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Exploring the relationship between non-suicidal self-injury and schema modes among university students: a latent class analysis approach

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Abstract
Non-suicidal self-injury (NSSI) is a prevalent behavior among university students. Although understanding NSSI within the framework of schema theory would be valuable, existing research in this area remains limited. Therefore, the present study aimed to classify NSSI into homogeneous subgroups and to examine the associations between schema modes and these subgroups. Data were collected from a sample of 357 university students using self-report measures. First, latent class analysis (LCA) was employed to identify NSSI subgroups. Subsequently, a series of multinomial logistic regression (MLR) analyses were conducted to examine the predictive role of schema modes in differentiating these subgroups. The LCA revealed three distinct classes: a mild/experimental group, a moderate NSSI group with intrapersonal functions, and a severe NSSI group. Results from the MLR analyses indicated that dysfunctional schema modes significantly predicted the likelihood of belonging to different NSSI subgroups. In particular, Dysfunctional Parent Modes (i.e., Punitive and Demanding Parent Modes) and Angry Child Mode emerged as the most distinctive modes in the severe group. Furthermore, Avoidant and Surrendering Coping Modes—specifically, Compliant Surrender, Detached Self-Soother, and Angry Protector Modes—were more likely to be associated with membership in the severe NSSI group. Finally, Overcompensatory Coping Modes, including those conceptualized as forensic modes (Self-Aggrandizer, Conning and Manipulative, and Paranoid Overcontroller), were also linked to a greater likelihood of belonging to the severe group. The findings were discussed in light of schema theory. Assessing and targeting schema modes in clinical practice may help reduce NSSI behaviors, though further emprical evidence is needed.

Keywords Non-suicidal self-injury (NSSI) · NSSI functions · Schema mode · University students · Latent class analysis

Introduction

Non-suicidal self-injury (NSSI) is defined as the deliberate damage to one's body without suicidal intent (Nock, 2010). NSSI encompasses a wide range of behaviors such as self-cutting, biting, burning, carving, punching, scratching, banging, hitting, wound picking, and needle sticking (Klonsky & Glenn, 2009). Among these, cutting is the most commonly reported method, followed by banging, scratching, hitting, and burning (Cipriano et al., 2017). The estimated lifetime prevalence of NSSI is 16.9% among adolescents (Gillies et al., 2018), up to 38.9% among university students, and between 4% and 23% among adults (Cipriano et al., 2017; Kiekens et al., 2023). NSSI has been strongly associated with a wide range of psychological conditions, including borderline personality disorder, depressive, bipolar, anxiety, conduct, and eating disorders (Cipriano et al., 2017), as well as suicidal behaviors (Klonsky & Olino, 2008). Given its high prevalence and comorbidity, NSSI has become an extensively investigated and significant public health concern in recent years. In the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5;

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American Psychiatric Association, 2013), it has been underlined as a condition warranting further examination.

NSSI serves various functions that are typically categorized as intrapersonal or interpersonal functions (Klonsky & Glenn, 2009). Intrapersonal functions refer to self-directed motivations through which individuals engage in NSSI to regulate internal experiences (Klonsky et al., 2015). Affect regulation is the most frequently reported intrapersonal function (Taylor et al., 2018). Some individuals endorse NSSI as a means of expressing self-punitive thoughts (Burke et al., 2021), which may provide relief from anger, hatred, or shame directed toward the self. Other intrapersonal functions include anti-dissociation, anti-suicide (preventing suicidal thoughts), and marking distress (Klonsky & Glenn, 2009). In contrast, interpersonal functions involve socially oriented motives for engaging in NSSI, relating to communication, influence, or connection with others—such as establishing autonomy, maintaining interpersonal boundaries, exerting influence, bonding with peers, expressing self-care, seeking revenge or sensation, and demonstrating toughness (Klonsky et al., 2015). Compared with interpersonal functions, intrapersonal functions are more prevalent in NSSI, serving as a mechanism to modify internal states such as emotions, thoughts, or bodily sensations (Taylor et al., 2018). Individuals who engage in NSSI may also display multiple functions simultaneously, which is a pattern linked to more severe psychological difficulties (Dixon-Gordon et al., 2022).

Recently, researches have increasingly applied schema theory to gain deeper insights into the underlying mechanisms of NSSI, offering a more comprehensive framework for understanding its development and maintenance (Aakbari et al., 2022). Central to this framework are early maladaptive schemas (EMS) — pervasive self- and other-related patterns formed during childhood or adolescence when basic emotional needs for connection, autonomy, and reciprocity are unmet (Young et al., 2006). EMS comprise thoughts, emotions, and bodily sensations that shape how individuals interpret experiences, engage in cognitive processing, and relate to others, often resulting in dysfunctional coping responses. These schemas tend to persist into adulthood, influencing thoughts, emotions, and behaviors, including self-injurious actions (Arntz & Jacob, 2017; Young et al., 2006). Although direct evidence on the schema-NSSI link remains limited, existing studies suggest that individuals who engage in NSSI display distinct maladaptive schemas compared with those who do not. For instance, social isolation, emotional inhibition, and entitlement/grandiosity schemas have been found to differentiate individuals with NSSI from those without (Lewis et al., 2015), while another study highlighted the role of social isolation, insufficient self-discipline, emotional deprivation, and mistrust schemas (Castille et al., 2007). Shi et al. (2024) also found that experiences of emotional abuse predicted disconnection/rejection schemas, which in turn, heightened the risk of NSSI thoughts. Beyond general schema vulnerability, research has explored the role of specific schemas in shaping the functions of NSSI. Abandonment and entitlement schemas have been linked to intrapersonal functions of NSSI, whereas interpersonal functions have been associated with insufficient self-control (Nicol et al., 2022). These findings underscore the potential of schema theory to explain why some individuals develop and maintain NSSI behaviors. Identifying the specific maladaptive schemas underlying self-injury may inform schema-based interventions that target the cognitive and emotional mechanisms sustaining NSSI.

