ALEXITHYMIA AND INJURY ANXIETY IMPEDE INJURY RECOVERY: EVIDENCE FROM HIGH-PERFORMANCE ATHLETES

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Abstract:

This study examined the relationship between alexithymia, sport injury anxiety, and injury recovery outcomes in athletes. A sample of 57 high-performance athletes (30 females) completed the Toronto Alexithymia

Scale, Sport Injury Anxiety Scale, and Return to Sport after Serious Injury Questionnaire. Multiple regression analysis showed that difficulties in identifying feelings (a component of alexithymia), and sport injury anxiety significantly predicted negative recovery outcomes (return concerns), together explaining 27.7% of variance. However, neither alexithymia nor injury anxiety predicted positive recovery outcomes (renewed perspective), and both were unrelated to injury risk. The prevalence of alexithymia in this sample was approximately 20%, which is notably higher than general population estimates (~10%). This study provides preliminary evidence that emotion-related traits like alexithymia and contextual anxiety measures may play important roles in sport injury recovery processes, highlighting potential targets for psychological intervention during rehabilitation.

Keywords: *sport injury, return to sport, emotion, personality, high-performance athletes, retrospective assessment*

Introduction

While the importance of stable individual differences has been recognised in sport injury psychology (Andersen & Williams, 1988; Brewer, Andersen, & Van Raalte, 2002; Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998), the study of personality traits influencing athlete's responses to injury and its outcomes is still in its infancy (Brewer, 2010; McKay, Rollo, Dillon, & Prapavessis, 2022). Our study aims to address this gap by exploring if alexithymia and sport injury anxiety affect athlete's self-assessed injury recovery. We begin by presenting the role of personality in contemporary sports injury models and reviewing the relevant empirical evidence. Then we outline the rationale for studying alexithymia and sport injury anxiety in injury recovery setting.

Psychology of sports injuries

Sport injury is defined as a medically recognised damage to bodily structure or function as a consequence of sport participation that requires absence from training and/or competition (Kerr, Comstock, Dompier, & Marshall, 2018). Beyond physical damage, injuries are now recognised as psychological events influenced by individual differences, from their occurrence to recovery (Arvinen-Barrow & Walker, 2013; McKay, 2022).

Sport injuries occur within a complex training and competition environment and are holistically shaped by multiple characteristics including training quality, programme design, and performance goals (Gabbett, 2016). Moreover, different sports present with different injuries and unique recovery challenges (Rice, et al., 2019). Further, rehabilitation quality varies considerably across settings and performance levels (Ardern, et al., 2016). Competitive level can influence both the pattern and severity of injuries as well as their psychological impact, with elite athletes potentially facing different demands than recreational participants (Jacobsson, et al., 2013). While acknowledging these important

contextual factors, this paper focuses specifically on individual personality traits that influence injury experiences across different training contexts and performance levels.

Three theoretical models guide most sport injury psychology research. The Stress-Injury Model (SIM; Andersen & Williams, 1988; Williams & Andersen, 1998) highlights the role of stress in increasing injury risk and identifies personality traits that amplify stress responses. The Integrated Model (Wiese-Bjornstal, et al., 1998) extends the SIM to post-injury phases, showing how personal and situational factors interactively shape cognitive appraisals, emotional responses, and recovery outcomes. The Biopsychosocial Model (Brewer, et al., 2002) further emphasises that biological, psychological and socio-contextual factors influence rehabilitation success via intermediate biological outcomes. While SIM focuses on injury occurrence, the latter two models address injury recovery, with all three recognising that personality traits influence the entire injury experience from risk through rehabilitation outcomes.

Empirical studies on personality and injury

Studies have addressed the predictive potential of psychological factors for sports injury risk, especially the traits suggested by the SIM. In a review of 45 studies examining 20 psychological variables, approximately two-thirds identified significant associations with injury (Appaneal & Habif, 2013). Since our focus is on injury recovery, in this summary we will concentrate on stable personality traits (vs. states such as mood) conceptually linked to stress response, coping, and management. Our analysis centres on emotion-related traits most relevant to the injury recovery experience. We focus specifically on traits that could directly shape cognitive appraisals and emotional responses to injury (such as anxiety), rather than traits that might influence recovery only indirectly through behaviour (such as sensation seeking, which affects injury risk through increased risk-taking).

