not necessarily reflect those of the HTA programme, NIHR, the UK National Health Service, or the Department of Health. The authors would like to thank the original SHIFT study team and participants for allowing use of anonymised SHIFT data.

Abstract

Theories of self-harm (self-injurious behaviour that may or may not include suicidal intent) include behavioural components such as escape, coping, and reinforcement through emotion regulation. By better understanding the functions (i.e., reasons or anticipated consequences) of self-harm, we may be able to improve treatment outcomes. This is a secondary analysis of data from the Self-Harm Intervention: Family Therapy trial. We used latent class analysis to identify patterns of self-harm functions (e.g., interpersonal, intrapersonal) in adolescents who presented to services due to self-harm. Participants (N = 832, 11-17 years; 89% female) completed a structured interview to provide information on the presence and functions of self-harm as well as a questionnaire on suicidal ideation. Five latent classes were identified: 1) self-harming to stop feelings of anger and communicate desperation to others ("Anger/Desperation"); 2) self-harming to relieve negative feelings, particularly anxiety, and to receive help ("Anxious/Distressed"); 3) both intrapersonal and interpersonal functions with a desire to receive help ("Mixed Inter-Intrapersonal;"); 4) intrapersonal functions without an interest in seeking help ("Intrapersonal/Internalizing"); and 5) a low probability of intrapersonal and interpersonal functions ("Few Self-Harm Functions"). The Intrapersonal/Internalizing class had significantly higher suicidal ideation at 12-month post-treatment follow-up than the Few Self-Harm Functions class. Both the Anxious/Distressed and Intrapersonal/Internalizing classes were significantly more likely to have engaged in self-harm between baseline and 12-month post-treatment follow-up than the Few Self-Harm Functions class. The results highlight the need to identify effective treatment approaches to intervene on self-harm behaviour based on its functions.

Keywords: adolescents; self-harm; treatment; latent class analysis; functions of behaviour

Patterns of Self-Harm Functions among Clinic-Referred Youth: Associations with Treatment Outcomes

Self-harm in youth is a growing mental health concern, with approximately 4% of Canadian youth attempting suicide in the past year (Boak et al., 2018) and 17% reporting a history of nonsuicidal self-injury (Nixon et al., 2008). Self-harm is associated with many psychiatric difficulties, including depression, anxiety, borderline personality traits, substance use, attention deficit hyperactivity disorder, and dissociation (Silverman et al., 2018). While self-harm can be an isolated incident, the majority of those who self-harm engage in the behaviour repeatedly and for prolonged periods of time (Hambleton et al., 2022). Self-harm has serious consequences, such as feelings of guilt and shame, social rejection, and severe physical injuries (Silverman et al., 2018). Further, the chronic nature of self-harm causes a significant burden on the healthcare system due to the necessary medical care and potential hospitalization (Hambleton et al., 2022). The term "self-harm" is used in the present study to refer to deliberate self-injury, whether or not suicidal intent is present (De Leo et al., 2021). The terms nonsuicidal self-injury ("deliberate damage to one's own body tissue without suicidal intent;" Nock & Prinstein, 2004, p. 885) and suicidal self-directed violence (in which intent is not undetermined or explicitly nonsuicidal; Klonsky et al., 2016) are used when theory or previous findings are specific to one of these forms of self-harm.

Theories of Self-Harm

Some theories propose that suicidal self-directed violence is caused by antecedents (i.e., what people experience before suicidal self-directed violence), mainly including emotions such as hopelessness, stress, and rejection. For example, hopelessness, burdensomeness, and lack of belonging have been suggested as causes of suicidal self-directed violence (Beck et al., 1985;

Joiner, 2005; Van Orden et al., 2010). Other theories suggest that suicidal self-directed violence is the function of anticipated consequences (i.e., what people anticipate they will experience after suicidal self-directed violence), such as escaping emotional distress due to interpersonal failures and social inadequacies (Baumeister, 1990). Other behavioural theories suggest that suicidal self-directed violence is a coping strategy for internal distress, thus reflecting a lack of emotion regulation skills (Miller & Prinstein, 2019; Shneidman, 1998).

Several theories and models of nonsuicidal self-injury functions have also been proposed, addressing the function the behaviour may serve as well as the immediate antecedents and consequences that reinforce the behaviour over time (Pollak et al., 2020). For example, Chapman et al. (2006) proposed the "Experiential Avoidance Model," which suggests that nonsuicidal self-injury is maintained by negative reinforcement. In other words, individuals self-injure to escape or avoid unwanted emotions. The short-term relief of unwanted emotions then reinforces the self-injury behaviour, which increases the likelihood that the individual will engage in future nonsuicidal self-injury. Similarly, Gordon et al. (2010) explored whether each incident of self-harm (nonsuicidal and suicidal) would decrease negative feelings (e.g., fear) and increase positive feelings (e.g., relief). They found that individuals with more previous self-harm episodes felt more soothed, relieved, and calmer following their most recent episode, suggesting that the emotion regulation function of self-harm becomes more reinforcing with repetition.

Applying a Function-Based Approach to Self-Harm

A function-based approach involves classifying and treating the behaviour based on the antecedent and consequent contextual influences (Nock & Prinstein, 2004). Self-harm functions are defined as self-reported reasons or anticipated consequences of engaging in self-harm (Pollak et al., 2020). Proposed models of nonsuicidal self-injury broadly divide the functions into

intrapersonal (i.e., regulating internal experiences) or interpersonal (i.e., regulating social experiences; Nock & Prinstein, 2004; Pollak et al., 2020). While self-harm functions have mainly been considered in youth with nonsuicidal self-injury, some studies using innovative methods, such as experimental paradigms and virtual reality, have also demonstrated the relevance of functions to suicidal self-directed violence (Huang et al., 2020; Millner et al., 2019). In addition, the distinction between suicidal and nonsuicidal motives can be unclear and can fluctuate across self-harm episodes (De Leo et al., 2021; Holliday et al., 2020; Witt et al., 2025). Some individuals may also be unsure of the extent to which their self-harm is suicidal in intent (Brausch et al., 2016). Further, previous research shows a high co-occurrence between nonsuicidal self-injury and suicidal self-directed violence (e.g., Cheung et al., 2013; Poudel et al., 2022; Voss et al., 2020). Self-harm among adolescents, regardless of suicidal intent, is also a predictor of death by suicide (e.g., Wilkinson et al., 2011). Given the considerable overlap between nonsuicidal self-injury and suicidal self-directed violence, we apply a function-based approach to the broad construct of self-harm, encompassing self-injurious behaviour regardless of intent (De Leo et al., 2021).

There are few intervention trials for youth self-harm and treatment effects on self-harm persistence have been modest (Cottrell et al., 2018; Hawton et al., 2015). A Cochrane review found modest treatment effects for individual cognitive behavioural therapy, mentalization-based therapy for adolescents, group therapy, enhanced assessment approaches, compliance enhancement approaches, family interventions, or remote contact interventions (Witt et al., 2021). Available trials also reported small beneficial effects for Dialectical Behaviour Therapy-Adolescents in reducing self-harm repetition (Witt et al., 2021). Function-based approaches have been applied to various other psychopathology, which has led to a better understanding of the

conceptualization, assessment, and treatment of these disorders (Hayes et al., 1996; Payne et al., 2007). Treatment outcomes for self-harm may therefore be improved by gaining a deeper understanding of the function of the self-harm behaviour.

