STUDIA UBB EDUCATIO ARTIS GYMN., LXXI, 1, 2026, pp. 21-33
(RECOMMENDED CITATION)
DOI:10.24193/subbeag.71(1).02

Self-compassion as a Protective Mediator Between Childhood Adversity and Stress in Combat Athletes

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Article history: Received 2026 January 28; Revised 2026 February 27; Accepted 2026 March 03; Available online 2026 March 30.; Available print 2026 April 30
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ABSTRACT. Introduction: Athletes who participate in combat sports commonly experience intense physical and interpersonal stressors. Assessing and regulating stress are essential for performance and well-being in these environments. Although both ACE and self-compassion are independently associated with athletes' psychological functioning, few empirical studies have examined how these factors jointly influence perceived stress in combat sports athletes. **Objective:** This study examined the relationships among adverse childhood experiences (ACEs), self-compassion, and perceived stress in combat sport athletes, and tested whether self-compassion mediates the ACE - stress association. **Method:** In a correlational design, combat athletes (N = 141) completed validated measures of ACEs, self-compassion, and perceived stress. Internal consistency was assessed, correlations were computed, and a multiple regression predicted perceived stress from ACEs and self-compassion. A nonparametric bootstrap mediation (B = 5,000) evaluated the indirect effect ACE → self-compassion → stress. **Results:** Regression showed ACEs (b = 0.50, p = .030) positively and self-compassion (b = −0.44, p < .001) negatively predicted stress (R^2 = .303). Mediation indicated a significant indirect effect (a × b = 0.34, 95% CI [0.10, 0.64]), consistent with partial mediation. **Conclusion:** Self-compassion was an important predictor and a significant mediator, suggesting self-compassion-based interventions may mitigate stress in combat athletes with ACE histories. Findings align with prior evidence that ACEs elevate stress vulnerability while self-compassion supports adaptive regulation in sport contexts.

Keywords. *adverse childhood experiences, self-compassion, perceived stress, combat sports, athletes.*

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INTRODUCTION

Combat sports create a unique psychological and physiological context, subjecting athletes to intensities and interpersonal dynamics rarely encountered in other athletic disciplines. Unlike traditional team or individual sports, combat involves structured physical confrontation where the explicit objective, within regulated boundaries, is to cause physical harm to an opponent (James et al., 2018). This environment encompasses a broad spectrum of contact, from controlled recreational sparring to professional full-contact matches that permit high-impact strikes to the head and torso (K-1 Hungary, 2014). For the practitioner, this creates a double pressure system, consisting of a high-intensity physical threat and psychological demand. Crucially, objective physical danger does not unilaterally dictate the athlete's experience; rather, in this field of sport, the interpretation of intent and physical threat makes cognitive assessment more volatile than in non-combative disciplines. The subjective impact of these stressors is strongly mediated by how the individual interprets and regulates their internal state (Slimani et al., 2018). Understanding these dynamics is strategically vital, as the athlete's ability to manage this "interpreted threat" is a primary determinant of both competitive longevity and peak performance. To dissect this regulation, we must evaluate the internal neurobiological mechanisms that govern the stress response.

Analyzing the complexities of elite athlete behavior under pressure requires the synthesis of three specific theoretical pillars: General Adaptation Syndrome (Selye, 1956, 1976), Polyvagal Theory (Porges, 2001, 2007), and Cognitive Appraisal (Lazarus & Folkman, 1984). These frameworks illuminate how an athlete transitions from physiological activation to either peak performance or breakdown. Stress, from an evolutionary perspective, serves to mobilize energy for survival (Bereczkei, 2000). Selye (1956, 1976) defined this as a nonspecific reaction to external demands, distinguishing between *eustress* (the performance-enhancing form of activation) and *distress*. When activation becomes chronic, it results in the maladaptive state described by Sanderson (2018), characterized by elevated cortisol, oxidative stress, and accelerated physiological aging (Aschbacher et al., 2013).