Anxiety and locus of control (LoC) received the most research attention. In addition, there is some indirect evidence that neuroticism is important in the sports injury context, but studies examining that relationship directly are lacking (McKay, et al., 2022). Studies of LoC show mixed results, with both internal and external LoC predicting injury risk in some studies, but others failed to register a significant relationship (Appaneal & Habif, 2013; McKay, et al., 2022). In contrast, anxiety (especially the competitive variant) has consistently been shown to increase the risk of injury (Appaneal & Habif, 2013; Cagle, Overcash, Rowe, & Needle, 2017; Ford, Ildefonso, Jones, & Arvinen-Barrow, 2017; McKay, et al., 2022), and its potential to influence injury recovery and return to play by shaping athlete's cognitive appraisals at various stages has been recognised (Ford, et al., 2017). However, some studies fail to find a significant relationship to injury risk (e.g., Devantier, 2011; Eckerman, Svensson, Edman, & Alricsson, 2019) and even when the relationship has been found, anxiety alone typically has small predictive power (Ford, et al., 2017). This aligns with the theoretical perspective suggesting complex and multifaceted relationship between psychological traits and sport injuries (Williams & Andersen, 1998). Some researchers suggest that using the context-specific anxiety measures (i.e., sport injury anxiety vs. general anxiety) could improve predictive power (Rex & Metzler, 2016).

In contrast to injury risk, personality has rarely been investigated in relation to injury recovery. Brewer's review (2010) of psychological factors influencing sports injury rehabilitation outcomes identified only one study examining personality in relationship to recovery outcomes—„a composite of hypochondriasis and hysteria"—plus several studies showing a positive relationship between internal health-injury-related locus of control and recovery. Recent research remains limited. One study found that openness to experience (but no other Big Five trait) and internal locus of control predicted the return-to-play composite in previously injured athletes from NCAA Division I Intercollegiate athletic teams (Osborne & Doty, 2022). Another study by Manko et al. (2024) found that all Big Five traits were related to injury perception, with different patterns for high vs. low-risk sports athletes. Finally, in a study of Slovene athletes surgically treated for knee injuries (Masten, Stražar, Žilavec, Tušak, & Kandare, 2014), emotional lability and „masculinity" (consisting of neuroticism and calmness) predicted a variety of psychological responses to injury, while extraversion did not.

A self-determination theory review of psychological factors associated with post-injury return to sport (Ardern, Taylor, Feller, & Webster, 2013) found tentative evidence that positive emotional responses were related to better recovery outcomes (higher rate of return, faster return, higher level of play after return). This evidence supports the hypothesis that emotion-related traits hold the most promise for predicting injury recovery. Together, current studies on injury risk and recovery suggest that emotion-related traits generally and sport injury anxiety specifically hold the most promise to predict recovery outcomes.

Why alexithymia?

Alexithymia („no words for feelings") encompasses difficulties in identifying, reflecting on, regulating, and verbally communicating emotional states (Taylor, 2000). These cognitive-experiential deficits

further impair interpersonal emotion regulation by preventing the person from relying on other people to alleviate difficult emotional experiences.

Alexithymia is notably frequent in people with various psychiatric conditions (see e.g. Taylor, Bagby, & Parker, 1999), and somatic diseases with a suspected psychological component (see e.g. Holmes, Marella, Rodriguez, Glass, & Goerlich, 2022). Interestingly, recent studies have found high rates of alexithymia among athletes, a population typically conceived as „healthy adults" (Proenca-Lopes, et al., 2022a), especially high-performance athletes in confrontational (Proenca-Lopes, et al., 2022b) and high static-dynamic sports (Graham, Boat, Cooper, & Kinrade, 2025).

Alexithymia has been linked to high-risk sport participation, suggesting that high-alexithymic individuals derive emotion regulation benefits from activities that provide unambiguous frameworks for recognising and expressing emotions (Roberts & Woodman, 2015). Woodman and colleagues (Woodman, Le Scanff, & Luminet, 2020) extended this argument to sports performance in general, suggesting that sport participation offers highly alexithymic individuals an opportunity to experience and control anxiety with a clarity impossible to achieve in everyday life, contributing to their overall well-being. There is some evidence to this claim: for example, Woodman and Welch (2021) showed that anxiety was reduced in extreme endurance runners post-running, but only if they were high on alexithymia, suggesting that endurance running provided an emotion regulation function.

In our view, the paradox that alexithymic individuals may rely on sport for emotional clarity suggests that alexithymia could predict recovery difficulties when injury removes this coping mechanism.