Beyond schemas, research exploring the relationship between *schema modes* and NSSI is also relatively limited (see Aakbari et al., 2022). However, schema modes constitute a key concept in schema theory that reflects transient emotional, cognitive, and behavioral states activated by specific schemas in response to life circumstances (Arntz & Jacob, 2017; Young et al., 2006). Whereas schemas are enduring trait-like patterns, modes are state-dependent (Bach et al., 2016). Young et al. (2006) initially identified ten schema modes organized into four categories (Child, Dysfunctional Parent, Dysfunctional Coping and Healthy Adult Modes). Bernstein and colleagues (2019) later refined and expanded this framework to better capture the diversity of modes, distinguishing five categories: Child Modes, Dysfunctional Parent Modes, Avoidant and Surrendering Coping Modes, Overcompensatory Coping Modes, and Healthy Modes, offering a more nuanced depiction of emotional states often observed in forensic contexts. **Child Modes** consist of the *Vulnerable Child* (feelings of loneliness, helplessness, or sadness), *Angry Child* (anger arising from unmet needs), *Impulsive/Undisciplined Child* (difficulty with persistence and delayed gratification), *Lonely Child* (feelings of emptiness or being misunderstood) (Young et al., 2006), as well as *Enraged Child* (an intensified, outwardly destructive form of the Angry Child) (Bach & Bernstein, 2019). These modes are associated with adverse feelings that originate in childhood due to unmet basic emotional needs (Young et al., 2006). **Dysfunctional Parent Modes** stem from the internalization of negative behaviors exhibited by significant others, such as caregivers, and are associated with feelings of guilt, shame, or self-criticism. They comprise two primary types: the *Punitive Parent Mode* and *Demanding Parent Mode* (Bach & Bernstein, 2019; Young et al., 2006). As refined by Bernstein and colleagues (2019), **Dysfunctional Coping Modes** are divided into two major subgroups:

Avoidant and Surrendering and **Overcompensatory Coping Modes.** The former includes *Detached Protector*, *Detached Self-Soother*, *Angry Protector*, and *Compliant Surrender Modes* (characterized by submissiveness to avoid conflict). The latter comprises *Self-Aggrandizer*, *Bully and Attack*, *Conning and Manipulative*, *Predator*, *and Overcontroller Modes*, which reflect exaggerated efforts to counteract shame and are frequently associated with antisocial or criminal behaviors, particularly in forensic populations (Bach & Bernstein, 2019; Bernstein et al., 2019). Finally, **Healthy Modes**—also referred to as functional modes—include the *Happy Child* and the *Healthy Adult*, which facilitate emotional balance and responsible functioning (Arntz & Jacob, 2017; Young et al., 2006). One of the few studies examining schema modes and NSSI found that the Vulnerable Child, Angry Child, and Punitive Parent Modes were particularly related to age of onset, duration, and variety of NSSI methods (Saldias et al., 2013), suggesting that NSSI may be triggered by specific situational factors.

Although the importance of schema modes in understanding NSSI has been recognized (Saldias et al., 2013), their precise influence on multiple dimensions of NSSI remains unclear. Thus, the current study aimed to clarify this link through a comprehensive and multidimensional examination in a university student population, among whom NSSI prevalence has been rising over the past decade (Wester et al., 2018). Given that NSSI is often situationally driven and primarily serves as an emotion-regulation strategy, schema modes—rather than enduring, underlying schemas—may play a more immediate role in triggering these behaviors. Classifying individuals who engage in NSSI into clinically meaningful subgroups may therefore provide deeper insight into understanding NSSI characteristics and their relationship to schema modes. The heterogeneity of NSSI has been increasingly recognized, and researchers have applied Latent Class Analysis (LCA) to identify subgroups based on key variables such as methods used (Gu et al., 2023), frequency, and functions of behaviors (Case et al., 2020; Dixon-Gordon et al., 2022; Klonsky & Olino, 2008; Shahwan et al., 2020). For instance, Case et al. (2020) identified four classes— mild/experimental, moderate, moderate-multiple-function, and severe NSSI—varying by frequency and function endorsement. Given methodological and sample differences, the number and features of classes vary across studies, yet this multidimensional approach enables a more refined classification beyond simple frequency or severity levels.

Accordingly, this study first aimed to identify NSSI subgroups based on clinically relevant indicators such as types of NSSI behaviors, descriptive/contextual features (e.g., feeling physical pain, being alone during the act, time between urge and behavior), and intrapersonal/interpersonal functions. Building upon these findings, this study also aimed to examine the predictive role of schema modes in subgroup membership. Following Berstein et al. (2007, 2019), the study focused on four mode categories—Child, Parent, Avoidant/Surrendering, and Overcompensatory Coping Modes—to explore their unique contributions. It was expected that modes involving intense negative emotions, such as Dysfunctional Child and Parent Modes, might be associated with a higher likelihood of belonging to moderate or severe NSSI groups, characterized by features such as pain, loneliness, or multiple functions. Additionally, certain modes (e.g., Punitive Parent or forensic-related Overcompensatory Modes) were expected to be more prominent among individuals with severe or recurrent NSSI. Schema modes thus provide a valuable framework for understanding situationally activated cognitive, emotional, and behavioral patterns (Young et al., 2006), which underlie temporary versus chronic, low- versus high-risk, and single- versus multiple-function NSSI. In doing so, this study may contribute both to theoretical conceptualization and clinical practice. As schema therapy has increasingly been recognized as an effective approach for individuals with persistent emotional and behavioral dysregulation, including self-harming behaviors (Arntz & Van Genderen, 2020; Young et al., 2006), identifying and targeting dysfunctional modes while strengthening healthy ones may enhance interventions tailored to specific NSSI subgroups.

