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Examine the relationship between self-injurious behaviors and emotion regulation in Iranian adolescent athletes

Ebrahim Norouzi[1*]

Abstract

Objective Non-suicidal self-injury (NSSI) represents a significant public health concern, particularly among adolescents. Understanding the prevalence of NSSI within specific at-risk populations, such as athletes, is crucial for developing effective prevention programs. Given the unique stressors and pressures experienced by young athletes, it is essential to examine the factors contributing to their vulnerability. This study aimed to determine the occurrence of NSSI in adolescent athletes and to investigate the role of emotional regulation in their self-injurious behaviors.

Method This study involved 456 adolescent athletes, aged 13 to 18 (mean age 14.66 years, SD = 2.80), recruited in Tehran in 2024. The sample consisted of 183 female (40.1%) and 273 male (59.9%) participants. Participants completed surveys measuring self-injury behaviors, cognitive emotion regulation and behavioral emotion regulation strategies. Data analysis employed Pearson correlation coefficients and regression testing.

Results The findings revealed a concerning prevalence of self-injury among the adolescent athletes in Tehran. A significant relationship was found between self-injury and cognitive and behavioral emotion regulation. The regression model indicated that self-injury could be predicted by the level of behavioral emotion regulation, followed by cognitive emotion regulation.

Conclusion This study highlights the importance of considering emotion regulation in understanding and addressing self-injurious behaviors among adolescent athletes. The findings suggest that interventions aimed at improving cognitive and behavioral emotion regulation strategies may be beneficial in reducing NSSI among this population.

Keywords Adolescent athletes, Self-injury, Emotion regulation, Cognition, Sports, Mental health

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Introduction

Youth athletes who engage in self-injury exhibit patterns of behavior that medical professionals categorize as an unhealthy form of coping [1]. Self-injury functions as an indicator to evaluate individual mental health and behavioral maladjustment patterns among adolescent competitive athletes [2, 3]. Self-injury describes purposeful actions of self-harm which do not aim for suicide [4]. The most common forms of self-injury include cutting, scratching, hitting or banging, and burning [5]. While these forms are generally consistent, cultural factors might influence the specific methods chosen. For instance, some forms of self-injury might be more stigmatized than others within the Iranian cultural context, potentially influencing reporting and observed prevalence [6]. Adolescent girls are usually more inclined to cutting, carving, and scratching, while adolescent boys are more likely to hit themselves [7]. However, further research is needed to examine of self-injury within Iranian adolescent athletes, considering cultural norms and expectations surrounding masculinity and femininity.

The global prevalence of adolescent self-injury is a growing concern [8, 9]. However, methodological variations and inconsistent terminology make direct comparisons across studies challenging. A systematic review by Muehlenkamp et al. [10] analyzing data from 2005 to 2011, found similar prevalence rates for deliberate self-harm (16.1%) and non-suicidal self-injury (18%). Standardized assessment methods are crucial for reliable cross-cultural comparisons; this review indicated increased stability in prevalence rates over time, with behavioral checklists yielding higher rates than single-item assessments. More recent research, such as Calvete et al. [11] reported prevalence rates exceeding 50% for at least one self-injury episode in transgender and non-binary adolescents and young adults, potentially reflecting unique stressors like victimization. Studies within Iranian adolescents show a wide range of self-injury prevalence, from 4.3–40.5% [12]. Izadi-Mazidi et al. [12] for example, found a significant rate of self-injury (178 out of 646 students) among Iranian high school students. These variations likely stem from differences in sampling, assessment tools, and studied populations. It is important to note that these figures may not be directly applicable to Iranian adolescent athletes, who face distinct physical and psychological pressures related to competitive sports, such as performance anxiety and injury, potentially influencing self-injury behaviors differently.

