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Non-Suicidal Self-Injury and Emotion Regulation in Adolescent inpatients: A Single-Center Study

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Non-suicidal self-injury (NSSI) refers to intentional, repeated, and direct damage to one's own tissue without suicidal intent and for purposes that are not socially accepted. Research on adolescents has shown that NSSI is motivated by a variety of functions, which can be categorized as intrapersonal, based on emotion regulation or interpersonal, based on social processes. The aim of the study was to examine differences in emotional regulation strategies, specifically cognitive reappraisal and expressive suppression, between adolescents who engage in non-suicidal self-injury and those without a history of self-injury. The sample included 121 adolescents (24 male, 97 female; mean age 15.38 ± 1.48 years) receiving treatment at the Department for Child and Adolescent psychiatry, University Clinical Centre Nis, Serbia. Participants were divided into two groups: adolescents with at least one NSSI episode in the past year (n = 62) and adolescents without self-injury (n = 59). Emotion regulation was assessed using the Emotion Regulation Questionnaire (ERQ). Sociodemographic and clinical variables, including internalizing and externalizing symptoms and suicidal phenomena, were recorded. Results showed that adolescents with NSSI reported significantly lower cognitive reappraisal ($p = 0.012$) and higher expressive suppression ($p = 0.019$) compared to those without NSSI. Suicidal phenomena were more frequent in the NSSI

group (72.6% vs. 18.6%, $p < 0.001$). No significant differences were found in age, gender, or family structure. Results emphasize the importance of interventions that enhance adaptive emotion regulation skills, such as cognitive reappraisal, while reducing reliance on maladaptive strategies in this vulnerable patient population.

Key words: non-suicidal self-injury, adolescents, emotional regulation

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Nesuicidalno samopovređivanje i emocionalna regulacija kod adolescenta na bolničkom lečenju: studija jednog centra

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Nesuicidalno samopovređivanje (NSSI) odnosi se na namerno, ponovljeno i direktno nanošenje štete sopstvenom telu bez suicidalne namere i u svrhe koje nisu društveno prihvaćene. Istraživanja kod adolescenata su pokazala da je NSSI motivisan različitim funkcijama, koje se mogu podeliti na intrapersonalne, zasnovane na regulaciji emocija, i interpersonalne, zasnovane na socijalnim procesima. Cilj ove studije bio je da ispita razlike u emocionalnoj regulaciji, konkretno kognitivnoj reinterpretaciji i supresiji izražavanja emocija između adolescenata koji se samopovređuju i onih koji nemaju istoriju samopovređivanja. Uzorak je uključivao 121 adolescenta (24 muškog pola, 97 ženskog pola; prosečne starosti 15,38 ± 1,48 godina) koji su bili na ambulantnom ili hospitalnom tremanu na Odeljenju za dečiju i adolescentnu psihijatriju, Univerzitetskog Kliničkog centra Niš. Učesnici su podeljeni u dve grupe: adolescenti sa najmanje jednom NSSI epizodom u prethodnoj godini (n = 62) i adolescenti bez istorije samopovređivanja (n = 59). Regulacija emocija procenjena je pomoću Upitnika za regulaciju emocija (ERQ – Emotion Regulation Questionnaire). Evidentirane su sociodemografske i kliničke varijable, uključujući internalizujuće i eksternalizujuće simptome, kao i suicidalni fenomeni. Rezultati su pokazali da adolescenti sa NSSI imaju značajno niži nivo kognitivne reinterpretacije (p = 0,012) i viši nivo supresije izražavanja emocija (p = 0,019) u poređenju sa adolescentima bez NSSI. Suicidalni fenomeni su bili češći u NSSI grupi (72,6% naspram 18,6%, p < 0,001). Nisu pronađene značajne razlike u starosti, polu ili porodičnoj strukturi između ispitivanih grupa. Rezultati naglašavaju značaj intervencija koje poboljšavaju adaptivne veštine regulacije emocija, poput kognitivne reinterpretacije,

istovremeno smanjujući oslanjanje na maladaptivne strategije u ovoj ranjivoj populaciji pacijenata.