Methods

Participants

The sample consisted of 488 university students from Türkiye. Of these, 357 participants who reported engaging in at least one NSSI behavior at any level were retained for the remainder of the study. Participants indicated lifetime engagement in at least one of the 12 NSSI begaviors— cutting, biting, burning, carving, pinching, scratching, hair pulling, banging or hitting, interfering with wound healing, rubbing the skin, needle sticking, and swallowing dangerous substances. The most prevalent method was interfering with wound healing (66.6%), followed by pinching (49.1%) and banging or hitting (47.1%) (see Online Resource 1). The mean age of the sample was 21.36 years ($SD = 2.40$, range = 17–38), and the majority were women ($n = 229$; 64.1%). Table 1 presents detailed socio-demographic cahacteristics of the sample.

Table 1 Socio-demographic characteristics of participants

		N (%)
Gender	Women	229 (64.1)
	Men	127 (35.6)
	Queer	1 (0.3)
Marital Status	Single	353 (0.98.9)
	Married	4 (1.1)
Employment	Employed	45 (12.6)
	Unemployed	312 (87.4)
Income status	Very bad	25 (7.0)
	Somewhat bad	38 (10.6)
	Neither good nor bad	246 (68.9)
	Fairly good	43 (12.0)
	Very good	3 (0.8)
Presence of a psychiatric diagnosis	Yes	68 (19.0)
	No	289 (81.0)
Name of diagnosis	Depressive disorders	19 (5.3)
	Anxiety disorders	19 (5.3)
	Depressive disorders & anxiety disorders	5 (1.4)
	Obsessive-compulsive disorder	5 (1.4)
	Bipolar disorder	4 (1.1)
	Others (AD/HD, impulse control disorders, different comorbidities, unknown)	16 (4.5)
Use of psychiatric medication	Yes	20 (5.6)
	No	337 (94.4)
Receiving psychotherapy	Yes	9 (2.5)
	No	348 (97.5)

Measures

Socio-demographic information form This form included items pertaining to socio-demographic variables such as age, gender, marital status, employment status, profession, income, presence of psychiatric diagnosis, name of psychiatric diagnosis, use of psychiatric medications, and whether they were currently receiving psychotherapy.

Inventory of statements about self-injury (ISAS) The ISAS (Klonsky & Glenn, 2009) is a widely used self-report instrument assessing the frequency and functions of non-suicidal self-injury. The first section evaluates the lifetime frequency of 12 self-injurious behaviors without suicidal intent. These behaviors are cutting, biting, burning, carving, punching, hair pulling, scratching, banging/hitting, wound picking, rubbing the skin, needle sticking, and swallowing. It also includes additional items evaluating various descriptive and contextual features such as the experience of physical pain, being alone during the behavior, the time interval between urge and act, and willingness to stop self-injury. The second section consists of 39 items measuring intrapersonal and interpersonal functions, each beginning with the phrase "*When I harm myself, I am…*". Intrapersonal functions include affect regulation (e.g., *"…calming myself down*"), anti-suicide (e.g., *"…putting a stop to suicidal thoughts*"), self-punishment (e.g., *"…expressing anger towards myself for being worthless or stupid* "), marking distress (e.g., *"…creating a physical sign that I feel awful*"), and anti-dissociation (e.g., *"…causing pain so I will stop feeling numb*"). Interpersonal functions include autonomy (e.g., *"…demonstrating that I do not need to rely on others for help*"), interpersonal boundaries (e.g., "*…creating a boundary between myself and others*"), interpersonal influence (e.g., *"…letting others know the extent of my physical pain"*), peer-bonding (e.g., *"…fitting in with others"*), self-care (e.g., *"…creating a physical injury that is easier to care for than my emotional distress"*), revenge (e.g., *"…getting back at someone"*), sensation seeking (e.g., *"…doing something to generate excitement or exhilaration"*), and toughness (e.g., *"…seeing if I can stand the pain"*). The Turkish adaptation of the ISAS (Bildik et al., 2013) preserved the original factor structure and demonstrated high internal consistency coefficients for intrapersonal (α = 0.81), interpersonal (α = 0.86), and total (α = 0.93) scores.

Schema mode inventory-forensic (SMI-F) The SMI-F is an expanded version of the Schema Mode Inventory, developed to assess a wide range of schema modes (Lobbestael et al., 2010). This version comprises 174 items rated on a 6-point scale (1 = *never or hardly ever*; 6 = *always*), including forensic modes. The SMI-F measures 19 schema modes: Vulnerable Child (e.g. "*I often feel alone in the world*"), Angry Child (e.g., "*I'm angry with someone for leaving me alone or abandoning me*"), Enraged Child ("*I throw things around when I'm angry*"), Impulsive Child (e.g., "*It is impossible for me to control my impulses*"), Undisciplined Child (e.g., "*I get bored easily and lose interest in things*"), Happy Child (e.g., "*I feel that I have plenty of stability and security in my life*"), Punitive Parent (e.g., "*It's my fault when something bad happens*"), Demanding Parent (e.g.,"*I sacrifice pleasure, health, or happiness to meet my own standards*"), Healthy Adult (e.g.,"*I feel that I'm basically a good person* "), Compliant Surrender (e.g.,"*I try very hard to please other people in order to avoid conflict, confrontation, or rejection* "), Detached Protector (e.g.,"*I feel indifferent about most things*"), Detached Self-Soother (e.g.,"*I want to distract myself from upsetting thoughts and feelings*"), Self-Aggrandizer (e.g.,"*It's important for me to be Number One (e.g. the most popular, most successful, most wealthy, most powerful)*"), Bully and Attack (e.g.,"*I mock or bully other people*"), Conning and Manipulative (e.g.,"*I get other people to do what I want without them even knowing it*"), Predator (e.g.,"*I make plans to get rid of people*"), Angry Protector (e.g.,"*I make a silent "wall of anger" that keeps*

people at a distance "), Paranoid Overcontroller (e.g.,"*If others are nice to you, they have hidden reasons for this*"), and Forensic Self-Aggrandizer (e.g.,"*I do what I want to do, regardless of other people's needs and feelings*") (Soygüt et al., 2023). The Turkish validation of the SMI-F (Soygüt et al., 2023) confirmed the instrument's validity and reliability through the confirmatory factor analysis and internal consistency analysis (α ranging between 0.62 and 0.91).