Self-Harm Intervention: Family Therapy (SHIFT) Trial

The Self-Harm Intervention: Family Therapy (SHIFT; Current Controlled Trials ISRCTN59793150) trial was a pragmatic, Phase III, multicentre, individually randomized controlled trial comparing the effects of family therapy with treatment as usual (TAU) on adolescents' rates of repetition of self-harm leading to hospital attendance (Cottrell et al., 2018; Wright-Hughes et al., 2015). Family therapy sessions were approximately 1.25 hours in duration at approximately monthly intervals, with more frequent initial appointments (8 sessions on average). The duration of both treatments was designed to be approximately 6 months. There were no restrictions on treatment in the TAU condition. Based on therapist report of session content, TAU involved individual (47.7%), family-oriented work (44.1%), a combination of both (3.6%), or group sessions (3.2%). Although systemic family therapy was not associated with significantly greater reductions in hospital attendance for self-harm at an 18-month follow-up compared to TAU in the SHIFT trial, moderation analyses suggest heterogeneity in treatment outcomes based on a variety of factors (Cottrell et al., 2018). Self-harm is often reported as more prevalent in female adolescents compared to males (Sornberger et al., 2012; Steinhoff et al., 2021). The rates of nonsuicidal self-injury are rising among adolescents in North America, but more so among female adolescents (Diggins et al., 2024; Moloney et al., 2024). Thus, examining self-harm is particularly pertinent in females (Cybulski et al., 2021; Gardner et al., 2019; Madigan et al., 2023; Ruch et al., 2019; Sara et al., 2023). Most participants in SHIFT were female, consistent with evidence of a gender imbalance in self-harm rates.

Present Study

Most previous studies on adolescents' motivations for self-harm classify them into two separate domains (i.e., intrapersonal and interpersonal); however, this variable-oriented approach is limiting as individuals may have a combination of intrapersonal and interpersonal functions and, within the two categories, there may be variability in the specific functions of youth self-harm (Nock & Prinstein, 2004). Therefore, an important research direction is to examine patterns of endorsed self-harm functions among adolescents, as different patterns of self-harm functions may result in different self-harm related outcomes and suggest different treatment approaches (Pollak et al., 2020). More specifically, exploring item-level data may be important, as a latent conceptualization of intrapersonal and interpersonal functions may mask the specific driving factors for youth self-harm.

A person-oriented approach to explore typologies of self-harm functions has been central to a few previous studies to date (e.g., Bracken-Minor et al., 2012; Case et al., 2020; Klonsky & Olino, 2008; Sack et al., 2022; Somer et al., 2015; Shahwan et al., 2020). However, previous studies have included other information when creating their classes, such as self-harm methods and frequency. In the one study to focus solely on functions of self-harm, Sack et al. (2022) identified two classes of nonsuicidal self-injury in an inpatient sample of adolescents: 1) Multiple functions; and 2) Single/avoidant function. Further research with larger samples is needed to identify more specific classes of self-harm functions that can inform treatment.

The present study is a secondary analysis of data from the SHIFT trial. The first objective was to elucidate patterns of co-occurrence among self-harm functions (e.g., interpersonal, intrapersonal) in adolescents who presented to hospital due to self-harm (i.e., suicidal and/or nonsuicidal self-injury). The second objective was to explore whether the various classes of self-

harm functions predict suicidal ideation and self-harm presence at a 12-months post-treatment. Finally, the third objective was to determine whether the association between classes of self-harm functions and treatment outcomes varied by treatment condition (family therapy vs. TAU).

Materials and Methods

Participants

Participants were 832 adolescents aged 11 to 17 (M = 14.34, SD = 1.37) recruited from Child and Adolescent Mental Health Services (CAMHS) across three hubs in England who had self-harmed prior to assessment by the CAMHS team and who had engaged in at least one previous episode of self-harm prior to the index presentation (though youth at serious risk of suicide were excluded; see Cottrell et al., 2018 for detailed inclusion and exclusion criteria). The final sample included 737 girls (88.6%) and 95 boys (11.4%). In terms of ethnicity, 84.3% of the sample were white (n = 701), 7.2% were black (n = 60), 3.5% were Asian, including Pakistani, Indian, Bangladeshi, and mixed (n = 29), 4.8% selected "other ethnic group" (n = 40), and 0.2% did not state their ethnicity (n = 2). All participants had self-harmed on at least two occasions and most adolescents self-harmed on at least three previous occasions (88.9% in the family therapy condition and 88.7% in the TAU condition).

Procedure

Participants were randomly assigned on a 1:1 basis to receive family therapy or TAU (for details, see Cottrell et al., 2018). Researchers were blind to treatment allocation in order to facilitate unbiased collection of follow-up data.

Ethical Considerations

Participants provided informed consent to participate in the SHIFT trial. All study procedures were approved by the National Research Ethics Service Committee Yorkshire and the

Humber – Leeds West (09/H1307/20) in April 2009 and all study procedures complied with relevant laws and institutional guidelines. The present analysis was approved by the last author's hospital research ethics board (054-2021). Pseudo-anonymized individual participant data were transferred securely with a formal Data Sharing Agreement.

Measures

Self-Harm Functions

Self-harm functions were drawn from the Interpersonal Influence and Emotion Relief scales of the Suicide Attempt Self-Injury Interview (SASII; Linehan et al., 2006). The SASII is a structured interview designed to provide comprehensive information about all past self-harm behaviour, regardless of intent to die (i.e., suicidal and nonsuicidal self-harm). Participants responded yes or no to a list of potential self-harm functions, broadly classified as "Interpersonal Influence" or "Emotion Relief" functions (Brown et al., 2002). The self-harm functions items in the SASII were originally generated based on unstructured interviews with 51 adult psychiatric inpatients admitted for suicidal behaviour without an intent to die. The responses were collapsed into 29 distinct reasons based on their content, 22 of which were further clustered into four rationally derived scales by expert consensus (Brown et al., 2002), including 8 reasons formed the Interpersonal Influence scale (α = .80) and 6 reasons formed the Emotion Relief scale (α = .63). Therefore, these SASII items were included in the present study based on expert consensus and internal consistency values. Self-harm functions at baseline from the SASII interview, which focused on the index episode of self-harm that brought the youth into treatment (Cottrell et al., 2018), were used as indicator variables.

Self-harm Recurrence

Self-harm recurrence was defined as the presence of self-harm (i.e., dichotomized into

yes/no) between baseline and the 12-month follow-up as reported by youth on the SASII (i.e., whether the participant engaged in self-harm since baseline or post-randomization). Self-harm recurrence was used as an outcome variable.

Suicidal Ideation

The total raw score on the Beck Scale for Suicide Ideation (BSSI; Beck et al., 1979) was used to measure suicidal ideation. The BSSI is a 19-item questionnaire that evaluates the presence and intensity of suicidal ideation. Each item involves three statements and the individual is asked to select the statement that best describes how they have been feeling for the past week, including the present day. The statements are ranked in ascending order of severity on a 3-point scale ranging from 0 to 2 and total scores range from 0 to 38. The first five items serve as a screen for suicidal ideation. If an individual gives a zero rating on item 4 (indicating no active suicidal intention) or item 5 (indicating no passive suicidal ideation), the remaining 14 questions pertaining to plans and attitudes are scored as 0; otherwise, the remaining 14 items are completed. Therefore, suicidal ideation is operationalized as individuals who have either active (i.e., desire to kill oneself), passive (i.e., desire to be dead), or both types of ideations (Liu et al., 2020; Pinninti et al., 2002). The BSSI has demonstrated strong internal consistency ($\alpha = .89$) and interrater reliability ($r = .83$ between clinicians). In the present study, the Cronbach's alpha for the BSSI was .88 (baseline) and .87 (follow-up). Further, many clinical trials have provided evidence for its sensitivity to treatment in adolescents (e.g., Aggarwal et al., 2023; Marasinghe et al., 2012; Zhao et al., 2023). Suicidal ideation at 12-months post-randomization was used a second outcome variable as it is an indicator of ongoing suicide risk (Miller & Prinstein, 2019).

Statistical Analyses

Basic descriptive statistics and patterns of missing data were examined. A latent class

analysis (LCA) was carried out using Mplus 8.3 (Muthén & Muthén, 2017) to identify classes of self-harm functions using the robust maximum-likelihood estimator. The LCA included 13 dichotomous variables of interpersonal ($k = 7$) and intrapersonal ($k = 6$) functions of self-harm at baseline. One item from the Interpersonal Influence scale was removed from the original 8 ("to make others understand how desperate you were") due to having substantial content overlap with another item on the scale ("to communicate or let others know how desperate you were") and thus, was considered redundant ($r = .55$, $p < .01$). "To communicate or let others know how desperate you were" was selected because it was more intuitive and had more complete data ($n = 749$ vs. $n = 733$).