Self-injury becomes most prevalent in people during the adolescent period [13]. The onset of self-injury is usually between 12 and 14 years old [14]. Self-injury is strongly associated with unhealthy psychological processes (such as problems in emotion regulation, negative mood, emotional alexithymia, self-criticism) [3]. For instance, Taylor et al. 's meta-analysis [15] found that intrapersonal functions, particularly emotion regulation, are the most prevalent motivations for non-suicidal self-injury. Moreover, the competitive sports environment can create additional pressures related to performance, body image, and social comparisons, potentially increasing the risk of these unhealthy psychological processes [16, 17]. In addition, mental health and improving psychological indicators can reduce the rate of self-injury [18]. Furthermore, evidence has shown that the most frequent cause of self-injury is psychological problems [19]. Among these, the psychological indicator of emotion regulation has been less studied [19, 20], especially within the context of adolescent athletes. Emotion regulation can be defined as the biological (shortness of breath or increased breathing rate), social (seeking support from others or spouse), and behavioral (shouting, crying, or withdrawing) processes in coping with various life issues. Emotion regulation can also be affected by unconscious thoughts such as denial, catastrophizing, and self-blame [21]. Among the emotion regulation strategies, two main branches are considered, including cognitive emotion regulation [21] and behavioral emotion regulation [22]. Cognitive emotion regulation can include evaluating the stages and various types of cognitive processing that play a role in attention, evaluation, and response to a stressful stimulus. Several cognitive regulation and cognitive emotion strategies include blaming others or self-blame and reappraisal with considering through different perspectives but also catastrophizing and rumination and positive refocusing and refocus on planning and acceptance [21]. In contrast, behavioral emotion regulation in response to life-threatening events includes five ways including seeking social support, actively approaching, withdrawal, seeking distraction and ignoring [22]. In general, taking other actions, actively confronting, and seeking social support are positive ways to control and manage stressful events. In contrast, withdrawal and ignoring are also negative ways to control and manage emotions [15, 22]. Cultural and sports factors may influence the acceptability and utilization of these different emotion regulation strategies among Iranian athletes.

While self-injury is recognized as an unhealthy coping strategy among young populations, including athletes, it is particularly vital to study this issue in the context of Iranian adolescent athletes [1, 6, 23]. Competitive sports impose unique stressors that can affect mental health, making it crucial to understand how these pressures contribute to self-injury in this population [1, 17, 24]. The cultural context of Iran also influences the prevalence and expression of self-injurious behaviors, as certain forms of self-injury may carry different levels of stigma and acceptance [6, 25]. By focusing on adolescent athletes in Iran, we can gain insights into the specific motivations

and coping strategies that are impacted by both cultural norms and the demands of competitive sports. Understanding these factors is essential for developing targeted interventions that address the mental health needs of this vulnerable group.

Insufficient emotion regulation is associated with mood and anxiety disorders [26]. Cognitive and behavioral emotion regulation are among the factors that can help reduce high-risk behaviors [21]. Although there is accumulated evidence for the relationship between emotion regulation and mental health, there is little information about the relationship between emotion regulation and self-injurious behaviors [19, 27] especially within the specific population of adolescent athletes in Iran. The precise mechanisms linking these factors, particularly the roles of cognitive and behavioral emotion regulation, remain under-explored, representing a significant research gap addressed in the present study. While research indicates a notable prevalence of self-injury among Iranian adolescents [25], studies involving young athletes often overlook the unique stressors inherent in their athletic experiences.

Sports performance and total health success of adolescent athletes depends heavily on cognitive factors together with mental health outcomes. Performance-enhancing factors that occur during competition increase stress while creating anxiety that requires effective management techniques [28, 29]. Adopting constructive coping approaches including problem-solving and positive reframing enables athletes to maintain emotional control while decreasing their likelihood of conducting harmful acts such as self-injury [23]. Therefore, exploring the relationship between cognition emotion regulation and self-injury is essential for developing targeted interventions that support young athletes in navigating the challenges of competitive sports.

To the best of our knowledge, no research has been conducted on the prevalence of self-injurious behaviors among adolescent athletes in Tehran. Therefore, this research gap will be considered in the present study. As a result, the purpose of the present study is to investigate the prevalence of self-injurious behaviors and the relationship between self-injury and cognitive-behavioral emotion regulation among adolescent athletes in Tehran. In addition, a regression model will be examined in the present study to predict the rate of emotional behaviors through cognitive and emotional regulation.