Procedure

Ethical approval for this study was obtained from Ethics Review Board of Dokuz Eylül University. Data were collected both online (79%) and in-person (21%) procedures. Online data collection was conducted via Google Forms, and participants were recruited through social media platforms (e.g., Instagram). Additionally, university students from various regions of Türkiye were recruited using convenience sampling. Participants who provided informed consent—after being informed about the study's aims, confidentiality, and voluntary participation—completed the self-report measures.

Data analysis

Latent class analysis (LCA) was performed using the Latent GOLD 4.5 (Vermunt & Magidson, 2008) to identify distinct homogeneous subgroups based on NSSI behaviors. The Bayesian information criterion (BIC) and entropy were used as primary model selection criteria. According to Nylund et al.'s (2007) simulation study, the BIC serves as a reliable indicator for determining the optimal number of latent classes. Entropy reflects the accuracy of class membership assignment, with higher values indicating greater precision. An entropy value above 0.80 is generally considered high (Jung & Wickrama, 2008). The Bootstrap Likelihood Ratio Test (BLRT) was also used to compare model fit, where $p<.05$ indicates that a k-class solution is statistically superior to a $k-1$ class solution (Muthén, 2004). Parsimony and interpretability of class solutions (Collins & Lanza, 2010) were also considered when selecting the final model.

Subsequent analyses were conducted using IBM SPSS Statistics Version 29. Pearson correlation analyses were performed to examine the relationships among schema modes. Following the theoretical framework proposed by Berstein et al. (2007, 2019), schema modes were categorized into four groups: Child Modes, Parent Modes, Avoidant/Surrendering Coping Modes, and Overcompensatory Coping Modes. Four separate multinomial logistic regression (MLR) analyses were then conducted to examine the predictive roles of these schema mode categories in NSSI class membership. Before performing MLR analyses, multicollinearity was assessed and deemed absent when the Variance Inflation Factor (VIF) values were below 5 and tolerance values exceeded 0.10 (Kim, 2019).

Results

Descriptive statistics and correlation analysis

Table 2 presents the means, standard deviations, and Pearson correlation coefficients for the study variables.

Latent class analysis

Variables included in the LCA were the lifetime presence of 12 NSSI behaviors, descriptive characteristics of NSSI (i.e., absence of pain, being alone during the act, time from urge to act, and willingness to stop self-injury), and the intrapersonal/interpersonal functions of NSSI. The fit statistics were examined from 1- through 10-class solutions, with lower model selection criteria indicating better fit. Parsimony and interpretability of the classes (Collins & Lanza, 2010) were also considered. As shown in Table 3, a three-class solution with the lowest BIC and CAIC scores provided the best fit. In addition, the entropy value for the three-class solution was high (0.96), suggesting precise identification of the latent class membership. Furthermore, the Bootstrap Likelihood Ratio Test (BLRT) for the three-class solution was statistically significant. Considering the lower BIC, high entropy, significant BLRT, and interpretability of the classes, the three-class solution was retained as the final model. Moreover, LCA studies generally recommend that each class include at least 50 cases (Muthén & Muthén, 2000) and account for no less than 5% of the total sample (Shanahan et al., 2013). These criteria were satisfied in the three-class solution. Demographic characteristics by class are reported in Online Resource 2.

According to the LCA findings, Class 1 comprised 37.3% of the sample ($n=133$) who reported low probabilities of NSSI behaviors and low endorsement of all NSSI functions. Members tended to report low physical pain, were less likely to be alone during self-injury, and showed a low desire to cease self-injury. Wound picking was the most common behavior in this class. This class was considered as the 'mild/experimental NSSI group'.

Class 2, which comprised 40.3% of the sample ($n=144$), was a group indicating relatively high lifetime probabilities of multiple behaviors including wound picking, pinching, banging/hitting, biting, hair pulling, scratching, and needle sticking. Likelihood of being alone and experiencing pain

Table 2 Correlations between schema modes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.Vulnerable	1																		
2.Angry	0.70**	1																	
3.Enraged	0.47**	0.72**	1																
4.Impulsive	0.57**	0.68**	0.67**	1															
5.Undisciplined	0.54**	0.53**	0.42**	0.51**	1														
6.Happy	−0.35**	−0.13*	−0.05	−0.10	−0.05	1													
7.Punishing	0.73**	0.59**	0.46**	0.59**	0.42**	−0.29**	1												
8.Demanding	0.64**	0.67**	0.47**	0.46**	0.40**	−0.08	0.65**	1											
9.Healthy	0.12*	0.34**	0.19**	0.12*	0.19**	0.63**	0.07	0.40**	1										
10.CS	0.63**	0.44**	0.29**	0.52**	0.58**	−0.13*	0.56**	0.43**	0.03	1									
11.DP	0.74**	0.66**	0.50**	0.56**	0.58**	−0.27**	0.58**	0.62**	0.20**	0.54**	1								
12.DS	0.48**	0.58**	0.39**	0.42**	0.35**	0.13*	0.43**	0.61**	0.47**	0.31**	0.45**	1							
13.AP	0.49**	0.74**	0.69**	0.56**	0.46**	0.00	0.43**	0.57**	0.39**	0.22**	0.60**	0.53**	1						
14.Self-agg	0.45**	0.71**	0.60**	0.59**	0.46**	0.05	0.47**	0.64**	0.38**	0.40**	0.57**	0.48**	0.59**	1					
15.B&A	0.41**	0.69**	0.59**	0.52**	0.44**	−0.07	0.42**	0.52**	0.30**	0.34**	0.59**	0.37**	0.61**	0.75**	1				
16.C&M	0.36**	0.60**	0.58**	0.55**	0.44**	−0.00	0.44**	0.48**	0.25**	0.42**	0.56**	0.38**	0.50**	0.75**	0.76**	1			
17.Predator	0.37**	0.65**	0.65**	0.48**	0.44**	−0.05	0.42**	0.50**	0.25**	0.31**	0.58**	0.36**	0.60**	0.70**	0.80**	0.81**	1		
18.PC	0.57**	0.74**	0.56**	0.50**	0.48**	−0.00	0.52**	0.69**	0.44**	0.44**	0.66**	0.59**	0.65**	0.67**	0.69**	0.63**	0.68**	1	
19.F. Self-agg	0.38**	0.69**	0.59**	0.51**	0.41**	0.11*	0.39**	0.64**	0.45**	0.28**	0.58**	0.49**	65**	0.87**	0.77**	0.73**	0.72**	0.72**	1
M	30.04	22.77	17.88	15.17	14.19	28.89	19.27	14.80	40.01	13.24	22.03	13.03	20.99	27.06	13.32	21.29	19.30	35.91	34.81
SD	13.42	8.93	9.38	6.29	5.27	8.64	8.65	6.37	9.82	5.40	9.21	4.90	8.68	10.10	5.96	10.04	9.39	13.59	13.46
Cronbach's alpha	0.93	0.83	0.91	0.81	0.76	0.87	0.87	0.81	0.85	0.78	0.87	0.76	0.85	0.86	0.80	0.90	0.86	0.91	0.89