Model fit was examined for each class solution based on the Bayesian information criterion (BIC) and bootstrap likelihood ratio test (BLRT). The BIC is an indicator of model fit, with smaller values suggesting better model fit. A nonsignificant BLRT p value ($\geq .05$) suggests that a model with one fewer latent class is a better fit (Nylund et al., 2007). The BLRT identifies the correct number of classes more consistently than the BIC with categorical outcomes (Nylund et al., 2007) and, as a result, when model fit indicators conflicted, the results of the BLRT were given more weight in selecting the model. Entropy values were also examined for each model, which reflect the accuracy of classification, ranging from 0 to 1 (1 indicating greater accuracy; Geiser, 2013). The interpretability of the classes, including class size, was also considered in choosing the number of classes (Muthén & Muthén, 2017).

Once the best-fitting number of classes was identified, participants were assigned to their most likely class based on the posterior probabilities. Classes were then compared on youth sex, age (continuous), medication use (dichotomous: yes, no), experienced physical and sexual abuse (dichotomous: yes, no), and suicidal ideation (continuous) at baseline using chi-square analyses

for categorical and ANOVAs for continuous variables. Classes were also compared on the severity of suicidal ideation at the 12-month follow-up using a linear regression model that controlled for baseline suicidal ideation severity and medication use, as medication use could potentially affect treatment outcomes. A binary logistic regression model was conducted to compare classes on self-harm recurrence, controlling for medication use. There was no baseline control variable for the self-harm recurrence analysis because all participants had self-harmed at baseline. Saved class membership was used for all analyses because it is not possible to include control variables in comparisons of classes on distal outcomes in Mplus, and controlling for baseline severity is recommended in analyzing data from clinical trials (Clifton & Clifton, 2019; Nunes et al., 2011). We then tested whether the association between class membership with suicidal ideation and self-harm presence at 12 months varied by treatment condition by adding an interaction of class membership by treatment condition to the regression models. All analyses were run using full information maximum likelihood estimation such that participants with missing data were included in the analysis if they had data available on one or more variables in the analysis. A significance level of $p < .05$ was used, and post hoc class comparisons were corrected for multiple comparisons with a Bonferroni correction (.05/4 = .0125).

Results

Descriptive Statistics

Table 1 presents sample descriptive statistics. Baseline characteristics of youth age, sex, medication use, experienced physical or sexual abuse, suicidal ideation, and endorsed self-harm functions were comparable between treatment conditions due to randomization. It is important to note that participants in TAU had higher rates of missing data at 12 months ($n = 168$) than participants in the family therapy condition ($n = 118$), $\chi^2(1) = 13.69$, $p < .001$.

Participants with (n = 546; 66%) and without (n = 286; 34%) outcome data (i.e., suicidal ideation and self-harm presence at 12-month follow-up) were compared on youth age, sex, medication use, experienced physical and sexual abuse, baseline suicidal ideation, and endorsed self-harm functions. There were no significant differences in any of these variables between participants with and without outcome data. Eleven participants were excluded from the LCA because they were missing data on the items of the SASII pertaining to the self-harm functions.

Half (50%) of the index self-harm episodes were classified as obviously having no intent to die, whereas the remainder had minimal (17%), definite but ambivalent (15%), serious (16%), and extreme (2%) intent to die. Rates of endorsed self-harm functions are reported in Table 2. The most commonly endorsed function was "to stop bad feelings," whereas "to shock or impress others" was the least commonly endorsed function.

Latent Class Analysis

Fit indices for one- through six-class solutions are presented in Table 3. Although the BIC values increased from the three-class to the four-class and from the five-class to six-class solutions, the BLRT and the entropy values suggest that the five-class solution represents the best fit. In addition, the additional class in the six-class solution was similar to two classes already identified in the five-class model and did not appear to add clinically meaningful information. Therefore, the five-class model was chosen as the best model because it had profiles of adequate size that captured clinically relevant patterns of functions.

Figure 1 shows the probability of participants in each latent class endorsing each of the self-harm functions. Class 1 (19.0% of the sample) was characterized by a high probability of endorsing both intrapersonal and interpersonal functions of self-harm, particularly to stop feelings of anger (ρ = 0.70) and communicate desperation to others (ρ = 0.65). Further, Class 1

had a low probability of self-harming to relieve anxiety (ρ = 0.23). Based on these probabilities, Class 1 was labeled Anger/Desperation. Class 2 (10.4% of the sample) was characterized by a high probability of self-harming to relieve anxiety (ρ = 1.0) as well as other negative feelings, including loneliness/emptiness (ρ = 0.91), anger (ρ = 0.93), and self-hatred (ρ = 0.87). Participants in Class 2 also endorsed a high probability of self-harming to communicate desperation to others (ρ = 0.63) and to receive help (ρ = 0.70). Class 2 was labeled Anxious/Distressed. Class 3 (5.9% of the sample) was characterized by a high probability of both interpersonal and intrapersonal functions of self-harm, particularly to receive help (ρ = 1.0) and get into a hospital program (ρ = 0.66) as well as to demonstrate to others how wrong they were (ρ = 0.76) and get back at them (ρ = 0.90). In addition, participants in Class 3 were characterized by a high probability of self-harming to stop feelings of anger (ρ = 0.95), loneliness/emptiness (ρ = 0.95), self-hatred (ρ = 0.83), and anxiety (ρ = 0.82). Class 3 was labeled Mixed Inter-Intrapersonal. Class 4 (33.1% of the sample) was characterized by a high probability of intrapersonal functions of self-harm and a low probability of functions involving seeking help (ρ = 0.0) or gaining admission into a hospital program (ρ = 0.0). Based on these probabilities, Class 4 was labeled Intrapersonal/Internalizing. Finally, Class 5 (31.5% of the sample) included participants who endorsed few inter- or intrapersonal functions of self-harm, mainly endorsing functions involving stopping bad feelings (ρ = 0.63) and anger (ρ = 0.56). Class 5 was also characterized by a low probability of all interpersonal functions of self-harm. Class 5 was labeled Few Self-Harm Functions and was used as the reference class in subsequent analyses given that they had the lowest probability of endorsing intrapersonal functions, which are predictive of self-harm persistence (Pollak et al., 2020).

Baseline Class Comparisons

There was a significant difference in youth age between classes, $F(4, 816) = 3.16$, $p < .05$, $\eta^2 = .015$. Post-hoc comparisons using a Bonferroni correction indicated that youth in the Intrapersonal/Internalizing class ($M = 14.54$, $SD = 1.33$) were significantly older than youth in the Few Self-Harm Functions class ($M = 14.18$, $SD = 1.29$, $p < .05$; $d = .27$). There were no significant sex differences between classes, $\chi^2(4) = 3.27$, $p = .51$. In addition, the classes did not significantly differ on baseline medication use, $\chi^2(4) = 5.70$, $p = .22$, or experienced physical, $\chi^2(8) = 10.94$, $p = .21$, or sexual abuse, $\chi^2(8) = 3.75$, $p = .88$. In terms of suicidal ideation, there was a significant difference between classes at baseline, $F(4, 801) = 4.06$, $p < .01$, $\eta^2 = .020$. Post-hoc comparisons using a Bonferroni correction indicated youth in the Intrapersonal/Internalizing class ($M = 12.14$, $SD = 9.18$) had significantly more severe suicidal ideation than youth in the Few Self-Harm Functions class ($M = 9.17$, $SD = 9.04$, $p < .01$). The effect size was small ($d = .33$). No other post-hoc comparisons of baseline suicidal ideation between classes reached the corrected significance level. See Table S1 for descriptive statistics by class.