Method

Participants

A representative sample of several educational institutions based in Tehran was recruited by cluster sampling technique for this study. The research team strategically targeted schools which offered sports programs to obtain a representative group of adolescent athletes. The studies included schools that maintained athletic teams for football, basketball, volleyball, wrestling and track and field activities. The researcher included school programs that focused on individual sports like gymnastics and swimming as part of their goal to study different types of athletic participation. A follow-up school visit was made by researchers to acquire participants from initial absent students. The study participants needed to be aged 13 to 18 while being members of active sports teams participating in either school or club or national competitions located in Iran. All participants were asked to give their consent to the study and consent from parents or guardians was necessary. Research participants were ineligible when they had either intellectual disability or psychotic or severe mental illness in addition to substance abuse or medical condition at risk during the study period or language communication barriers and psychiatric diagnoses. School psychologists evaluated students' mental health statuses according to existing files and reports to determine their mental disability and psychotic and other severe mental illnesses. Post-school evaluation documents from professional mental health staff contained logged assessments together with diagnoses. The evaluation files provided substance abuse information which was cross-checked during the first screening period with participants. The study established medical conditions that put participation at risk by combining subjective participant reports with documentations from their guardians or parents. The researchers determined communication ability based on their initial interactions with possible participants.

Procedure

This research utilized a correlational method for data analysis following an applied research purpose with field-based data collection methods. A selection process of schools took place for different regions (19 regions) within the city of Tehran. The researcher obtained essential coordination from the province center education department to avoid any difficulties throughout questionnaire distribution and retrieval procedures. The project used a planned two-step questionnaire distribution approach to reduce participant withdrawal. The researcher distributed questionnaires to school adolescents who received instructions for completion prior to returning to collect them at a later time. The researcher distributed the questionnaires using proper explanatory texts that contained active contact details for responses or inquiries. The researchers with colleagues later traveled back to these schools to retrieve the finalized questionnaires. The researchers conducted the research questionnaire administration directly to most of the study participants during the second stage. The

researchers personally explained questionnaire completion procedures before allowing participants to start their responses while inviting questions at any time throughout the process. The researchers executed the direct administration to standardize the process while responding to any immediate issues. Participants received equivalent instructions together with questionnaire information no matter which distribution technique they used.

The participants consented to the research before filling in the questionnaires while receiving promises of full confidentiality. Ethical considerations were taken into account in this research, in such a way that the objectives of the study were explained to the adolescents in an understandable way. Participation in the research was completely voluntary and without any coercion. They were assured that the results of the examinations and tests were completely confidential, and in this regard, the principle of confidentiality was observed. The identity information of the subjects was not recorded, and only codes were used to identify the data. The subjects had the right to withdraw from continuing the research at all stages of the research, including data collection. Informed consent was obtained from all subjects, and they were asked to sign the prepared form. Recognizing the sensitivity of self-injury, a specific protocol was established to manage potential disclosures. Prior to data collection, the research team collaborated with school psychologists and counselors to ensure appropriate support systems were in place. Participants were informed about available mental health resources, including contact information for school counselors and external mental health services. If a participant disclosed active self-injury or expressed significant distress during the study, the researchers followed a pre-determined protocol to immediately notify the school psychologist or counselor and facilitate appropriate intervention. In cases of high risk, parental/guardian notification was also considered, adhering to ethical guidelines and legal requirements. The researchers maintained a list of mental health resources that were provided to all participants after the study completion. This approach aimed to balance the need for data collection with the ethical responsibility to support participant well-being.

Tools

Demographic information questionnaire

This questionnaire was used to measure individual, social, and economic indicators (such as age, gender, field of study, and family income).

Self-injurious behaviors scale

This scale was developed by Klonsky and Glenn [14] and consists of two parts: a list of self-injurious behaviors, which includes 22 items in two responses of yes and no, and a list of items that assesses self-injury motives and measures two motives of intra-individual and inter-individual. Responses are scored on a 1 to 3 point Likert scale. Subscales of self-injury motives include emotional regulation, differentiating oneself from others, self-punishment, self-care, anti-dissociation, anti-suicide, sensation seeking, belonging to peers, proving power and toughness. Pompili, Goracci, Giordano, Erbuto, Girardi, Klonsky and Baldessarini [30] reported the Cronbach's alpha of this instrument as 0.80. The self-injurious behaviors scale has demonstrated acceptable validity in prior research [30]. In Iran, Izadi-Mazidi, Yaghubi, Mohammadkhani and Hassanabadi [12] reported the reliability through Cronbach's alpha of 0.94 and validity of this instrument.