Note. *CS*=Compliant surrender; *DP*=Detached protector; *DS*=Detached self-soother; *AP*=Angry protector; *Self-agg*=Self-aggrandizer; *B&A*=Bully and attack; *C&M*=Conning and manipulative; *PC*=Paranoid over controller; *F. self-agg.* = Forensic self-aggrandizer

**Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed)

Table 3 Model fit indices of latent class analyses based on reported information on non-suicidal self-injury behaviors

Model	LL	BIC(LL)	AIC(LL)	AIC3(LL)	CAIC(LL)	Entropy
1-Cluster	−10251.40	20826.02	20612.74	20667.74	20881.02	1.00
2-Cluster	−8588.01	17828.45	17398.02	17509.02	17939.45	0.96
3-Cluster	−8158.82	**17299.22**	16651.64	16818.64	**17466.22**	0.96
4-Cluster	−8005.38	17321.50	16456.76	16679.76	17544.50	0.95
5-Cluster	−7886.60	17413.09	16331.21	16610.21	17692.09	0.94
6-Cluster	−7792.31	17553.66	16254.62	**16589.62**	17888.66	0.96
7-Cluster	−7726.31	17750.82	16234.63	16625.63	18141.82	0.96
8-Cluster	−7657.16	17941.67	16208.32	16655.32	18388.67	0.96
9-Cluster	−7594.09	18144.68	16194.18	16697.18	18647.68	0.96
10-Cluster	**−7525.20**	18336.05	**16168.40**	16727.40	18895.05	0.97

LL: Log-likelihood; *AIC*: Akaike Information Criterion; *BIC*: Bayesian Information Criterion; *AIC3*: Corrected AIC with a penalty factor of 3; *CAIC*: Consistent AIC

Bold values represent the best-fit model of each information criterion

during NSSI was higher than in Class 1. Participants in this class reported high levels of intrapersonal functions (except anti-suicide) and low levels of interpersonal functions. This class was named as the 'moderate NSSI group with intrapersonal functions'.

As for Class 3, which comprised 22.4% of the sample ($n=80$), individuals in this class reported engaging in the same types of self-injurious behaviors as those in Class 2, with slightly higher probabilities of cutting, burning, and swallowing. In this group, NSSI behaviors were more likely to occur alone and to involve physical pain. Participants reported high levels of both intrapersonal and interpersonal functions and were more likely to endorse anti-suicide functions compared to Classes 1 and 2. Moreover, they showed higher probabilities of endorsing intrapersonal functions than those in Class 2. Therefore, this class was labeled as the 'severe NSSI group'.

Multinomial logistic regression analyses

The findings of the MLR are presented in Table 4. Prior to analysis, multicollinearity was assessed. The VIF for the Forensic Self-Aggrandizer mode exceeded 5, and its correlation with Self-Aggrandizer was high ($r=.87$), indicating potential collinearity. To mitigate this, the Forensic Self-Aggrandizer variable was excluded from the analysis. Aftrer removal, VIFs ranged from 1.21 to 3.87 and tolerances from 0.26 to 0.83, indicating no multicollinearity among remaining predictors. The mild group and moderate groups were used as the reference categories in all analyses.

In the first regression analysis, we examined the predictor effects of the six child modes on different NSSI subgroups. The results showed that adding the predictors to the intercept-only model significantly improved model fit (χ^2 [12, $N=357$] = 98.74, $p<.001$; Nagelkerke's $R^2=0.27$). Specifically, a higher level of the Angry Child Mode was associated with an increased likelihood of belonging to the severe NSSI group compared to both the mild group (OR = 1.11, 95% CI [1.04, 1.19], $p<.01$) and the moderate group (OR = 1.07, 95% CI [1.01, 1.14], $p<.05$). Similarly, a higher level of the Enraged Child Mode was linked to a greater probability of belonging to the moderate group rather than the mild group (OR = 1.05, 95% CI [1.00, 1.11], $p<.05$).

In the second regression analysis focusing on Parent Modes, the final model that included the predictors was statistically significant (χ^2 [6, $N=357$] = 97.04, $p<.001$; Nagelkerke's $R^2=0.27$). However, none of the schema modes predicted the likelihood of belonging to the moderate group compared to the mild group. The results indicated that a higher level of the Punitive Parent Mode was associated with an increased likelihood of belonging to the severe group rather than the mild group (OR = 1.12, 95% CI [1.06, 1.18], $p<.001$) and the moderate group (OR = 1.09, 95% CI [1.04, 1.14], $p<.001$). Additionally, a higher level of the Demanding Parent Mode was associated with a greater likelihood of belonging to the severe NSSI group compared to the mild group (OR = 1.11, 95% CI [1.03, 1.20], $p<.01$).