Study goal

The goal of this study was to explore the relationship of alexithymia as a personality trait indicative of challenges in emotion regulation and sport injury anxiety to injury recovery outcomes. Based on existing theory and research about alexithymia in sport (Roberts & Woodman, 2015; Woodman, et al., 2020; Woodman & Welch, 2021), we propose that if athletes rely on sport participation to understand and regulate their emotional landscape, an injury not only arouses various emotions requiring regulation (Weinberg & Gold, 2023) but takes away the primary means of emotion regulation. We hypothesise that this could lead to two possible outcomes while favouring the former: high-alexithymic athletes might experience hindered progress in injury recovery and return to sport, or alternatively, they might be highly motivated to recover quickly to regain their primary method of emotion regulation. To our knowledge, this is the first study investigating alexithymia in the context of sport injuries. For sport injury anxiety, we aim to investigate if the importance of anxiety for injury risk extends to the post-injury phase, by using Rex and Metzler's (2016) contextually specific sport injury anxiety scale.

Method

Sample

We recruited a convenience sample of 61 athletes (31 females): 40 futsal (male) and football (female) players and 21 combat sport athletes (judo and mixed martial arts). This selection represents athletes of both genders in high-contact team and individual sports with high injury rates (Kujala, et al., 1995). Mean training load in our sample was 13.3 hours/week (SD = 5.37), and mean sport experience was ~11 years (M = 136.5 months, SD = 63.6). Among football and futsal players, most were members of their respective national teams (82.5%) at the time of participation, and 92.5% had been national team members at some point in their careers. Among combat athletes, 50% were national-level and 40% international-level athletes.

Athletes were asked to report all medically recognised injuries that required absence from training and/or competition for at least seven days. Inclusion criteria were: (1) being active competitive athletes, (2) being of minimum age of 15 years per Ethical guidelines of the Serbian Psychological Society, and (3) the history of at least one medically recognised injury requiring ≥ 7 days absence from training/competition. Four participants were excluded: three reported no injuries meeting inclusion criteria and one participant was underage. The final sample consisted of 57 athletes (30 females), aged 15 to 32 years (M = 23).

Instruments

Toronto alexithymia scale (TAS20; Bagby, Parker, & Taylor, 1994) was used for assessing alexithymia. TAS is a 20-item scale grouped in three indicators: identifying emotions (five items), describing emotions (seven items), and externally oriented thinking style (eight items). We used the adapted Serbian version of the TAS (Trajanović, et al., 2014). Participants responded on a 1-5 Likert scale. We opted to calculate the mean scores for each indicator instead of summary scores to facilitate comparison. We also calculated summary total scores in order to compare alexithymia prevalence in the population of athletes with alexithymia prevalence in the general population.

Sport injury anxiety scale (SIAS; Rex & Metzler, 2016) was used to measure general injury anxiety. SIAS consists of 21 items grouped in seven subscales (losing athletic ability, being perceived as weak, pain, letting down important others, reinjury,

losing social support, impaired self-image). Each item was graded on a five-point Likert scale. The SIAS was back-translated to Serbian for this study. We calculated mean total score, and mean score for each subscale.

Recovery outcomes were measured with the Return to Sport after Serious Injury Questionnaire (RSSIQ; Podlog & Eklund, 2005) consisting of 15 items graded on a 7-point Likert scale and grouped in two indicators: return concerns (eight items) and renewed perspective (seven items), indicating negative and positive outcomes, respectively. The RSSIQ was also back-translated to Serbian for this study. Participants were instructed to respond to RSSIQ with respect to their most serious injury. Mean scores were calculated for each outcome separately.

Procedure

After providing informed consent, participants first provided socio-demographic information and reported on their sport experience and weekly training load, and then reported on their injuries (frequency, type, severity), after which they completed the RSSIQ, SIAS, and TAS-20 (in that order). Athletes were tested individually, and they completed the questionnaires either online (n = 22) or in printed form (n = 39), which took approximately 15-20 minutes to finish.

The study was approved by the Institutional Review Board of the University of Belgrade – Faculty of Sport and Physical Education (#02-757/25-2). All data, supplementary tables and study materials are available on OSF (https://osf.io/bsnjq/).