Comparing Classes on 12-Month Follow-Up Outcomes

In the analysis of class differences in suicidal ideation at 12-month follow-up, there was a significant main effect of Intrapersonal/Internalizing class membership, with the Intrapersonal/Internalizing class having significantly higher suicidal ideation at the 12-month follow-up than the Few Self-Harm Functions class ($\beta = .138$, $p = .005$, 95% CI [0.04, 0.23]), controlling for baseline suicidal ideation and medication use (see Table 4). No other main effects were significant.

In the analysis of class differences in self-harm presence at the 12-month follow-up, the Anxious/Distressed and Intrapersonal/Internalizing classes were both significantly more likely to

have engaged in self-harm between baseline and the 12-month follow-up than the Few Self-Harm Functions class, OR = 2.58, 95% CI [1.07, 6.21]; and OR = 1.62, 95% CI [1.01, 2.61], respectively, even after controlling for medication use. No other effects were significant (see Table 4 and Table S2 for descriptive statistics by latent class).

Moderation Effect of Treatment Condition

Finally, we examined whether the association between class membership and outcomes at 12-month follow-up was moderated by treatment condition (family therapy vs. TAU). There were no significant treatment condition by class interaction effects for either suicidal ideation or self-harm presence at 12-month follow-up (see Table 5).

Discussion

The present study applied person-oriented analysis to a range of self-harm functions, including both interpersonal and intrapersonal, in adolescents participating in a clinical trial for self-harm. The goal was to determine what classes of self-harm functions are present in a clinical sample of adolescents who self-harm, and how these classes may be related to severity and persistence/recurrence of suicidal ideation and self-harm following psychosocial treatment. The present study identified five classes of self-harm functions, with the majority of adolescents (~65%) falling within classes characterized by r*elatively* low endorsement of interpersonal functions and *relatively* high endorsement of intrapersonal functions (i.e., Intrapersonal/Internalizing class and Few Self-Harm Functions class). Approximately one-fifth of the adolescents fell within a class characterized most notably by self-harming to stop feeling angry and to communicate desperation to others. In addition, a small class of adolescents who all identified self-harming as a way to relieve anxiety was identified. The remaining class, which included the lowest percentage of participants (~6%), was characterized by high endorsement of

both interpersonal and intrapersonal functions of self-harm.

The classes of self-harm functions identified are consistent with previous variable-oriented research, which has revealed that majority of adolescents in clinic and community samples report self-harming to get relief from internal distress (Doyle et al., 2017; Nock & Prinstein, 2004; Pollak et al., 2020). These findings are also consistent with the affect-regulation model of self-harm (Klonsky, 2007), which suggests that self-harm serves as a mechanism for relieving negative emotions and that individuals self-harm as a maladaptive coping strategy (Brausch & Woods, 2019). Further, Gordon et al. (2010) found that the maladaptive coping strategy of relieving negative emotions through self-harm becomes more reinforced through repeated self-harm. Interestingly, while classes were identified as having mixed inter- and intrapersonal functions of self-harm, none of the classes endorsed only interpersonal functions, which is consistent with previous research (e.g., Gardner et al., 2021; Sack et al., 2022). Gardner et al. (2021) found that 72.9% of adolescents reported intrapersonal functions only, 19.5% reported both intra- and interpersonal functions, and only 7.6% reported interpersonal functions exclusively.

It is important to note that these findings are based on a largely female (89%) sample, consistent with other studies exploring self-harm functions among adolescents (e.g., Pollak et al., 2020). We did not find any sex differences between classes, which is consistent with Llyod-Richardson et al. (2007), who conducted a confirmatory factor analysis using nonsuicidal self-injury functions as indicator variables. Similarly, Sack et al. (2022) conducted a latent class analysis of nonsuicidal self-injury functions and found no sex differences in class membership. However, Reinhardt et al. (2021) found that, among predominantly male justice-involved youth, male youth were more likely to self-harm to obtain interpersonal resources (e.g., gain social

attention) than female youth. Their findings suggest that the expected and valued outcomes of self-harm may differ by sex, and that facilitating improved social relationships may be necessary for justice-involved male youth. Thus, it is important to consider sex differences in motivations for engaging in self-harm behaviour. Further research is needed to understand to sex differences in self-harm functions in clinical and community samples.

The second objective was to explore whether the identified classes predicted treatment outcomes (i.e., suicidal ideation, self-harm recurrence) at a 12-month follow-up. We found that participants in the Intrapersonal/Internalizing class had significantly higher suicidal ideation and self-harm recurrence at post-treatment follow-up compared to those in the Few Self-Harm Functions class. Therefore, adolescents who self-harm for intrapersonal reasons, in the absence of interpersonal functions, may have the greatest risk for persistent self-harm and suicidal ideation. This finding is consistent with previous evidence that intrapersonal functions maintain self-harm over time and potentially elevate the risk of suicide attempts, while interpersonal functions may be less likely to predict continued self-harm (Gardner et al., 2021; Pollak et al., 2020).

We also found that the Anxious/Distressed class was significantly more likely to have persistent self-harm (yet not suicidal ideation), compared to those in the Few Self-Harm Functions class. These results are consistent with Gordon et al. (2010), such that self-harm is maintained through the emotion regulation function (i.e., regulating feelings of anxiety and distress). The Anxious/Distressed class also had the highest probability of endorsing “stop self-hatred” as a function of self-harm, which may partly explain the finding that adolescents in this class were more likely to have persistent self-harm. The Defective Self Model of Nonsuicidal Self-Injury (Hooley et al., 2010) proposes that individuals engage in nonsuicidal self-injury to

respond to feelings of self-hatred and punish themselves. Burke et al. (2021) found that self-criticism cognitions predicted nonsuicidal self-injury urges and intensity, providing support for the Defective Self Model of Nonsuicidal Self-Injury. Further, Fox et al. (2019) found that self-criticism was positively correlated with mood improvement during pain, thus strengthening the reinforcement of nonsuicidal self-injury benefits. Contrary to our findings, Bentley et al. (2021) found that higher levels of anxiety/agitation and shame/self-hatred during hospitalization predicted more days with suicidal thoughts after discharge. However, they explored anxiety/agitation and shame/self-hatred as experienced affect during hospitalization rather than a function or cause of self-harm.

Lastly, treatment condition did not moderate the association between classes of self-harm functions and treatment outcomes. While Nock and Prinstein (2004) suggest that different treatment approaches may be needed depending on the functions of self-harm, our results do not support the idea that one treatment approach may be more advantageous over others for any of the classes of functions. The lack of a significant treatment by self-harm function class interaction may be consistent with the common factors model of therapy, which suggests that there are characteristics present across most psychotherapy approaches (e.g., empathy, trust, reassurance, therapeutic alliance) that are the primary mechanisms of change in psychotherapy (Wampold, 2015). While theories of self-harm have suggested that family/interpersonal therapy is an appropriate treatment for adolescents who self-harm (Tang et al., 2009), interventions that are tailored by clinicians to best suit client needs seem to be equally successful (Ng & Weisz, 2016). However, it is also possible that targeting interpersonal relationships improves overall emotion regulation (Beauchaine, 2015). For instance, family interactions may have escalated less as a result of family therapy, leading to fewer instances of emotional dysregulation. Both

treatment approaches (i.e., family therapy and TAU) achieved similar results, possibly through both shared and unique processes. It is important to note that the family therapy was designed to be flexible, so it is possible that both treatment conditions involved personalization to some extent. An important next step will be to test personalization and specific therapy components in a more standardized way in order to better understand the potential benefits of personalizing treatment based on self-harm functions (e.g., Fisher et al., 2019).