Another MLR analysis was conducted using the Avoidant and Surrendering Coping Modes as predictors of the NSSI class membership. The results indicated that the final model significantly improved model fit compared to the intercept-only model (χ^2 (8, $N=357$) = 82.96, $p<.001$; Nagelkerke's $R^2=0.24$). A higher level of the Compliant Surrender Mode was associated with an increased likelihood of belonging to the moderate group (OR = 1.07, 95% CI [1.01, 1.14], $p<.05$) and severe group (OR = 1.16, 95% CI [1.08, 1.24], $p<.001$) rather than the mild group. Additionally, a higher level of the Compliant Surrender Mode was also associated with a greater likelihood of belonging to the severe group (OR = 1.08, 95% CI [1.02, 1.15], $p<.05$) rather than the moderate group. Similarly, a higher level of the Detached Self-Soother Mode was associated with an increased likelihood of belonging to the severe group compared to both the

Table 4 Results of multinomial logistic regression analyses of schema modes predicting class membership

			Moderate vs. Mild			Severe vs. Mild					Severe vs. Moderate				
Schema Modes	*B*	*SE*	*OR*	*95% CI*	*p*	*B*	*SE*	*OR*	*95% CI*	*p*	*B*	*SE*	*OR*	*95% CI*	*p*
Child Modes															
Vulnerable	0.01	0.02	1.01	0.98–1.04	0.46	0.03	0.02	1.03	0.99–1.07	0.16	0.02	0.02	1.02	0.98–1.05	0.37
Angry	0.04	0.03	1.04	0.98–1.09	0.20	0.11	0.03	1.11	1.04–1.19	**0.00**	0.07	0.03	1.07	1.01–1.14	**0.02**
Enraged	0.05	0.03	1.05	1.00–1.11	**0.05**	0.04	0.03	1.04	0.99−1.10	0.15	−0.01	0.02	0.99	0.95–1.04	0.68
Impulsive	−0.01	0.03	0.99	0.92–1.06	0.69	0.04	0.04	1.05	0.97–1.13	0.27	0.06	0.03	1.06	0.99–1.13	0.08
Undisciplined	−0.00	0.03	1.00	0.94–1.06	0.93	−0.03	0.04	0.97	0.90–1.05	0.45	−0.03	0.04	0.97	0.91–1.04	0.44
Happy	0.02	0.02	1.02	0.99–1.05	0.17	0.01	0.02	1.01	0.96–1.06	0.69	−0.01	0.02	0.99	0.95–1.03	0.58
Parent Modes															
Punitive	0.03	0.03	1.03	0.98–1.08	0.25	0.11	0.03	1.12	1.06–1.18	**0.00**	0.09	0.02	1.09	1.04–1.14	**0.00**
Demanding	0.05	0.03	1.05	0.99–1.12	0.10	0.11	0.04	1.11	1.03–1.20	**0.00**	0.06	0.03	1.06	0.99–1.13	0.09
Healthy Adult	0.03	0.01	1.03	1.00–1.05	0.09	0.01	0.02	1.01	0.97–1.05	0.77	−0.02	0.02	0.98	0.94–1.02	0.34
Avoidant and Surrendering Coping Modes															
Compliant Surrender	0.07	0.03	1.07	1.01–1.14	**0.02**	0.15	0.04	1.16	1.08–1.24	**0.00**	0.08	0.03	1.08	1.02–1.15	**0.02**
Detached Protector	0.00	0.02	1.00	0.96–1.05	0.89	0.01	0.03	1.01	0.96–1.06	64	0.01	0.02	1.01	0.97–1.05	0.69
Detached Self-Soother	0.06	0.03	1.06	0.99–1.13	0.08	0.14	0.04	1.15	1.06–1.24	**0.00**	0.08	0.04	1.08	1.01–1.16	**0.03**
Angry Protector	0.02	0.02	1.02	0.98–1.07	0.26	0.05	0.03	1.05	1.00–1.10	**0.05**	0.03	0.02	1.03	0.98–1.07	0.23
Overcompensatory Coping Modes															
Self-Aggrandizer	0.02	0.02	1.02	0.98–1.07	0.35	0.07	0.03	1.07	1.02–1.13	**0.01**	0.05	0.03	1.05	1.00–1.10	**0.05**
Bully and Attack	0.07	0.04	1.07	0.99–1.16	0.10	−0.02	0.05	0.99	0.89–1.09	0.78	−0.08	0.05	0.92	0.84–1.01	0.08
Conning and Manipulative	0.02	0.03	1.03	0.97-0.1.08	0.38	0.06	0.03	1.07	1.00–1.13	**0.04**	0.04	0.03	1.04	0.99–1.09	0.12
Predator	0.01	0.03	1.01	0.95–1.07	0.78	0.01	0.03	1.01	0.94–1.07	0.83	−0.00	0.03	1.00	0.95–1.06	0.97
Paranoid Overcontroller	−0.01	0.01	0.99	0.96–1.02	0.50	0.04	0.02	1.04	1.00–1.07	**0.05**	0.04	0.02	1.05	1.01–1.08	**0.01**

Note. Mild and moderate group was used as the reference group. Respectively; OR. Odds ratio; 95% CI. 95% confidence interval of odds ratio. Values in bold indicate statisticalsignificance at the 0.05 or 0.01 level

mild (OR = 1.15. 95% CI [1.06, 1.24], $p < .001$) and moderate groups (OR = 1.08, 95% CI [1.00, 1.16], $p < .05$). Furthermore, a higher level of Angry Protector Mode was linked to a greater likelihood of belonging to the severe group compared to the mild group (OR = 1.05, 95% CI [1.00, 1.10], $p < .05$).