Porges' (2001, 2207) Polyvagal Theory expands this by highlighting the "heart–brain connection" and the critical role of the "Vagus Nerve System" in regulating emotional states. Success in combat depends on autonomic resilience, the ability of the autonomic nervous system to oscillate rapidly between "fight–flight" mobilization and the "social engagement" required for tactical decision-making. The chronic distress and cortisol elevation (General Adaptation Syndrome) identified by Selye (1956, 1976) essentially represent a failure of this autonomic resilience. Finally, biological activation is filtered through cognitive evaluation. Lazarus and Folkman (1984) argue that the distinction between a "threat" and

a "challenge" determines success; if an athlete perceives a match as an uncontrollable threat, they suffer heightened tension that disrupts performance. While universal, these biological systems are not static; they are frequently calibrated by an individual's developmental history and "neurobiological sensitization" resulting from early-life experiences.

Adverse Childhood Experiences (ACEs) represent a critical, yet frequently overlooked, variable in the trajectory of sport performance. These early-life adversities, ranging from violence to neglect, fundamentally alter the neurobiological systems responsible for stress regulation, specifically the hypothalamic–pituitary–adrenal (HPA) axis and the amygdala (Felitti et al., 1998). Interpersonal trauma during childhood often creates a maladaptive cognitive architecture, impairing emotional regulation and secure attachment, which manifests in adulthood as complex post-traumatic stress or substance abuse (Bennett, 2022; Peng & Ishak, 2025). Even among highly trained performers, high ACE scores correlate with increased perceived stress and significant psychiatric risks (Brown et al., 2020). Athletic risks of ACE exposure are several: heightened perceived stress and acute reactivity to competitive pressure (Brown et al., 2020), elevated risk of emotion regulation difficulties and problematic substance use (Bennett, 2022; Powless et al., 2025), increased prevalence of depression and suicide attempts compared to athletes with lower ACE scores (Powless et al., 2025).

However, early adversity does not necessitate a path of dysfunction. Many individuals exhibit post-traumatic growth, finding increased strength or purpose through their history (Eger, 2017). Furthermore, sport can serve as a potent vehicle for resilience-building (Norris & Norris, 2021). The variability in these outcomes suggests that specific psychological resources can interrupt the HPA-axis dysregulation caused by ACEs, reshaping the trajectory from trauma toward performance.

Self-compassion has continued to emerge as an important psychological resource in athletic contexts, supporting athletes' emotional resilience and their ability to navigate stressors effectively (Frentz et al., 2025; Magnus et al., 2010; Mosewich, 2020; Mosewich et al., 2011; Mosewich et al., 2013; Semenchuk et al., 2018). Athletes high in self-compassion tend to frame their sport experiences through themes such as balance, growth, and transformation, reflecting its influence on identity development and meaning-making in sport (Frentz et al., 2025). Defined by Neff's (2003, 2023) triad of self-kindness, common humanity, and mindfulness, it provides a trainable, non-pathological alternative to traditional clinical models. A qualitative scoping review by Kullman et al. (2025) highlights that both the "Yin" (gentle) and "Yang" (fierce) expressions of self-compassion are vital. In the "toughness" culture of combat sports, the "Yang" or fierce expression is particularly strategic, providing the protective and motivational qualities necessary to maintain performance without falling into the trap of self-critical rumination

(Eke et al., 2025). The efficacy of self-compassion as a regulatory buffer is well-supported: high self-compassion improves parasympathetic flexibility, leading to better heart rate variability (HRV) reactivity and faster emotional recovery after failure (Ceccarelli et al., 2019; Zhang et al., 2023), athletes with higher levels of self-compassion are more likely to recommit to training goals following a sports injury and display lower fear of failure (Semenchuk et al., 2018; Doorley et al., 2022).