Ključe reči: nesuicidalno samopovređivanje, adolescenti, emocionalna regulacija

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Introduction

Non-suicidal self-injury (NSSI) refers to intentional, repeated, and direct damage to one's own tissue without suicidal intent and for purposes that are not socially accepted (1). These behaviors include various forms of self-harm, such as cutting or cutting the skin with sharp objects (glass, razors, sharp objects), scratching, pulling, burning, piercing or piercing the skin, hitting the head and body against a hard surface, and are clearly distinct from socially acceptable body modifications such as tattooing or piercing, as well as from religious or cultural rituals (1). Non-suicidal self-injury is a common phenomenon in adolescence, both in clinical and non-clinical populations, and represents a significant public health problem. Research shows that the frequency of non-suicidal self-harm in the general adolescent population is between 13% and 23%, while in the clinical population, it is significantly higher, from 50% to 70%. (2). The Serbian ACE study (3), conducted on a nationally representative sample of the non-clinical adolescent population, showed that the rate of non-suicidal self-harm in Serbia is 4.3%, while the criterion of "at least one positive answer" on the Non-Suicidal Self-Injury Screening Protocol (NSSP) checklist rises to 14.4% (4). The same study found that the most common form of non-suicidal self-injury is wound digging, excluding which the rate drops to 8.8% (4).

Research on adolescents has shown that NSSI is motivated by a variety of functions, which can be categorized as intrapersonal (based on emotion regulation) or interpersonal (based on social processes, such as communicating emotional distress, seeking help, establishing or regulating relationships with others, and affirming personal boundaries and autonomy), and these functions are not mutually exclusive (5,6). Meta-analyzes by Wolf et al. (7) show that emotional dysregulation is one of the most stable correlates of NSSI, regardless of age, gender, or type of sample (clinical or outpatient). The dimensions of emotional dysregulation most strongly associated with NSSI were denial of emotional

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responses, difficulties in impulse control, limited access to regulation strategies, and difficulties in goal-directed behavior (7).

Emotional regulation is defined as the process by which individuals influence their emotions, but also their own experience of their emotions (8). It implies modification of various components of emotions, such as intensity, duration, and manner of expression, so that a person adapts to situational requirements (8). According to Gross's (9) process model of emotion regulation, the emotional process is initiated by an external situation or mental representation that the person values. Further evaluation of that situation further triggers a set of adaptive responses in her, including experiential, behavioral, and physiological systems. Antecedent-focused strategies, such as cognitive reappraisal, are applied before the emotion is fully generated and involve cognitively reinterpreting an emotionally eliciting situation, thereby changing the emotional experience. In contrast, response-focused strategies, such as expressive suppression, are applied after the emotional response has already been activated and primarily involve inhibiting the outward expression of emotion, without necessarily reducing the subjective experience of the emotion. This distinction between strategies has also been confirmed by research showing that suppression operates in later stages of emotional processing, after cognitive appraisal and the activation of physiological and behavioral mechanisms (10). Building on this model, research has shown that adaptive strategies such as cognitive reappraisal have been linked to lower levels of psychological distress and better emotional resilience (8), whereas maladaptive strategies, such as rumination or suppression, are associated with increased risks of anxiety, depression, and other psychological disorders. More specifically, adaptive strategies like cognitive reinterpretation, have been found to reduce the risk of non-suicidal self-injury, while maladaptive strategies, including expressive suppression and rumination, increase that risk (11–13). Most of the studies have been conducted in the general adolescent population, while less research has examined adolescents in clinical settings who self-injure and may have

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psychiatric comorbidities, highlighting the particular vulnerability of this group to non-suicidal self-injury.

The aim of the study was to examine differences in emotional regulation strategies, specifically cognitive reappraisal and expressive suppression, between adolescent inpatients who engage in non-suicidal self-injury and those who do not have a history of self-injury.