Finally, the Overcompensatory Coping Modes were included in the model as predictors of class membership. Comparing the model with five predictors to the intercept-only model demonstrated a statistically significant improvement in model fit ($\chi 2$ [10, $N = 357$] = 96.41, $p < .001$; Nagelkerke's $R^2 = 0.27$). None of the overcompensatory coping modes differentiated the likelihood of belonging to the moderate group compared to the mild group. However, higher levels of the Self-Aggrandizer Mode were associated with an increased likelihood of belonging to the severe group rather than the mild group (OR = 1.07, 95% CI [1.02, 1.13], $p < .05$) and the moderate group (OR = 1.05, 95% CI [1.00- 1.10], $p = .05$). Additionally, a higher level of the Conning and Manipulative Mode was associated with a greater likelihood of belonging to the severe group compared to the mild group (OR = 1.07, 95% CI [1.00, 1.13], $p < .05$). Lastly, a higher level of the Paranoid Overcontroller Mode was associated with a greater likelihood of belonging to the severe group rather than the mild group (OR = 1.04, 95% CI [1.00, 1.07], $p < .05$) and the moderate group (OR = 1.05, 95% CI [1.01, 1.08], $p < .05$).

Discussion

The main aim of this study was to identify subgroups of individuals engaging in NSSI and to uncover the underlying schema modes that distinguish them. Using latent class analysis, three distinct groups were identified based on lifetime engagement, descriptive characteristics, and functions of NSSI. These were labeled the "mild/experimental NSSI group", "moderate NSSI group with intrapersonal functions", and "severe NSSI group". The literature indicates the presence of similar NSSI subgroups in previous studies (e.g., Gu et al., 2023; Shahwan et al., 2020), supporting the validity of our findings. Given that the variation in subgroup structures reported across studies (e.g., Case et al., 2020; Dixon-Gordon et al., 2022) likely stems from differences in methodological decisions—such as the indicators used, function categorization, and sample characteristics—the present study makes a meaningful contribution by extending prior findings and uncovering NSSI subtypes within a university student sample.

Subsequent multinomial logistic regression analyses were conducted to examine how schema modes within each domain were associated with the likelihood of belonging to the different NSSI subgroups. Consistent with our expectations, specific schema modes emerged as significant and unique predictors of different NSSI groups. Regarding the results for the Child Modes, as expected, these were found to significantly predict the likelihood of belonging to the NSSI subgroups, with anger-related modes emerging as the most salient. More specifically, individuals scoring higher on the Angry Child Mode were more likely to belong to the severe group than to the mild and moderate groups, while higher Enraged Child tendency predicted membership in the moderate group rather than the mild group. In these schema modes, children whose basic emotional needs have not been met tend to feel frustrated, angry, and enraged. In such cases, they may express their suppressed anger in maladaptive and inappropriate ways (Arntz & Jacob, 2017). The angry child mode typically involves feelings of deep injustice, abandonment, and resentment (Bernstein et al., 2007), which may be internalized and expressed through intense, self-directed aggression. Supporting, Klonsky (2007) suggested that adolescents exposed to parental rejection may develop dysregulated anger expression that is redirected toward the self through severe self-harm. Similarly, Warm at al. (2003) found that self-injury often serves as a way of managing anger. As for the Enraged Child Mode, it involves intense anger that results in uncontrollable aggression, often directed toward others or the environment, including acts such as threatening, physical assault, or impulsive outbursts (Bach & Bernstein, 2019). This externalized expression of distress, while maladaptive, may serve to temporarily alleviate internal emotional pressure. Thus, individuals in the moderate group may externalize their anger, which may temporarily alleviate distress, however such expressions may also coexist with emerging self-directed harm when outward expression proves insufficient. Consequently, the direction, intensity, and target of anger appear central in differentiating NSSI severity and function across subgroups.

Findings related to Parent Modes have also provided an important perspective that aligned with our expectations. The results suggest that higher levels of Punitive and Demanding Parenting modes were associated with a greater likelihood of belonging to the severe group. The Punitive Parent Mode represents the internalized voice of caregivers who punish through anger or criticism, which, in turn, fosters tendencies toward self-punishment. In addition, the Demanding (or Critical) Parent Mode emerges when caregivers are overly demanding, critical, or hold excessively high expectations for their children (Arntz & Jacob, 2017). Robin et al. (1990) argued that individuals raised by parents with highly critical attitudes tend to develop self-critical tendencies, particularly when they fail to meet their parents' high standards. In this context, Nock's (2009) self-punishment hypothesis posits that individuals who engage in

self-criticism or experience external criticism may employ NSSI as a means of punishing themselves for their perceived imperfections. Therefore, self-punishment and self-criticism have been identified as common motivations for NSSI, as supported by empirical evidence from studies such as Klonsky's (2007) review. However, Daly and Willoughby's (2019) longitudinal findings challenge the assumption that self-criticism predisposes individuals to NSSI, suggesting that it may instead arise as a consequence of NSSI engagement. Therefore, our findings may also imply that higher levels of NSSI engagement could activate the Demanding/Critical Parent Mode.

As for Avoidant and Surrendering Coping Modes, higher Compliant Surrender scores predicted membership in both the moderate and severe groups, while elevated Detached Self-Soother and Angry Protector scores were associated with the severe group. Those in Compliant Surrender Mode tend to passively prioritize the needs of others over their own, potentially as a coping mechanism to avoid criticism or rejection from punitive and demanding parents (Arntz & Jacob, 2017). In this context, NSSI may represent a physical manifestation of submissive behavior, reflecting intense internalized distress and serving as a means of coping with the challenging dynamics of such parenting modes. Moreover, individuals in the Detached Self-Soother Mode may resort to behaviors such as overeating or substance use to disconnect from distressing emotions. Likewise, self-injury can be understood as a means of escaping distressing thoughts and emotions (Taylor et al., 2018). Therefore, when the Detached Self-Soother Mode is activeted, NSSI may provide temporary relief by redirecting attention to immediate physical pain. Finally, the Angry Protector Mode, like the Angry Child Mode, involves the defensive use of anger in response to perceived threats such as abandonment, mistreatment, or frustration. Unlike the Angry Child Mode, in which anger is expressed outwardly and uncontrollably, the Angry Protector Mode employs anger as an "emotional shield" to keep perceived threats at a safe distance (Bernstein et al., 2007). In this mode, anger may be directed inward rather than outward, manifesting as self-directed aggression. Consequently, anger can provide a temporary sense of power and control, while self-injurious behavior may serve to make emotions more manageable and less threatening. Therefore, despite manifesting differently, the Angry Protector mode is also likely to be associated with NSSI, similar to the Angry Child mode.