Intervention research consistently demonstrates that self-compassion is trainable. The RESET program significantly increased athletes' self-compassion, reduced self-criticism, rumination, and worrying about setbacks and improved perceived performance relative to control participants (Kuchar et al., 2023; Mosewich et al., 2013). Imagery-based interventions have also been effective; athletes who completed Compassion-Focused Imagery exercises showed improvements in emotion regulation, self-acceptance, and overall psychological well-being (Carson Sackett et al., 2024). By fostering a balanced stance toward internal experiences, self-compassion acts as a mechanism that can mitigate the neurobiological sensitization caused by early trauma, making it an essential focus for the athletic population.

Despite the clear evidence linking ACEs to stress and self-compassion to recovery, a significant research gap exists regarding *combat athletes* (McLoughlin et al., 2020). This population faces unique psychological pressures and a culture of "toughness" that often makes athletes less likely to acknowledge or seek support for mental health challenges (McLoughlin et al., 2020). Self-compassion is therefore a superior strategic intervention because it is a self-administered, non-pathological resource that aligns with the athlete's need for autonomy.

Goal and Hypotheses

This study models the relationship between adverse childhood experiences and self-compassion as an internal regulatory resource in this specialized group. Based on the synthesis of neurobiological and psychological evidence, we test the following hypotheses:

• **H1:** Adverse Childhood Experiences (ACEs) will be positive predictor of perceived stress, reflecting the long-term impact of early-life neurobiological sensitization, and self-compassion will be negative predictor perceived stress, serving as a robust protective factor against athletic distress.

• **H2:** Self-compassion will act as a significant mediator in the relationship between ACEs and perceived stress, suggesting that developing compassionate regulatory resources can interrupt the maladaptive outcomes typically associated with a history of early-life adversity.

MATERIALS AND METHODS

Participants

The sample comprised 141 athletes (112 men, 29 women) aged 18–67 years (M = 34.83, SD = 12.01). Monthly training sessions ranged from 1 to 100 (M = 9.16, SD = 10.06), and years of practice from 1 to 45 (M = 13.05, SD = 11.46).

Measures

Perceived Stress was assessed using the 10-item Hungarian adaptation of the Perceived Stress Scale (PSS; Cohen et al., 1983; Stauder & Konkolÿ Thege, 2006). The PSS-10 assesses appraised stress over the past month with 10 items (e.g. 4th item "In the last month, how often have you felt confident about your ability to handle your personal problems?") rated on a 5-point Likert scale: 0 = *Never*, 1 = *Almost never*, 2 = *Sometimes*, 3 = *Fairly often*, 4 = *Very often*. Items were summed to a total score (0–40) after reversing the reverse-score items (4, 5, 7, 8). The scale is intended for relative comparisons (it is not a diagnostic instrument with official cut-offs). The scale's reliability was good in this sample (α = .87).

Self-Compassion was assessed with the 12-item Hungarian adaptation of the Self-Compassion Scale – Short Form (SCS-SF; Póka et al., 2024; Raes et al., 2011). The SCS-SF measures each of the components of self-compassion (i.e., self-kindness, self-judgment, common humanity, isolation, mindfulness, over-identification) with two items (e.g., "I try to see my failings as part of the human condition"). Items were rated on a 5-point scale (*1 = almost never*, *5 = almost always*). The six items that measure the negative dimensions of self-compassion are reverse coded. Scores for self-compassion were calculated by summing the scores ratings on items measuring self-compassionate behaviors (i.e., self-kindness, common humanity, mindfulness) and reverse coded scores on items measuring uncompassionate behaviors towards the self (i.e., self-judgment, isolation, over-identification). The scale had good reliability in this sample (α = .80).

Adverse Childhood Experiences (ACEs) were measured with ACE questionnaire, which is a 10-item yes/no checklist (e.g. "Prior to your 18th birthday, did an adult or person at least 5 years older than you ever touch you in a sexual way, or attempt/actually have oral, anal, or vaginal intercourse with you?") covering exposure to abuse/neglect and household dysfunction before age 18. The ACE score is the sum of "Yes" responses (0–10). Content domains are: emotional, physical, and sexual abuse; emotional and physical neglect; parental separation/divorce; caregiver treated violently; household substance use, mental illness/attempted suicide, and incarceration.