Behavioral emotion regulation questionnaire

This questionnaire was designed by Kraaij and Garnefski [22] and is a 21-item tool that assesses adolescents' and adults' behavioral emotion regulation strategies in response to threatening and stressful life events. The Behavioral Emotion Regulation Questionnaire consists of five subscales: seeking distraction, withdrawal, actively approaching, seeking social support, and ignoring. The scoring of this questionnaire is in five-point Likert scales from score 1 (never) to score 5 (always). Considering that each subscale consists of four items, the total score of each subscale is obtained from the sum of the scores of the relevant items, which is between 4 and 20. The higher the score a subject gets in the subscales of seeking distraction, actively approaching, and seeking social support, and the lower the score in the subscales of withdrawal and ignoring, the better his/her condition is in terms of behavioral emotion regulation. The reliability and validity Persian version of this questionnaire by Cronbach's alpha method is reported in the range of 0.89 to 0.93 and through retesting in the range of 0.74 to 0.759 [31].

Cognitive emotion regulation questionnaire

This questionnaire was developed by Garnefski and Kraaij [21] and has 36 expressions and 9 subscales. The subscale evaluates positive refocusing; refocusing on planning; positive reappraisal, putting into perspective; and acceptance and non-adaptive strategies such as self-blame; blaming others; rumination and catastrophizing on a Likert scale from never = 1 to always = 5. In Iran, Hasani [32] reported the Cronbach's alpha of this questionnaire as 0.72 to 0.90.

Data analysis

To analyze the collected data and assess the status of the variables in relation to the research questions, we employed descriptive statistical methods, including

Table 1 Descriptive statistics and overview of sociodemographic background

Variable	(*n* = 456)			
	M	*SD*		
Age (years)	14.66	2.80		
Age range (years)	(13–18)			
Time Active in Professional Sport (Years)	3.4	1.0		
	n	%	χ^2	*p*
Civil status			16.02	0.001
Single	449	98.46		
Married	7	1.54		
Gender			0.12	0.70
Male	273	59.9		
Female	183	40.1		
Educational level			2.06	0.04
Middle school	152	33.33		
High school	304	66.67		
Fathers occupation			3.32	0.02
Self-employed	214	46.93		
Employed	142	31.14		
Other	100	21.93		

Table 2 The mean and standard deviation for the study sample variables

Variables	M (SD)
Behavioral Emotion Regulation	
Seeking Distraction	13.76 (1.02)
Withdrawal	14.93 (2.53)
Actively Approaching	8.37 (1.24)
Seeking Social Support	9.83 (1.32)
Ignoring	17.36 (2.04)
Total scores of behavioral emotion regulation	63.72 (7.03)
Self-Injury	
Functional self-injury	13.88 (2.09)
Behavioral self-injury	95.23 (9.54)
Total score of self-injury	109.27 (12.65)
Cognitive Emotion Regulation	
Positive Refocusing	4.00 (0.84)
Refocus on Planning	5.11 (0.98)
Positive Reappraisal	2.56 (0.34)
Putting into Perspective	1.43 (0.21)
Acceptance	2.07 (0.25)
Self-Blame	8.22 (1.06)
Other-Blame	6.30 (0.32)
Rumination	5.95 (0.56)
Catastrophizing	6.65 (0.86)
Total scores of cognitive emotion regulation	40 (4.69)

means and standard deviations. We utilized the Pearson correlation coefficient to examine the relationships between the predictor and criterion variables. Following this, we conducted regression analysis, a statistical technique used to estimate the relationships between variables. This analysis enables us to understand how the value of the dependent variable changes with variations in each independent variable while holding the other independent variables constant. Before performing the regression analysis, we conducted an ANOVA to determine the overall significance of the model. Additionally, we assessed the distribution of the data using a normality test, which confirmed that the data were normally distributed ($p = 0.15$). This finding supports the validity of our regression analysis. All data analyses were conducted using SPSS-22 statistical software.

Results

Results showed that average age of the 456 participants was 14.66 years with a standard deviation of 2.80, indicating that most participants were adolescents (see Table 1). Regarding gender, there were 183 female participants and 273 male participants. The vast majority of participants (449) were single, with only 7 participants being married. In terms of education level, 152 participants were in the middle school level, while 304 participants were in the high school level. For father's occupation, 214 participants' fathers were self-employed, 142 were employed, and 100 were categorized as "other."