It is prudent to highlight several limitations of this study. First, as expected for a pragmatic clinical trial, there was significant loss at follow-up (~50%). The proportion of participants lost in TAU was higher than in the family therapy condition. In addition, because there were no restrictions in terms of the type of therapy participants in the TAU condition were receiving, approximately 30% of participants in TAU received some type of family therapy. These characteristics of the TAU condition may have reduced the likelihood of finding an interaction between class membership and treatment condition. We also did not separate functions of nonsuicidal self-injury from functions of suicidal self-directed violence. Our sample included relatively equal numbers of youth with and without intent to die during the self-harm episode that brought them into treatment. While several authors have argued for an overall self-harm construct (e.g., De Leo et al., 2021), others have demonstrated differences in youth whose self-injury is nonsuicidal compared to those with suicidal intent on variables such as hopelessness, impulsivity, family conflict, and history of abuse (Asarnow et al., 2011; Dougherty et al., 2009). Generating latent classes based solely on samples with or without suicidal intent could therefore lead to different patterns of self-harm functions than those identified in the present study. Further, the measure of self-harm may not have included all potentially relevant self-harm functions. Specifically, positive-intrapersonal functions (e.g., to feel something, to

punish myself) and negative-interpersonal functions (e.g., to avoid punishment from others) were not included (Nock & Prinstein, 2004). Including a broader set of self-harm functions may be especially important given that approximately 30% of the sample fell within a class that had only low or moderate probability of endorsing any of the functions. Further, the self-harm recurrence variable included any self-harm behaviour from baseline (or post-randomization) until 12-month follow-up. It is possible that participants self-harmed prior to the start of intervention or before the completion of the intervention; therefore, the variable may not be reflective of outcomes following the completion of treatment. In addition, we only explored self-harm functions at baseline and did not account for potential changes in functions across time. Previous research has revealed that self-harm functions are not stable and may change across time and in different contexts; therefore, longitudinal studies would be useful to investigate whether self-harm functions change over the course of treatment (Klonsky, 2007; Klonsky & Glenn, 2009).

Conclusion

The present study adds to the literature on self-harm functions that predict suicide-related outcomes among clinic-referred youth participating in treatment. Understanding how self-harm functions predict suicide-related outcomes may help clinicians identify at-risk youth, though further research is needed to identify effective approaches to intervene on this life-threatening behaviour based on its functions.

Acknowledgements

The authors thank the original SHIFT study team and participants for allowing use of anonymised SHIFT data.

Funding Sources

This study was supported by the Cundill Centre for Child and Youth Depression at the Centre for

Addiction and Mental Health. The original trial analyzed here was funded by the UK National Institute for Health Research (NIHR) Health Technology Assessment (HTA) programme (project number 07/33). The views expressed in this publication are those of the authors and do not necessarily reflect those of the HTA programme, NIHR, the UK National Health Service, the Cundill Centre, or the Department of Health.

References

Aggarwal, S., Berk, M., Shah, N., Shah, A., Kondal, D., Patton, G., & Patel, V. (2023). Evaluating the acceptability of ATMAN intervention for self-harm in youth in India: A pilot study. *International Journal of Mental Health*, 1-21. https://doi.org/10.1080/00207411.2023.2230041

Asarnow, J.R., Porta, G., Spirito, A., Emslie, G., Clarke, G., Wagner, K.D., Vitiello, B., Keller, M., Birmaher, B., McCracken, J., Mayes, T., Berk, M., & Brent, D.A. (2011). Suicide attempts and nonsuicidal self-injury in the treatment of resistant depression in adolescents: findings from the TORDIA study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *50*(8), 772–781. https://doi.org/10.1016/j.jaac.2011.04.003

Baumeister, R.F. (1990). Suicide as escape from self. *Psychological Review*, *97*(1), 90–113. https://doi.org/10.1037/0033-295X.97.1.90

Beauchaine, T.P. (2015). Future directions in emotion dysregulation and youth psychopathology. *Journal of Clinical Child & Adolescent Psychology*, *44*(5), 875–896. https://doi.org/10.1080/15374416.2015.1038827

Beck, A. T., Kovacs, M., & Weissman, A. (1979). Assessment of suicidal intention: The Scale for Suicide Ideation. *Journal of Consulting and Clinical Psychology, 47*(2), 343–352. https://doi.org/10.1037/0022-006X.47.2.343

Beck, A.T., Steer, R.A., Kovacs, M., & Garrison, B. (1985). Hopelessness and eventual suicide: A 10-year prospective study of patients hospitalized with suicidal ideation. *American Journal of Psychiatry, 142*(5), 559–563.

Bentley, K.H., Coppersmith, D.L., Kleiman, E.M., Nook, E.C., Mair, P., Millner, A.J., Reid-Russell, A., Wang, S.B., Fortgang, R.G., Stein, M.B., Beck, S., Huffman, J.C., & Nock,

M.K. (2021). Do patterns and types of negative affect during Hospitalization predict short-term post-discharge suicidal thoughts and behaviors? *Affective Science, 2*(4), 484–494. https://doi.org/10.1007/s42761-021-00058-6

Boak, A., Hamilton, H.A., Adlaf, E.M., Henderson, J.L., & Mann, R.E. (2018). *The mental health and well-being of Ontario students, 1991-2017: Detailed findings from the Ontario Student Drug Use and Health Survey (OSDHUS) (CAMH Research Document Series No. 47).* Centre for Addiction and Mental Health.

Bracken-Minor, K.L., McDevitt-Murphy, M.E., & Parra, G.R. (2012). Profiles of non-suicidal self-injurers and associated patterns of alcohol use. *Journal of Psychopathology and Behavioral Assessment*, *34*(4), 552–563. https://doi.org/10.1007/s10862-012-9306-5

Brausch, A.M., Williams, A.G., & Cox, E.M. (2016). Examining intent to die and methods for nonsuicidal self-injury and suicide attempts. *Suicide and Life-Threatening Behavior, 46*(6), 737–744. https://doi.org/10.1111/sltb.12262

Brausch, A.M., & Woods, S.E. (2019). Emotion regulation deficits and nonsuicidal self-injury prospectively predict suicide ideation in adolescents. *Suicide and Life-Threatening Behavior*, *49*(3), 868–880.

Brown, M.Z., Comtois, K.A., & Linehan, M.M. (2002). Reasons for suicide attempts and nonsuicidal self-injury in women with borderline personality disorder. *Journal of Abnormal Psychology*, *111*(1), 198–202.

Burke, T.A., Fox, K., Kautz, M., Siegel, D.M., Kleiman, E., & Alloy, L.B. (2021). Real-time monitoring of the associations between self-critical and self-punishment cognitions and nonsuicidal self-injury. *Behaviour Research and Therapy, 137*, 103775. https://doi.org/10.1016/j.brat.2020.103775

Case, J.A., Burke, T.A., Siegel, D.M., Piccirillo, M.L., Alloy, L.B., & Olino, T.M. (2020). Functions of non-suicidal self-injury in late adolescence: A latent class analysis. *Archives of Suicide Research*, *24*(sup2), S165–S186. https://doi.org/10.1080/13811118.2019.1586607

Chapman, A.L., Gratz, K.L., & Brown, M.Z. (2006). Solving the puzzle of deliberate self-harm: The experiential avoidance model. *Behaviour Research and Therapy*, *44*(3), 371–394. https://doi.org/10.1016/j.brat.2005.03.005

Cheung, Y.T.D., Wong, P.W.C., Lee, A.M., Lam, T.H., Fan, Y.S.S., & Yip, P.S.F. (2013). Non-suicidal self-injury and suicidal behavior: Prevalence, co-occurrence, and correlates of suicide among adolescents in Hong Kong. *Social Psychiatry and Psychiatric Epidemiology*, *48*, 1133–1144. https://doi.org/10.1007/s00127-012-0640-4

Clifton, L., & Clifton, D.A. (2019). The correlation between baseline score and post-intervention score, and its implications for statistical analysis. *Trials*, *20*(1), 1–6. https://doi.org/10.1186/s13063-018-3108-3