Research Design and Procedures

This cross-sectional, quantitative, correlational study examined perceived stress and its associations with adverse childhood experiences (ACEs) and self-compassion among combat sport athletes. The study was conducted in accordance with the Code of Ethics of the American Psychological Association. After voluntarily agreeing to participate and providing online consent, participants completed an online structured survey using Google Forms.

To ensure adequate sensitivity, we conducted a priori power analyses using G*Power (v3.1.x) (Faul et al., 2009). For the multiple regression (predicting perceived stress from ACE and self-compassion), assuming a medium effect of $f^2 = .15$, $\alpha = .05$, with two predictors, the required sample size is N = 68 to achieve $1-\beta = .80$ power. Our sample (N = 141) therefore exceeded the a priori requirement. For the mediation (PROCESS Model 4) testing the indirect effect of ACE on stress via self-compassion with bias-corrected bootstrap, the required N depends on the sizes of a and b paths. Using the planning tables from Fritz & MacKinnon (2007), the recommended sample size is $N \approx 116$ for $1-\beta = .80$. Our N = 141 thus provided $1-\beta > .80$ for detecting the indirect effect.

Data were analyzed using IBM SPSS Statistics. Internal consistency of the scales was assessed using Cronbach's alpha coefficients. For interpretation we followed George & Mallery's (2003) recommendations. Descriptive statistics and Pearson correlations were computed for all study variables. Prior to modeling, we inspected assumptions for linear regression (linearity, homoscedasticity, approximate normality of residuals, and collinearity diagnostics). In order to test our first hypothesis, multiple linear regression analysis was conducted, and F statistics with their significance level, R^2, and β were reported.

Mediation analyses were also conducted in IBM SPSS Statistics with the PROCESS macro (version 4.0), Model 4, to test a simple mediation in which adverse childhood experiences (ACE; X) predict perceived stress (Y) indirectly via self-compassion (M). We estimated the total effect (c), the a-path (X→M), the b-path (M→Y | X), and the direct effect (c′; X→Y | M) following standard SPSS/PROCESS procedures. The indirect effect (a × b) was estimated via non-parametric bootstrap (B = 5,000) with bias-corrected 95% confidence intervals; mediation was concluded when the interval did not include zero, consistent with PROCESS guidance. All coefficients are reported as unstandardized b (primary) with SE, *t*, *p*, and 95% CIs, and standardized β (for comparability). Effects were considered significant at level $\alpha = .05$.

RESULTS

Descriptive Statistics and Correlations

Descriptive statistics and correlations between main variables are presented in Table 1.

Table 1. Descriptive statistics and correlations between investigated variables (N = 141)

Variable	Min.	Max.	M	SD	1.	2.	3.
1. Perceived Stress	0	34	14.81	7.02	-		
2. Self-Compassion	18	54	39.17	7.96	-.53**	-	
3. ACE	0	8	2.59	2.24	.27**	-.22**	-

Notes: PSS-10 = Perceived Stress; SCS-SF = Self-Compassion; ACE = Adverse Childhood Experiences. $p < .01$ (**), $p < .05$ (*)

Perceived stress scores averaged 14.81 (SD = 7.02), self-compassion averaged 39.17 (SD = 7.96), and ACE scores averaged 2.59 (SD = 2.24). Pearson correlations revealed that perceived stress was positively associated with ACE ($r = .27$, $p = .001$) and negatively associated with self-compassion ($r = -.53$, $p < .001$). ACE was also negatively correlated with self-compassion ($r = -.22$, $p = .01$).