Descriptive statistics for the study variables including self-injury, cognitive emotion regulation and behavioral emotion regulation and their subscales are presented in the Table 2. The mean score for self-injury was 109.27 (SD = 12.65), indicating a relatively high level of self-injury among the adolescents. The prevalence of self-injurious behaviors was assessed among the 456 adolescent athletes. A substantial proportion of participants reported engaging in self-injury behaviors related to emotional regulation ($n = 81$, "Often"). Regarding motivations for self-injury, sensation seeking ($n = 221$, "Often") and proving power ($n = 201$, "Often") were the most frequently endorsed. Other notable frequencies include

Table 3 Results of multiple regression test to predict self-injury through cognitive and behavioral emotion regulation

Predictors	β	t	sig
Cognitive emotion regulation	-0.47	-10.45	0.001
Behavioral emotion regulation	-0.54	-14.48	0.001
$R = 0.44$, $F(2,453) = 88.49$, $P < 0.001$			

Note = Dependent variable: self-injury

self-punishment ($n = 180$, "Never"), self-care ($n = 189$, "Never"), and hardiness ($n = 180$, "Never"). These findings suggest a concerning level of self-injurious behavior within this population, particularly related to emotional regulation, sensation seeking, and demonstrating a sense of power. The mean score for behavioral emotion regulation was 63.72 (SD = 7.03). The mean score for cognitive emotion regulation was 40 (SD = 4.69).

In our analysis, we controlled for several potential confounding factors that could influence the relationship between emotion regulation and self-injurious behaviors. Specifically, we accounted for the impact of prior psychiatric diagnoses, as documented in student files maintained by school psychologists, and incorporated socioeconomic status, as determined by the school's geographical location and associated demographics. Furthermore, while detailed trauma history was not collected, the exclusion criteria included severe mental illnesses, which may overlap with trauma-related disorders. Based on the Pearson's correlation coefficients, the results showed a relationship between cognitive emotion regulation and self-injury (r = -0.64, $p = 0.001$). This negative correlation indicates that lower levels of cognitive emotion regulation difficulties are associated with higher levels of self-injury. Similarly, there was a relationship between behavioral emotion regulation and self-injury (r = -0.73, $p = 0.001$). This negative correlation suggests that higher levels of behavioral emotion regulation are associated with lower levels of self-injury.

The regression model (see Table 3) was significant ($F(2, 453) = 88.49$, $p = 0.001$), with cognitive and behavioral emotion regulation explaining 42% of the variance in self-injury ($R = 0.44$). Within the model, both cognitive emotion regulation (β = -0.47, t = -10.45, $p = 0.001$) and behavioral emotion regulation (β = -0.54, t = -14.48, $p = 0.001$) were significant predictors of self-injury. Behavioral emotion regulation emerged as a stronger predictor than cognitive emotion regulation.

Discussion

This study found that participants reported a significant amount of self-injury, averaging 109.27, highlighting a substantial engagement in these behaviors, often driven by difficulties in managing emotions. Participants demonstrated varying coping strategies, reflected in average scores of 40 for cognitive emotion regulation and 63.72 for behavioral emotion regulation. Crucially, we observed strong negative correlations between both cognitive regulation (r = -0.64, $p = 0.001$) and behavioral regulation (r = -0.73, $p = 0.001$) and self-injury. This means that poorer cognitive regulation and more pronounced behavioral regulation were linked to higher instances of self-injury. Further analysis, using multiple regression, confirmed that these two emotion regulation styles accounted for 42% of the variation in self-injury, with behavioral regulation showing a particularly strong predictive effect. In essence, these results emphasize the critical role of emotion regulation interventions in supporting adolescents vulnerable to self-injury.

The present study revealed a concerning prevalence of self-injury among Iranian adolescent athletes. While self-injurious behavior can be transient, this study, conducted at a specific point in time, offers a valuable snapshot of prevalence within this population. This finding aligns with broader research indicating the presence of self-injury among youth. In this line, it is estimated that 3–7% of adolescents meet the criteria for self-injury [33]. Previous studies have shown that 32% of children and adolescents suffer from some type of anxiety disorder [34]. This suffering can be due to lack of self-confidence, low self-esteem, or feelings of hopelessness due to poor social and academic performance [35]. Studies indicate that between 30% and 50% of these cases of anxiety in adolescents are associated with another type of behavioral disorder such as self-injurious behavior, aggressive behaviors, eating disorders, and conduct disorder [36]. Furthermore, 80% of adolescents with these conditions do not receive any professional treatment or care [37]. Therefore, it is essential to prioritize attention to adolescents, particularly regarding self-injurious behaviors.