Cottrell, D., Wright-Hughes, A., Collinson, M., Boston, P., Eisler, I., Fortune, S., Graham, E.H., Green, J., House, A.O., Kerfoot, M., Owens, D.W., Saloniki, E., Simic, M., Tubeuf, S., & Farrin, A. (2018). A pragmatic randomised controlled trial and economic evaluation of family therapy versus treatment as usual for young people seen after second or subsequent episodes of self-harm: The Self-Harm Intervention-Family Therapy (SHIFT) trial. *Health Technology Assessment*, *22*(12). https://doi.org/10.3310/hta22120

Cybulski, L., Ashcroft, D.M., Carr, M.J., Garg, S., Chew-Graham, C.A., Kapur, N., & Webb, R.T. (2021). Temporal trends in annual incidence rates for psychiatric disorders and self-harm among children and adolescents in the UK, 2003–2018. *BMC Psychiatry*, 21, 229–

241. https://doi.org/10.1186/s12888-021-03235-w

De Leo, D., Goodfellow, B., Silverman, M., Berman, A., Mann, J., Arensman, E., Hawton, K., Phillips, M.R., Vijayakumar, L., Andriessen, K., Chavez-Hernandez, A-M., Heisel, M., & Kolves, K. (2021). International study of definitions of English-language terms for suicidal behaviours: A survey exploring preferred terminology. *BMJ Open*, *11*(2), e043409.

Diggins, E., Heuvelman, H., Pujades-Rodriguez, M., House, A., Cottrell, D., & Brennan, C. (2024). Exploring gender differences in risk factors for self-harm in adolescents using data from the millennium cohort study. *Journal of Affective Disorders*, *345*, 131–140. https://doi.org/10.1016/j.jad.2023.10.106

Dougherty, D.M., Mathias, C.W., Marsh-Richard, D.M., Prevette, K.N., Dawes, M.A., Hatzis, E.S., Palmes, G., & Nouvion, S.O. (2009). Impulsivity and clinical symptoms among adolescents with non-suicidal self-injury with or without attempted suicide. *Psychiatry Research*, *169*(1), 22–27. https://doi.org/10.1016/j.psychres.2008.06.011

Doyle, L., Sheridan, A., & Treacy, M. P. (2017). Motivations for adolescent self-harm and the implications for mental health nurses. *Journal of Psychiatric and Mental Health Nursing*, *24*(2-3), 134–142.

Fisher, A.J., Bosley, H.G., Fernandez, K.C., Reeves, J.W., Soyster, P.D., Diamond, A.E., & Barkin, J. (2019). Open trial of a personalized modular treatment for mood and anxiety. *Behaviour Research and Therapy*, *116*, 69–79. https://doi.org/10.1016/j.brat.2019.01.010

Fox, K.R., O'Sullivan, I.M., Wang, S.B., & Hooley, J.M. (2019). Self-criticism impacts emotional responses to pain. *Behavior Therapy, 50*(2), 410–420. https://doi.org/10.1016/j.beth.2018.07.008

Gardner, W., Pajer, K., Cloutier, P., Zemek, R., Currie, L., Hatcher, S., Colman, I., Bell, D., Gray, C., Cappelli, M., Duque, D.R., & Lima, I. (2019). Changing rates of self-harm and mental disorders by sex in youths presenting to Ontario emergency departments: Repeated cross-sectional study. *Canadian Journal of Psychiatry*, *64*(11), 789–797. https://doi.org/10.1177/0706743719854070

Gardner, K.J., Paul, E., Selby, E.A., Klonsky, E.D., & Mars, B. (2021). Intrapersonal and interpersonal functions as pathways to future self-harm repetition and suicide attempts. *Frontiers in Psychology*, *12*, 688472.

Geiser, C. (2013). *Data analysis with Mplus*. Guilford.

Gordon, K.H., Selby, E.A., Anestis, M.D., Bender, T.W., Witte, T.K., Braithwaite, S., Van Orden, K.A., Bresin, K., & Joiner Jr, T.E. (2010). The reinforcing properties of repeated deliberate self-harm. *Archives of Suicide Research*, *14*(4), 329–341. https://doi.org/10.1080/13811118.2010.524059

Hambleton, A.L., Hanstock, T.L., Halpin, S., & Dempsey, C. (2022). Initiation, meaning and cessation of self-harm: Australian adults' retrospective reflections and advice to adolescents who currently self-harm. *Counselling Psychology Quarterly*, *35*(2), 260–283. https://doi.org/10.1080/09515070.2020.1737509

Hawton, K., Witt, K. G., Salisbury, T. L. T., Arensman, E., Gunnell, D., Townsend, E., van Heeringen, K., & Hazell, P. (2015). Interventions for self-harm in children and adolescents. *Cochrane Database of Systematic Reviews*, (12). https://doi.org/10.1002/14651858.CD012013

Hayes, S.C., Wilson, K.G., Gifford, E.V., Follette, V.M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and

treatment. *Journal of Consulting and Clinical Psychology*, *64*(6), 1152–1168. https://doi.org/10.1037/0022-006X.64.6.1152

Holliday, R., Brennan, C., & Cottrell, D. (2020). Understanding adolescents' experiences of self-harm: Secondary analysis of family therapy sessions from the SHIFT trial. *Archives of Suicide Research, 24*(1), 190–203. https://doi.org/10.1080/13811118.2018.1501448

Hooley, J.M., Ho, D.T., Slater, J., & Lockshin, A. (2010). Pain perception and nonsuicidal self-injury: A laboratory investigation. *Personality Disorders: Theory, Research, and Treatment, 1*(3), 170–179. https://doi.org/10.1037/a0020106

Huang, X., Funsch, K.M., Park, E.C., & Franklin, J.C. (2020). Anticipated consequences as the primary causes of suicidal behavior: Evidence from a laboratory study. *Behaviour Research and Therapy*, *134*, 103726. https://doi.org/10.1016/j.brat.2020.103726

Joiner, T.E. (2005). *Why people die by suicide*. Harvard University Press.

Klonsky, E.D. (2007). The functions of deliberate self-injury: A review of the evidence. *Clinical Psychology Review*, *27*(2), 226–239.

Klonsky, E.D., & Olino, T.M. (2008). Identifying clinically distinct subgroups of self-injurers among young adults: A latent class analysis. *Journal of Consulting and Clinical Psychology, 76*(1), 22–27. https://doi.org/10.1037/0022-006X.76.1.22

Klonsky, E.D., & Glenn, C.R. (2009). Assessing the functions of non-suicidal self-injury: Psychometric properties of the Inventory of Statements About Self-injury (ISAS). *Journal of Psychopathology and Behavioral Assessment*, *31*(3), 215–219. https://doi.org/10.1007/s10862-008-9107-z

Linehan, M.M., Comtois, K.A., Brown, M.Z., Heard, H.L., & Wagner, A. (2006). Suicide attempt self-injury interview (SASII): Development, reliability, and validity of a scale to

assess suicide attempts and intentional self-injury. *Psychological Assessment*, *18*(3), 303–312. https://doi.org/10.1037/1040-3590.18.3.303

Liu, R.T., Bettis, A.H., & Burke, T.A. (2020). Characterizing the phenomenology of passive suicidal ideation: A systematic review and meta-analysis of its prevalence, psychiatric comorbidity, correlates, and comparisons with active suicidal ideation. *Psychological Medicine*, *50*(3), 367–383.