Concerning the Overcompensatory Coping Modes, the results indicated that higher levels of Self-Aggrandizer Mode were associated with membership in the severe NSSI group. The term 'self-aggrandizer' refers to a state commonly observed in narcissistic individuals, characterized by grandiosity and entitlement, often as a means of compensating for underlying emotional distress (Arntz & Jacob, 2017). The relationship between NSSI and narcissism has garnered attention in the literature, with studies suggesting a stronger association between narcissistic vulnerability and NSSI behaviors than with narcissistic grandiosity (Zobel et al., 2021). Given that narcissistic vulnerability is linked to difficulties in emotion regulation (Di Pierro et al., 2017), NSSI may serve an intrapersonal function to alleviate negative internal states. Narcissistic grandiosity has been linked to the interpersonal functions of NSSI as well, such as forming connections with peers or seeking revenge (Finch et al., 2023). Thus, although evidence supporting the relationship between NSSI and narcissistic traits remains mixed, the presence of the Self-Aggrandizer Mode in the severe NSSI group suggests that it may serve both intra- and interpersonal functions of NSSI. Lastly, individuals with the Conning and Manipulative Mode or Paranoid Overcontroller Mode were more likely to belong to the severe NSSI group. Individuals in the Conning and Manipulative Mode may employ deceptive strategies to achieve their goals, potentially victimizing others or avoiding punishment (Bach & Bernstein, 2019). In particular, considering the interpersonal functions of self-injurious behaviors within the severe NSSI group, individuals with this mode may engage in NSSI to express emotional distress deceptively, victimize themselves, elicit sympathy from others, or seek revenge. The Paranoid Overcontroller Mode is characterized by pervasive distrust and excessive control to protect oneself from perceived or real threats (Bach & Bernstein, 2019; Lobbestael et al., 2007). This heightened need for control, along with elevated distress, may contribute to engagement in more severe NSSI as a way to cope with difficult emotional states or challenging situations. Furthermore, individuals with this mode may resort to NSSI as a means of achieving interpersonal goals, such as establishing boundaries or exerting influence, particularly in response to perceived threats.

Implications

This study offers valuable insights for both research and practice, making an important contribution to our understanding of self-injurious behavior. Specifically, the latent class analysis allowed for the identification of distinct NSSI subgroups with unique clinical characteristics that might not be evident through conventional descriptive statistics. It also provides culturally relevant insights and reinforces the importance of person-centered approaches in understanding NSSI and guiding targeted interventions. Moreover, this study was the first to examine how distinct schema modes differentially influence the likelihood of belonging to specific NSSI subgroups. These results indicated the potential value of schema therapy for the treatment of

non-suicidal self-injury. Identifying which schema modes exert the strongest influence on distinct NSSI subgroups was intended to provide clinicians with practical insights for case formulation and treatment planning. For instance, among individuals in the severe NSSI group, the Punitive and Demanding Parent Modes may serve as treatment targets, whereas the Enraged Child Mode may be more prominent in treatment planning for those in the moderate group. Nevertheless, clinicians are advised to be cautious about the generalizability of these results and to emphasize individualized assessment for each client. In addition, NSSI is often associated with a range of psychological problems (Cipriano et al., 2017), but this study highlights how common NSSI is in a non-clinical sample. As Young (1990) noted, the findings of this study align with the view that schema therapy may be applicable to individuals without a personality disorder diagnosis, including those with NSSI in non-clinical populations.

Limitations and conclusion

This study has several limitations. First, the use of self-report measures may have introduced response bias, as participants could have provided socially desirable answers. Another limitation is that the measure used to assess NSSI asked participants whether they had ever engaged in self-injurious behavior across their lifetime, rather than focusing on more recent occurrences. Furthermore, the retrospective nature of the NSSI measure raises concerns about the accuracy of participants' reports regarding the frequency and functions of their behavior. Participants may complete the measure even if they are not currently engaging in NSSI, which could compromise the representativeness of the findings. To enhance the reliability of the results, it may be beneficial to assess NSSI behaviors within a specific recent time frame—such as the past six months or year—rather than focusing on lifetime engagement. Another limitation of this study is the absence of data on theoretically relevant psychological and demographic variables. Collecting such information could have allowed for the identification of more distinct subgroups within the NSSI population and offered a deeper understanding of the factors influencing NSSI behaviors. Finally, the cross-sectional design of the study limits the ability to observe changes over time in NSSI class membership and schema modes, as well as to establish causal relationships. Future studies should employ longitudinal or cross-lagged panel designs to allow for causal inference. In addition, incorporating daily diary or experience sampling methods (ESM) could yield rich, repeated real-time data on individuals' experiences and emotional states, offering insights into the dynamic interplay between schema modes and NSSI behaviors.

In conclusion, this study identified three homogeneous groups (mild, moderate, and severe) based on the characteristics and functions of NSSI. Moreover, specific schema modes were found to hold differential significance for the moderate and severe NSSI groups. This research represents one of the pioneering studies efforts to classify NSSI behaviors and to examine their associations with schema modes. Overall, the findings are expected to contribute to the existing literature and to inform schema therapy practice.

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Authors' contributions All authors contributed to the study. S.Ü. Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. G. D. Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. A.E.Y. Conceptualization, Project administration, Supervision, Writing – review & editing. All authors reviewed and approved the final manuscript.

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Data availability The dataset used in this study can be obtained from the corresponding author upon reasonable request.

Declarations

Ethics approval The current study received the ethical approval from the Ethics Review Board of Dokuz Eylül University.

Consent to participate Written informed consent was obtained from all individual participants included in the study.

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

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