Furthermore, results of the present study indicated a significant negative relationship between cognitive emotion regulation and self-injury. This suggests that improved cognitive emotion regulation skills may serve as a protective factor against self-injury. This aligns with theoretical frameworks of self-injury, such as the experiential avoidance model [38], and the cognitive-emotional model [39, 40], which emphasize the role of poor cognitive emotion regulation in self-injury. These models posit that difficulties in cognitive emotion regulation contribute to self-injury by hindering individuals' ability to manage distressing emotions effectively.

In the specific context of adolescent athletes, the interplay between cognitive and behavioral emotion regulation and self-injury may exhibit unique characteristics [23]. While general models highlight the protective role of strong emotion regulation, the high-pressure environment of competitive sports could potentially exacerbate emotion regulation deficits [1]. Athletes may experience intense performance anxiety, pressure to succeed,

and fear of failure, which could overwhelm their coping mechanisms. Additionally, the emphasis on physical strength and emotional resilience within sports culture might discourage athletes from seeking help for emotional distress, leading to maladaptive coping strategies like self-injury. Therefore, it might be the reason that adolescent athletes may face heightened challenges in emotion regulation compared to non-athlete populations.

Furthermore, the present findings resonate with Hasking, Whitlock, Voon and Rose [40] cognitive-emotional model of self-injury. This model incorporates the role of specific cognitions about self-injury alongside emotional experience and regulation. Individuals exhibiting heightened emotional reactivity, difficulty tolerating distress, and impaired emotion regulation, coupled with a belief in their inability to resist self-injurious urges and an expectation of positive outcomes from self-injury, demonstrate a higher likelihood of engaging in these behaviors. Conversely, individuals without a history of self-injury typically possess stronger self-efficacy beliefs regarding their ability to resist such urges [40].

On the other hand, the present study found a significant negative relationship between behavioral emotion regulation and self-injury. Previous study on behavioral emotion regulation and self-injury has almost exclusively focused on the idea that poor behavioral emotion regulation are risk factors for self-injury [18, 24]. The present study showed that behavioral emotion regulation and self-injury actually have a bidirectional and inverse relationship, such that engaging in self-injury may impair emotion regulation. This finding is consistent with personal accounts of individuals with a history of self-injury who are often afraid that disclosing self-injury will damage their relationships with coaches, teammate and family [5, 41, 42]. The present finding can be explained by the theory of emotional processes in the psychophysiological arousal model [43]. Defective processes in emotion analysis can play a significant role in self-injurious behavior. Unstable, impulsive, and out-of-control emotions can lead to self-injury and suicide. Pervious systematic review studies [19, 36] identified higher rates of self-injury among individuals with unstable emotions. Therefore, it seems that behavioral regulation and attention to healthy behavioral coping styles can play a significant role in reducing self-injury. Our finding is in line with Adrian, Zeman and Veits [44] and Sim, Adrian, Zeman, Cassano and Friedrich [45]. As a result, access to behavioral and cognitive emotion regulation strategies, defined as "beliefs and behaviors to use when a person is upset," is important. Our finding, consistent with the claim of Gratz and Roemer [46] showed that after controlling for other aspects of impaired emotion regulation, a significant association with self-injury remained.

The results of the present study showed that cognitive and behavioral emotion regulation can predict the level of self-injury. Adolescents with poor emotion regulation usually report self-injury [40]. Consistent with previous research [47, 48], the present study found significant negative correlations between emotion regulation and self-injury. These findings suggest that poorer behavioral and cognitive emotion regulation is associated with increased self-injury. However, given the cross-sectional design of this study, we can only establish associations, not causal pathways. Further longitudinal or experimental research is needed to determine the direction and nature of this relationship.