Lloyd-Richardson, E.E., Perrine, N., Dierker, L., & Kelley, M. L. (2007). Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. *Psychological Medicine*, *37*(8), 1183–1192. https://doi.org/10.1017/S003329170700027X

Madigan, S., Korczak, D.J., Vaillancourt, T., Racine, N., Hopkins, W.G., Pador, P., Hewitt, J.M.A., AlMousawi, B., McDonald, S., & Neville, R.D. (2023). Comparison of paediatric emergency department visits for attempted suicide, self-harm, and suicidal ideation before and during the COVID-19 pandemic: A systematic review and meta-analysis. *The Lancet Psychiatry, 10*(5), 342–351. https://doi.org/10.1016/S2215-0366(23)00036-6

Marasinghe, R.B., Edirippulige, S., Kavanagh, D., Smith, A., & Jiffry, M.T. (2012). Effect of mobile phone-based psychotherapy in suicide prevention: A randomized controlled trial in Sri Lanka. *Journal of Telemedicine and Telecare*, *18*(3), 151–155. https://doi.org/10.1258/jtt.2012.SFT107

Miller, A.B., & Prinstein, M.J. (2019). Adolescent suicide as a failure of acute stress-response systems. *Annual Review of Clinical Psychology*, *15*, 425–450. https://doi.org/10.1146/annurev-clinpsy-050718-095625

Millner, A.J., den Ouden, H.E.M., Gershman, S.J., Glenn, C.R., Kearns, J.C., Bornstein, A.M., Marx, B.P., Keane, T.M., & Nock, M.K. (2019). Suicidal thoughts and behaviors are

associated with an increased decision-making bias for active responses to escape aversive states. *Journal of Abnormal Psychology, 128*(2), 106–118. https://doi.org/10.1037/abn0000395

Moloney, F., Amini, J., Sinyor, M., Schaffer, A., Lanctôt, K. L., & Mitchell, R. H. (2024). Sex differences in the global prevalence of nonsuicidal self-injury in adolescents: A meta-analysis. *Journal of the American Medical Association Network Open*, *7*(6), e2415436-e2415436. https://doi.org/10.1001/jamanetworkopen.2024.15436

Ng, M.Y., & Weisz, J.R. (2016). Annual research review: Building a science of personalized intervention for youth mental health. *Journal of Child Psychology and Psychiatry*, *57*(3), 216–236. https://doi.org/10.1111/jcpp.12470

Nixon, M.K., Cloutier, P., & Jansson, S.M. (2008). Nonsuicidal self-harm in youth: A population-based survey. *Canadian Medical Association Journal*, *178*(3), 306–312. https://doi.org/10.1503/cmaj.061693

Nock, M.K., & Prinstein, M.J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, *72*(5), 885–890. https://doi.org/10.1037/0022-006X.72.5.885

Nunes, E.V., Pavlicova, M., Hu, M.C., Campbell, A.N., Miele, G., Hien, D., & Klein, D.F. (2011). Baseline matters: The importance of covariation for baseline severity in the analysis of clinical trials. *The American Journal of Drug and Alcohol Abuse*, *37*(5), 446–452. https://doi.org/10.3109/00952990.2011.596980

Nylund, K.L., Asparouhov, T., & Muthén, B.O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*, *14*, 535–569. https://doi.org/10.1080/10705510701575396

Payne, L.D., Scott, T.M., & Conroy, M. (2007). A school-based examination of the efficacy of function-based intervention. *Behavioral Disorders*, *32*(3), 158–174. https://doi.org/10.1177/0198742907032003

Pinninti, N., Steer, R.A., Rissmiller, D.J., Nelson, S., & Beck, A.T. (2002). Use of the Beck Scale for Suicide Ideation with psychiatric inpatients diagnosed with schizophrenia, schizoaffective, or bipolar disorders. *Behaviour Research and Therapy*, *40*(9), 1071–1079. https://doi.org/10.1016/S0005-7967(02)00002-5

Poudel, A., Lamichhane, A., Magar, K.R., & Khanal, G.P. (2022). Non suicidal self injury and suicidal behavior among adolescents: Co-occurrence and associated risk factors. *BMC Psychiatry*, *22*(1), 96–108. https://doi.org/10.1186/s12888-022-03763-z

Pollak, O. H., D'Angelo, E. J., & Cha, C. B. (2020). Does function predict persistence? Nonsuicidal self-injury among adolescents during and after hospitalization. *Psychiatry Research*, *286*, 112839. https://doi.org/10.1016/j.psychres.2020.112839

Reinhardt, M., Horváth, Z., Drubina, B., Kökönyei, G., & Rice, K.G. (2021). Latent class analysis of nonsuicidal self-injury among justice-involved juveniles: Association with motivational and emotional aspects of self-harm behavior. *Criminal Justice and Behavior*, *48*(7), 902–922. https://doi.org/10.1177/0093854821998411

Ruch, D.A., Sheftall, A.H., Schlagbaum, P., Rausch, J., Campo, J.V., & Bridge, J.A. (2019). Trends in suicide among youth aged 10 to 19 years in the United States, 1975 to 2016. *Journal of the American Medical Association Network Open*, *2*(5), e193886–e193886. https://doi.org/10.1001/jamanetworkopen.2019.3886

Sack, L., Seddon, J.A., Sosa-Hernandez, L., & Thomassin, K. (2022). Typologies of non-suicidal self-injury functions and clinical correlates among inpatient youth. *Child Psychiatry &*

Human Development, 1–11. https://doi.org/10.1007/s10578-022-01465-x

Sara, G., Wu, J., Uesi, J., Jong, N., Perkes, I., Knight, K., O'Leary, F., Trudgett, C., & Bowden, M. (2023). Growth in emergency department self-harm or suicidal ideation presentations in young people: Comparing trends before and since the COVID-19 first wave in New South Wales, Australia. *Australian & New Zealand Journal of Psychiatry*, *57*(1), 58–68. https://doi.org/10.1177/00048674221082518

Shahwan, S., Lau, J. H., Abdin, E., Zhang, Y., Sambasivam, R., Teh, W. L., ... & Subramaniam, M. (2020). A typology of nonsuicidal self-injury in a clinical sample: A latent class analysis. *Clinical Psychology & Psychotherapy*, *27*(6), 791–803. https://doi.org/10.1002/cpp.2463

Shneidman, E.S. (1998). Further reflections on suicide and psychache. *Suicide and Life-Threatening Behavior, 28*(3), 245–250. https://doi.org/10.1111/j.1943-278X.1998.tb00854.x

Silverman, J.R., Ross, E.H., & Kearney, C.A. (2018). Non-suicidal self-injury among male adjudicated adolescents: psychosocial concerns, coping responses, diagnoses, and functions. *Journal of Child and Family Studies*, *27*, 3564–3571. https://doi.org/10.1007/s10826-018-1172-7

Somer, O., Bildik, T., Kabukçu-Başay, B., Güngör, D., Başay, Ö., & Farmer, R.F. (2015). Prevalence of non-suicidal self-injury and distinct groups of self-injurers in a community sample of adolescents. *Social Psychiatry and Psychiatric Epidemiology*, *50*(7), 1163–1171. https://doi.org/10.1007/s00127-015-1060-z

Sornberger, M.J., Heath, N.L., Toste, J.R., & McLouth, R. (2012). Nonsuicidal self-injury and gender: Patterns of prevalence, methods, and locations among adolescents. *Suicide and*

Life-Threatening Behavior, *42*(3), 266–278. https://doi.org/10.1111/j.1943-278X.2012.0088.x

Steinhoff, A., Ribeaud, D., Kupferschmid, S., Raible-Destan, N., Quednow, B. B., Hepp, U., Eisner, M., & Shanahan, L. (2021). Self-injury from early adolescence to early adulthood: age-related course, recurrence, and services use in males and females from the community. *European Child & Adolescent Psychiatry*, *30*, 937–951. https://doi.org/10.1007/s00787-020-01573-w

Tang, T.C., Jou, S.H., Ko, C.H., Huang, S.Y., & Yen, C.F. (2009). Randomized study of school-based intensive interpersonal psychotherapy for depressed adolescents with suicidal risk and parasuicide behaviors. *Psychiatry and Clinical Neurosciences*, *63*(4), 463–470. https://doi.org/10.1111/j.1440-1819.2009.01991.x

Van Orden, K.A., Witte, T.K., Cukrowicz, K.C., Braithwaite, S.R., Selby, E.A., & Joiner, T.E. (2010). The interpersonal theory of suicide. *Psychological Review, 117*(2), 575–600. https://doi.org/10.1037/a0018697

Voss, C., Hoyer, J., Venz, J., Pieper, L., & Beesdo-Baum, K. (2020). Non-suicidal self-injury and its co-occurrence with suicidal behavior: An epidemiological-study among adolescents and young adults. *Acta Psychiatrica Scandinavica*, *142*(6), 496–508. https://doi.org/10.1111/acps.13237

Wampold, B.E. (2015). How important are the common factors in psychotherapy? An update. *World Psychiatry*, *14*(3), 270–277. https://doi.org/10.1002/wps.20238

Wilkinson, P., Kelvin, R., Roberts, C., Dubicka, B., & Goodyer, I. (2011). Clinical and psychosocial predictors of suicide attempts and nonsuicidal self-injury in the Adolescent Depression Antidepressants and Psychotherapy Trial (ADAPT). *American Journal of*

Psychiatry, *168*(5), 495–501. https://doi.org/10.1176/appi.ajp.2010.10050718

Witt, K.G., Hetrick, S.E., Rajaram, G., Hazell, P., Salisbury, T.L.T., Townsend, E., & Hawton, K. (2021). Interventions for self-harm in children and adolescents. *Cochrane database of Systematic Reviews*, (3), 1–98.