Regression Analysis

To test the first hypothesis, a multiple regression analysis was conducted, in order to predict perceived stress from ACE and self-compassion. The model was significant, $F(2, 138) = 30.02$, $p < .001$, explaining 30.3% of the variance ($R^2 = .303$, adjusted $R^2 = .293$, N = 141). ACE was a positive predictor (b = 0.50, SE = 0.23, $p = .030$), and self-compassion was a negative predictor (b = −0.44, SE = 0.06, $p < .001$). Standardized coefficients indicated that self-compassion ($\beta = -.49$) had a stronger effect than ACE ($\beta = .16$). The results of regression analyses are presented in Table 2. Based on these results, our first hypothesis was confirmed.

Table 2. Multiple Regression Predicting Perceived Stress from ACE and Self-Compassion (N = 141)

Outcome: perceived stress	b	*SE*	*t*(138)	*p*	β
Self-compassion	-.44	.06	-6.77	<.01	-.49
ACE	.50	.23	2.20	.03	.16

Note. Unstandardized coefficients (b) with standard errors (SE), the significance level (*p*) and standardized coefficients (β) are shown.
Dependent variable: Perceived Stress (PSS-10 total).
Predictors entered simultaneously: ACE total and Self-Compassion (SCS-SF total).
Assumption checks (linearity, homoscedasticity, approximate normality of residuals, and collinearity) were satisfactory.

Mediation Analysis

A mediation model was tested to examine our second hypothesis, whether self-compassion mediates the association between adverse childhood experiences (ACEs) and perceived stress among elite combat sport athletes. A non-parametric bootstrap mediation analysis (B = 5,000; bias-corrected 95% CI) indicated that self-compassion partially mediated the association between adverse childhood experiences (ACEs) and perceived stress.

The total effect of ACE on stress was significant (c = 0.84, *SE* = 0.19, $t(139) = 4.42$, $p < .001$), and this effect remained significant but was reduced when the mediator was included ($c' = 0.50$, *SE* = 0.23, $t(138) = 2.18$, $p = .031$). ACEs significantly predicted lower self-compassion (a = –0.23, *SE* = 0.09, $t(139) = -2.53$, $p = .013$), and self-compassion significantly predicted lower perceived stress when controlling for ACEs (b = –0.44, *SE* = 0.06, $t(138) = -6.84$, $p < .001$).

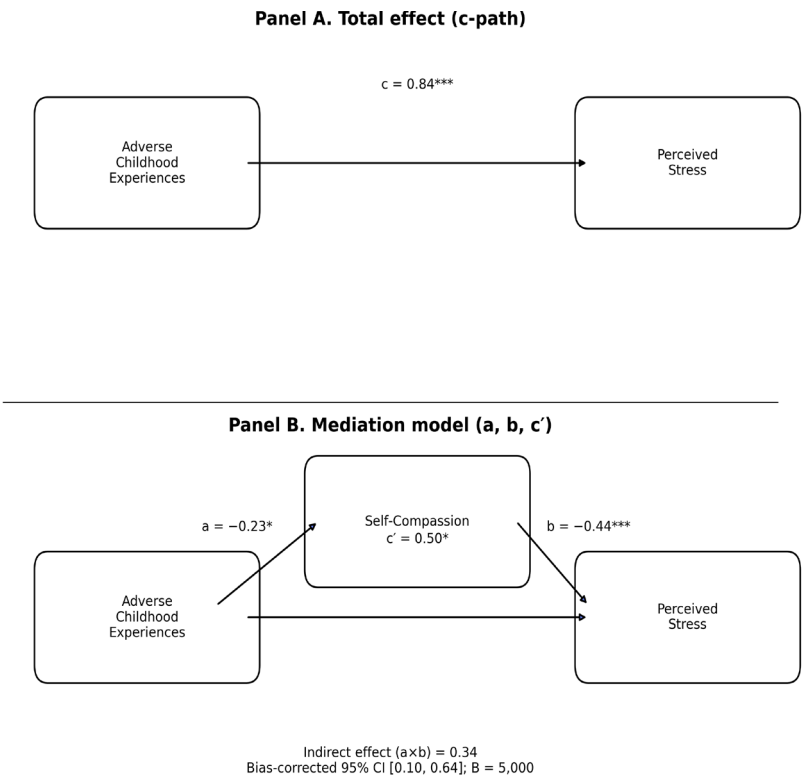

Fig. 1. Two-panel mediation diagram for the association between adverse childhood experiences (ACE) and perceived stress in elite combat athletes.