Materials and methods

The study involved 121 adolescents receiving outpatient or inpatient treatment at the Department of Child and Adolescent Psychiatry, University Clinical Centre Nis, between September 2024 and January 2026. Adolescents are divided into two groups: adolescents with a history of at least one episode of NSSI in the last year and adolescents without a history of self-injury. NSSI assessment was obtained from multiple sources (clinical interview, medical history, consultation reports, nursing documentation, and current examination status). At study inclusion, the following variables were analyzed: gender, age, family structure, internalizing (social withdrawal, anxiety, depression, emotional problems), and externalizing symptoms (aggression, impulsivity, rule breaking, hyperactivity), as well as history of suicidal phenomena (suicidal ideation, suicidal intent, and suicide attempts). Suicidal phenomena were recorded as a binary variable (absent = 0, present = 1). Formal psychiatric diagnoses were not used, but the functional presence of symptoms and emotional regulation strategies was assessed, which enables focus on real behaviors and emotional problems of adolescents' actual behaviors and emotional difficulties without the limitations of categorical diagnoses. Adolescents with a mental disability, a current or previous psychotic disorder, and substance use disorder were excluded from this study.

Emotion Regulation Questionnaire

The **Emotion Regulation Questionnaire** (ERQ) measures two key emotion regulation strategies: cognitive reappraisal, which involves changing the interpretation of a situation before an emotion fully develops, and expressive suppression, which refers to

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controlling or reducing the visible expression of emotions after they arise (14). The questionnaire consists of 10 items: 6 assess cognitive reappraisal (e.g., "I control my emotions by changing the way I think about the situation I'm in") and 4 assess expressive suppression (e.g., "I keep my emotions to myself"). Respondents rate each item on a Likert scale (1 = strongly disagree, 7 = strongly agree). Scores are calculated as a simple linear combination of the responses divided by the number of items for each emotion regulation strategy, with higher scores indicating more frequent use of the respective strategy. The coefficient of internal consistency for the Cognitive Reappraisal subscale is .79, and for the Expressive Suppression subscale is .73. Test-retest reliability after three months is .69 for both subscales (14). Validation of the Serbian adaptation of the ERQ demonstrated acceptable psychometric properties and confirmed the reliability of the scales, enabling a reliable assessment of adaptive and maladaptive emotion regulation strategies in adolescents (15).

Participation in the study was voluntary. The Ethics Committee of the University Clinical Centre Niš provided ethical approval for the study.

Statistical analysis. The data are presented in the form of standard descriptive statistic: arithmetic mean, standard deviation, minimum and maximum values, frequency and percentage share. Comparison of numerical variables related to bleeding was tested using the t test or Mann-Whitney test, depending on the data distribution. Comparison of the frequency of different characteristics was performed using the Chi-square test or the Fisher test. The null hypothesis was tested with a significance threshold of $p<0.05$. Statistical data processing was performed in the R software package (16).

Results

121 subjects (24 male and 97 female) were included in the study. The average age of the studied population is 15.38±1.48 years (Min 12 years, Max 20 years). The majority of the population comes from complete families (54.5%), and they more frequently exhibited comorbid internalizing symptoms (66.9%). Suicidal phenomena are present in almost half of

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the examined population (46.3%). The study population consisted of 62 adolescents with NSSI (82.3 % female, 17.7 % male) and 59 adolescents without self-harm (78.0 % female, 22.0 % male) (Table 2).

Table 1. Demographic and clinical characteristics of the studied population

	No	**%**
Gender		
Male	24	19.8
Female	97	80.2
Age †	15.38±1.48	12-20
Familly structure		
complete	66	54.5
incomplete	46	38.0
foster care	8	6.7
Emotional and behavioral problems		
externalizing symptoms	40	33.1
internalizing symptoms	81	66.9
Suicidal phenomena	56	46.3
Cognitive reappraisal †	3.56±1.32	1.00-6.50
Expressive Suppression †	4.10±1.49	1.00-7.00
Adolescents with NSSI	62	51.2
Adolescents without NSSI	59	48.8

† Data are presented as arithmetic mean±standard deviation; minimum-maximum values

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A statistically significant difference was found in the frequency of suicidal phenomena between adolescents with NSSI and adolescents without NSSI (72,6% vs 18,6%, p < 0,001).