In therapeutic interventions for adolescent athletes who engage in self-injury, it's beneficial to prioritize the development of stronger, more supportive relationships with coaches and peers. Specifically, fostering trust, open communication, and a sense of warmth within these key relationships can be a valuable component of the intervention [24, 49]. In addition, addressing cognitive and behavioral emotion regulation appears promising for reducing adolescent self-injury. Educational programs that frame self-injury as a maladaptive emotional regulation strategy may enhance coaches' and teammates' understanding, facilitating more effective support for adolescents struggling with emotions like fear or sadness. Furthermore, prioritizing coaches' self-care may prove beneficial. While this study confirms the predictive power of emotion regulation in relation to self-injury, further investigation is needed to elucidate the specific mechanisms and contextual factors that exacerbate the link between emotion dysregulation and self-injury [24].

This finding is consistent with previous research showing that difficulty in regulating behavioral and cognitive emotion is a predictor of self-injury [46]. According to various theories, a person who has difficulty in emotion regulation is more likely to self-injure. This claim is consistent with the experiential avoidance model [38] and general emotion regulation models [5]. Self-injury is used as a tool of maladaptive emotional expression in some adolescents. This strategy will not be effective and negative emotions will continue and even become dominant. One of the important factors in the continuation of self-injury is the belief in the inefficiency of emotion regulation. This distinction is very important clinically, because it points to the possibility of reconstructing cognitions about the effectiveness of emotion regulation as an important aspect of self-injury treatment. As a result, the present study has the clinical benefit value of emotional regulation in an adolescent athlete.

While this study provides valuable insights into the relationship between emotion regulation and self-injury among Iranian adolescent athletes, it is important to acknowledge the limitations regarding generalizability.

The findings may not be directly applicable to non-athlete adolescents or those from different cultural backgrounds. Cultural variations in emotion regulation strategies and self-injury motivations could significantly influence the observed associations. For example, the unique stressors and cultural norms within the Iranian athletic context may contribute to specific patterns of emotion regulation and self-injury that differ from those seen in other populations. Therefore, caution is warranted when extrapolating these results to broader populations. Future research should explore these relationships in diverse samples to enhance the generalizability of the findings. The current study suggests that coaches and teammates could play a role in intervention efforts, given their frequent interaction with adolescent athletes. However, it's important to acknowledge that this suggestion is based on the context of the athletic environment rather than direct empirical evidence within this study. The role of parental influence, school-based mental health services, and professional therapeutic interventions was not explicitly examined, which limits our understanding of the broader support network. Future research should investigate the efficacy of multi-faceted intervention approaches, including the involvement of parents, school counselors, and mental health professionals, to develop comprehensive and effective support systems for adolescent athletes at risk of self-injury. A more thorough exploration of these diverse intervention strategies would enhance the practical implications of our findings and inform the development of targeted support programs. Furthermore, third limitation of this study is the absence of a confirmatory factor analysis to re-evaluate the structural validity of the Self-Injurious Behaviors Scale, Behavioral Emotion Regulation Questionnaire, and Cognitive Emotion Regulation Questionnaire within our specific adolescent athlete population. While these scales have demonstrated adequate validity in previous research, including studies with adolescent samples, we did not specifically assess their factor structure within this unique group. Therefore, while we relied on established validity from prior studies, future research should consider examining the factor structure of these instruments within adolescent athlete populations to ensure their applicability and accuracy in this context.

Conclusion

In conclusion, this study reveals a concerning prevalence of self-injurious behaviors among adolescent athletes in Tehran and underscores the significant role of emotion regulation in these behaviors. The finding that self-injury can be predicted by behavioral and, to a lesser extent, cognitive emotion regulation aligns with previous studies highlighting the predictive power of psychological variables in self-injury. While the present study focused on predicting self-injury, future research could explore the reciprocal relationship, examining the impact of self-injury on various aspects of mental health, including identity development, pain thresholds, parental relationships, as well as its complex associations with resilience, emotion awareness, and anxiety. These findings emphasize the need for interventions targeting emotion regulation skills to mitigate self-injurious behaviors within this vulnerable population of young athletes.

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Author contributions
E.N: designed the study. E.N: collected the data. E.N: statistical analysis and revised the manuscript. E.N: wrote the main manuscript text.

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Data availability
The datasets used during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The protocol for this study was registered in the Farhangian University (Tehran, Iran) in Iran and was approved by the ethics committee of the university with the code IR. 1403.128, which was performed under the ethical principles laid down in the seventh and current edition (2013) of the Declaration of Helsinki. Written informed consent was obtained from all subjects and/or their legal guardian(s).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Clinical trial number
Not applicable.

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