Notes. Unstandardized coefficients (**b**) are displayed on arrows; asterisks mark significance (p < .05, *p < .01, **p < .001). Sample size: **N = 141**.

The indirect effect (a × b = 0.34) was significant, as the 95% confidence interval did not include zero [0.10, 0.64], indicating partial mediation. These results (also, presented in Table 3 and Figure 1) demonstrate that self-compassion is a psychological mechanism, a protective mediator between adverse childhood experiences and perceived stress among combat sport athletes.

Table 3. Results of mediation analysis (N = 141)

Path	Effect (b)	*SE*	*t*(df)	*p*	95% CI	β	Interpretation
a: ACE à SC	-0.23	0.09	-2.53 (139)	.013	[−0.41, −0.05]	-.22	ACE predicts lower SC
b: SC à Stress (ACE-controlled)	-0.44	0.06	-6.84 (138)	<.001	[−0.56, −0.32]	-.49	SC predicts lower stress
c: ACE à Stress (total)	0.84	0.19	4.42 (139)	<.001	[0.47, 1.21]	.27	ACE predicts higher stress
c': ACE à Stress (direct; SC-controlled)	0.50	0.23	2.18 (138)	.031	[0.05, 0.96]	.16	Reduced effect but significant
Indirect (a x b)	0.34	-	-		[.10, .64]	.11	Significant mediation

Notes: SC – Self-Compassion; ACE – Adverse Childhood Experience

DISCUSSION

General Discussion

The present study examined the relationships among adverse childhood experiences (ACEs), self-compassion, and perceived stress in combat sport athletes. Consistent with prior research on trauma and stress regulation (Felitti et al., 1998; Brown et al., 2020), ACEs were positive predictors for perceived stress, highlighting the enduring impact of early adversity on stress vulnerability in high-pressure environments.

Self-compassion emerged as a robust protective factor, demonstrating both a strong direct effect on perceived stress and a significant mediating role in the ACE–stress link. These findings align with previous evidence that self-compassion fosters adaptive coping, reduces rumination, and enhances emotional recovery in athletes (Ceccarelli et al., 2019; Doorley et al., 2022; Kuchar et al., 2023). The negative correlation between ACE and self-compassion suggests that early adversity may undermine the development of self-kindness and emotional balance, thereby increasing susceptibility to stress.

The mediation results underscore the potential of self-compassion as a mechanism through which the negative effects of ACEs on stress can be mitigated. While ACEs exerted a residual direct effect, indicating that other pathways (e.g.,

neurobiological sensitivity, emotion regulation deficits) may also contribute, the indirect effect via self-compassion was substantial. This supports the integration of compassion-based interventions in athlete mental health programs, particularly for those with trauma histories.

Limitations and Future Directions

The cross-sectional design precludes causal inference, and self-report measures may be subject to recall bias. Future research should employ longitudinal or experimental designs to confirm the mediating role of self-compassion and explore additional moderators (e.g., fear of self-compassion, coping styles). Examining physiological stress markers (e.g., cortisol, HRV) alongside psychological variables would provide a more comprehensive understanding of stress regulation in combat athletes.

CONCLUSIONS

Combat sports impose unique stress demands due to their inherently aggressive and high-risk nature (James et al., 2018; Slimani et al., 2018). In our study, self-compassion emerged as a robust protective factor, demonstrating both a strong direct effect on perceived stress and a significant mediating role in the ACE–stress link. Based on these results, enhancing self-compassion in this population is crucial, may not only buffer stress but also promote resilience and performance stability under pressure. Brief interventions such as mindfulness-based self-compassion training have shown promise in collegiate athletes (Kuchar et al., 2023) and could be adapted for combat sport contexts.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

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