Table 2. Demographic and clinical characteristics and emotion regulation in adolescent inpatients with and without NSSI

	Adolescents without NSSI		**Adolesscents with NSSI**		**p**
	Broj	%	Broj	%	
Gender					
Male	13	22.0	11	17.7	0.716
Famale	46	78.0	51	82.3	
Age †	15.59±1.54		15.18±1.40		0.123
Family structure					
Intact family	36	61.0	30	49.2	0.201
Non-intact family	18	30.5	28	45.9	
Foster care	5	8.5	3	4.9	
Emocional and behavioral problems					
externalizing symptoms	20	33.9	20	32.3	1.000
internalizing symptoms	39	66.1	42	67.7	
Suicidal phenomena	11	18.6	45	72.6	<0,001
Cognitive reappraisal†	3.78±1.04		3.38±0.78		0.012[3]
Expressive Suppression †	3.56±0.86		3.92±0.83		0.019[3]

† Data are presented as arithmetic mean±standard deviation; [1] Chi-square test, [2] t test, [3] Mann-Whitney test

It was found that cognitive reappraisal in adolescents with NSSI is statistically significantly lower compared to the group of adolescents without NSSI (p = 0.012), while expressive suppression is statistically significantly higher in adolescents with NSSI compared to the group of adolescents without NSSI (p=0.019) (Figure 1).

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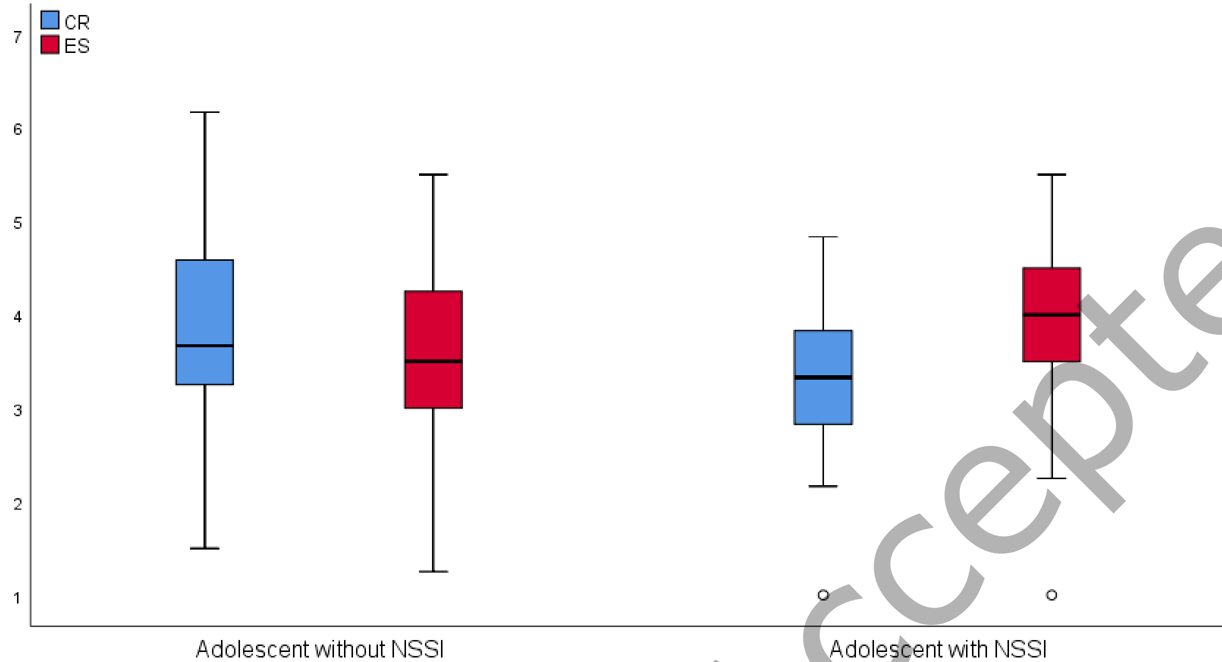