Witt, K., Stewart, A., & Hawton, K. (2025). Practitioner review: Treatments for young people who self-harm–challenges and recommendations for research and clinical practice. *Journal of Child Psychology and Psychiatry*, *66*(1), 122–131. https://doi.org/10.1111/jcpp.14052

Wright-Hughes, A., Graham, E., Farrin, A., Collinson, M., Boston, P., Eisler, I., Fortune, S., Green, J., House, A., Owens, D., Simic, M., Tubeuf, S., Nixon, J., McCabe, C., Kerfoot, M., & Cottrell, D. (2015). Self-Harm Intervention: Family Therapy (SHIFT), a study protocol for a randomised controlled trial of family therapy versus treatment as usual for young people seen after a second or subsequent episode of self-harm. *Trials*, *16*(1), 1–12. https://doi.org/10.1186/s13063-015-1007-4

Zhao, Y., He, Z., Luo, W., Yu, Y., Chen, J., Cai, X., Gao, J., Li, L., Gao, Q., Chen, H., & Lu, F. (2023). Effect of intermittent theta burst stimulation on suicidal ideation and depressive symptoms in adolescent depression with suicide attempt: A randomized sham-controlled study. *Journal of Affective Disorders*, *325*, 618–626. https://doi.org/10.1016/j.jad.2023.01.061

Table 1

Descriptive Statistics of Baseline Participant Characteristics and Covariates and 12-Month Follow-Up Outcomes

Variable	*N*	% or *M(SD)*	Range
Baseline			
Age (years)	832	14.34 (1.37)	11–17
Sex			
Male	95	11.4	
Female	737	88.6	
Medication Use			
Yes	41	4.9	
No	784	95.1	
Suicidal Ideation	816	10.61 (9.18)	0–38
12-Month Follow-Up			
Suicidal Ideation	462	5.06 (7.47)	0–38
Self-Harm Presence			
Yes	317	68.8	
No	144	31.2	

Table 2

Frequency of Endorsed Self-Harm Functions

	N	*n* Endorsed	%
Interpersonal Functions			
(1) To get people to act differently or change	739	79	10.7
(2) To communicate or let others know how desperate you were	749	190	25.4
(3) To get help	755	169	22.4
(4) To get back at or hurt someone	744	82	11.0
(5) To demonstrate to others how wrong they are	736	61	8.3
(6) To shock or impress others	735	16	2.2
(7) To gain admission into hospital/program	735	36	4.9
Intrapersonal Functions			
(8) To stop bad feelings	792	630	79.5
(9) To stop feeling angry/frustrated/enraged	797	590	74.0
(10) To relieve feelings of aloneness/emptiness/isolation	766	414	54.0
(11) To relieve anxiety or terror	752	298	39.6
(12) To stop feeling self-hatred or shame	758	358	47.2
(13) To obtain relief from a terrible state of mind	745	287	38.5

Table 3

*Model Fit Indices for Latent Class Analyses (*N = *821)*

Solution	BIC	BLRT *p* value	Entropy
1 class	9443.38	–	–
2 classes	8922.39	<.001	.65
3 classes	8681.08	<.001	.71
4 classes	8682.15	<.001	.68
5 classes	**8713.05**	<.001	**.70**
6 classes	8771.99	.05	.69

Note. Bold indicates the best-fitting model. BIC = Bayesian Information Criterion; BLRT = Bootstrap Likelihood Ratio Test.

Table 4

*Class Membership Predicting Suicidal Ideation and Self-Harm Presence at 12-Month Follow-Up (*N = *832)*

	Suicidal Ideation				Self-Harm Presence				
Variable	β	SE	*p*	95% CI	β	*SE*	*p*	Exp(*B*)	95% CI for Exp(*B*)
Baseline Suicidal Ideation	0.313	0.045	.000	0.22, 0.40					
Medication Use	-0.076	0.043	.073	-0.16, 0.01	-0.081	0.055	.141	0.505	0.20, 1.26
Class									
Anger/Desperation	0.028	0.046	.549	-0.06, 0.12	0.077	0.061	.211	1.476	0.80, 2.72
Anxious/Distressed	0.095	0.052	.070	-0.01, 0.20	0.147	0.068	.032	2.582	1.07, 6.21
Mixed Inter-Intrapersonal	0.014	0.047	.770	-0.08, 0.11	-0.007	0.057	.903	0.947	0.40, 2.26
Intrapersonal/Internalizing	0.138	0.049	.005	0.04, 0.23	0.125	0.062	.043	1.623	1.01, 2.61

Note. For class comparisons, the reference class is the Few Self-Harm Functions class. Exp(*B*) = the Odds Ratio. Due to the use of full information maximum likelihood estimation, participants with data on one or more variables were included in the analysis.

Table 5

*Testing Moderating Effect of Treatment Condition on the Association between Class Membership and Suicidal Ideation and Self-Harm Presence at 12-Month Follow-Up (*N = *832)*

	Suicidal Ideation				Self-Harm Presence				
Variable	β	*SE*	*p*	95% CI	β	*SE*	*p*	Exp(*B*)	95% CI for Exp(*B*)
Baseline Suicidal Ideation	0.314	0.045	.000	0.23, 0.40					
Medication Use	-0.085	0.042	.047	-0.17, 0.00	-0.080	0.055	.144	0.505	0.20, 1.26
Class									
Anger/Desperation	-0.040	0.082	.624	-0.20, 0.12	0.098	0.090	.276	1.654	0.67, 4.10
Anxious/Distressed	0.047	0.081	.564	-0.11, 0.21	0.129	0.092	.160	2.330	0.71, 7.62
Mixed Inter-Intrapersonal	-0.053	0.062	.389	-0.17, 0.07	-0.028	0.071	.695	0.802	0.27, 2.41
Intrapersonal/Internalizing	0.061	0.079	.438	-0.09, 0.22	0.209	0.096	.029	2.261	1.08, 4.75
Family Therapy	-0.180	0.068	.008	-0.31, -0.05	0.116	0.091	.206	1.538	0.79, 3.01
Family Therapy*Anger/Desperation	0.081	0.069	.243	-0.05, 0.22	-0.022	0.088	.802	0.854	0.25, 2.94
Family Therapy*Anxious/Distressed	0.054	0.073	.458	-0.09, 0.20	0.037	0.097	.706	1.406	0.24, 8.26
Family Therapy*Mixed Inter-Intrapersonal	0.082	0.059	.167	-0.03, 0.20	0.069	0.081	.395	2.405	0.32, 18.06
Family Therapy*Intrapersonal/Internalizing	0.102	0.079	.196	-0.05, 0.26	-0.116	0.101	.252	0.571	0.22, 1.49

Note. For class comparisons, the reference class is the Few Self-Harm Functions class. Due to the use of full information maximum likelihood estimation, participants with data on one or more variables were included in the analysis.