Figure 1. Values of ERQ domains in relation to the studied groups

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Discussion

In our study, a higher proportion of females reported engaging in self-injurious behavior, and the mean age of adolescents engaging in self-injury was 15.18 ± 1.40. The reasons for these gender differences remain open and may indicate that females are more likely to report existing self-injurious behavior than males, as well as gender-specific differences in emotion regulation mechanisms (17, 18). Our finding is consistent with data from longitudinal studies, which indicate that this type of behavior peaks in mid-adolescence and declines during late adolescence (19). In our study, NSSI was more frequently associated with internalizing symptoms and the previous research has consistently demonstrated associations between both externalizing and internalizing symptoms and NSSI (2, 20), what supports the conceptualization of non-suicidal self-injury as a "transdiagnostic phenomenon". Although NSSI, by definition, excludes suicidal intent, studies show associations between

NSSI and suicidal phenomena in clinical and outpatient samples, which significantly increase the risk of suicide (21–24). Whitlock J et al (25) describe NSSI as a "gateway" to suicide. Results of this study also indicate a significant difference in the frequency of suicidal phenomena between adolescent inpatients with NSSI and without NSSI. Although suicidal phenomena can be observed on a continuum ranging from suicidal ideation, through intentions and suicide attempts, in our research, they are conceptualized as binary variables without a clear differentiation between these levels; however, these findings remain concerning and warrant clinical attention.

In our study, there was a significant difference in emotion regulation, as reflected in cognitive reappraisal and expressive suppression, between adolescent inpatients who engage in self-injury and those who do not. Among adolescent inpatients who engage in self-injury, cognitive reappraisal was used significantly less frequently, whereas expressive suppression was used significantly more frequently compared to adolescents without a history of NSSI. Reduced use of cognitive reappraisal may indicate difficulties in reinterpreting emotionally distressing situations, leading to more intense and prolonged experience of negative emotions. At the same time, a more pronounced use of expressive suppression can contribute to the suppression of emotional expression without actually reducing the internal emotional experience, thereby increasing internal tension. In this context, NSSI can be understood as a maladaptive emotion regulation strategy, with which adolescents try to alleviate or terminate overwhelming negative affective states. Studies with adolescents show that these strategies are directly associated with the risk of NSSI. (11–13). A longitudinal study conducted by Voon and colleagues (11) in a large population of secondary school students found that lower use of cognitive reappraisal was associated with a higher risk of experiencing a first episode of self-harm within a year, while strategies such as expressive suppression and rumination did not predict the onset of non-suicidal self-injury. Similarly, a study of adolescents found that psychological distress, including depression, anxiety, and daily stress, significantly

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contributed to the incidence of non-suicidal self-harm. In this context, adaptive emotion regulation strategies, such as cognitive reappraisal, reduced the risk of self-harm, while expressive suppression was associated with a higher risk (12).

Recent network analysis has further demonstrated the complex associations among emotional regulation, interpersonal sensitivity, and cognitive insight regarding NSSI. A study conducted in a large adolescent sample found that cognitive reappraisal and expressive suppression play a central role within the network of psychological factors associated with NSSI, with reappraisal negatively associated with self-injury and suppression positively associated with increased risk. In addition, interpersonal sensitivity (sensitivity to interpersonal relationships and others' reactions) was a key node in the network, suggesting that emotional regulation does not operate in isolation but rather within a broader social and cognitive context. These findings emphasize that effective emotion regulation, particularly through adaptive strategies such as cognitive reappraisal, may reduce the frequency of NSSI, whereas maladaptive strategies and heightened interpersonal sensitivity contribute to its maintenance (26).

Although the study provides insight into emotion regulation in adolescent inpatients with non-suicidal self-injury, limitations such as its cross-sectional design and the single-center sample should be considered when interpreting the findings. Also, suicidal phenomena were taken as binary variables, so the use of continuous variables obtained from standardized questionnaires would provide greater reliability.

Conclusion

The results of this study revealed significant differences in emotional regulation between adolescent inpatients who self-injure and those without a history of self-injury. Adolescents who self-injure showed lower use of cognitive reappraisal and higher use of expressive suppression, highlighting the difficulties in the adaptive regulation of negative emotions.

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Clinically, results emphasize the importance of interventions that enhance adaptive emotion regulation skills, such as cognitive reappraisal, while reducing reliance on maladaptive strategies in this vulnerable patient population.

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