Data analysis

Descriptive statistics and Cronbach's alpha were calculated for all measures. Normality was assessed with the Shapiro-Wilks test, with the square-root transformation applied to variables with extreme skew. Pearson correlation coefficients were computed between alexithymia, sport injury anxiety, and recovery. Multiple regression analyses were performed to predict recovery from alexithymia and anxiety. Power analysis (G*Power; Faul, Erdfelder, Buchner, & Lang, 2009) indicated that our sample was adequately powered for large and somewhat underpowered for medium-sized effects (required N = 68 for power of .80 and α = .05). Two-way ANCOVA examined gender and sport type differences with sport experience as a covariate. Homogeneity of variances was assessed using the Levene's test. For the between-group comparison, our study was only suitable to detect large effects (required N = 64 for power of .80 and α = .05). Effect sizes were calculated using partial eta squared (ANCOVA) and standardized beta coefficients (regression). Analyses were performed using JASP (v. 0.18.1.0) with the significance level set at α = .05.

Results

Table 1 presents descriptive statistics and scale reliabilities for alexithymia, sport injury anxiety and recovery outcomes, and Table 2 presents TAS-20 alexithymia cutoff scoring categories in this sample of athletes. Reliability of the externally oriented thinking style scale of the TAS-20 was very low and much lower than reported in the original study (Bagby, et al., 1994) and the Serbian translation validation study (Trajanović, et al., 2013). We explored the reliability in detail and found two items negatively correlated to the total score (both related to preferences in consuming cinematographic content, Supplementary table on OSF), and several items with a low item-total correlation. Therefore, we

Table 1. Alexithymia, sport injury anxiety and recovery outcomes: Descriptives and scale reliabilities

		Min	Max	M	SD	SW	α
TAS	Identifying feelings	1.00	4.00	2.44	0.83	0.960	.79
	Describing feelings	1.00	4.80	2.71	0.91	0.966	.67
	Externally oriented thinking	1.00	3.63	2.40	0.53	0.986	.24
SIAS	Losing ability	1.00	5.00	2.46	1.20	0.919**	.92
	Being perceived as weak	1.00	4.33	2.00	1.06	0.849**	.83
	Pain	1.00	4.67	2.77	1.05	0.942**	.69
	Letting down important others	1.00	4.67	2.05	1.02	0.877**	.83
	Reinjury	1.00	5.00	2.56	1.17	0.939**	.86
	Losing social support	1.00	5.00	1.88	0.95	0.850**	.87
	Impaired self-image	1.00	5.00	2.48	1.21	0.915**	.84
	Total	1.00	4.38	2.31	0.80	0.972	.93
RSSIQ	Return concerns	1.00	6.30	3.46	1.52	0.952*	.92
	Renewed perspective	1.40	7.00	5.05	1.79	0.878**	.94

Note. Min – minimum; Max – maximum; M – mean; SD – standard deviation; SW – Shapiro-Wilks test; TAS – Toronto alexithymia scale; SIAS – Sport injury anxiety scale; RSSIQ – Return to sport after serious injury questionnaire; * p<.05; ** p<.01.

will present all the results from TAS but we invite caution in interpreting the externally oriented thinking scores and total alexithymia scores.

Despite the stated caveat, it is notable that almost 20% of the athletes scored 61 and above on TAS, the suggested cutoff value for alexithymia (Bagby, et al., 1994; Bagby & Taylor, 1997), and a similar number of athletes scored in the range of the „possible alexithymia" category (Table 2). Despite the high frequency of alexithymia as suggested by the cutoff total scores, the TAS scale means were somewhat below the theoretical average. SIAS average scores were also below the midpoint. A notable exception is the renewed perspective with high average scores and a negative skew. However, as the skew was not extreme in any of the scales, we chose to present the analysis of non-transformed data. We repeated the analysis with transformed variables, and found no notable changes in the results.

Pearson correlations between the variables are presented in Table 3**.** Difficulties in identifying feelings (TAS-ID) and describing feelings (TAS-DE) were positively correlated, but both were unrelated to externally oriented thinking (TAS-EOT), possibly due to the low internal consistency of the externally oriented thinking scale. In contrast, the scales of the SIAS were positively related and highly internally consistent, implying that athletes who reported higher injury anxiety tended to do so across appraisals. Injury anxiety (total score and five out of seven scales) was related to TAS-ID, but not to TAS-DE or TAS-EOT, meaning that athletes who reported higher injury anxiety also reported more difficulties in identifying feelings; however, the remaining aspects of alexithymia were independent from injury anxiety.

Recovery outcomes as indicated by the return concerns were positively related to both TAS-ID and SIAS (total and five out of seven scales), meaning that difficulties in identifying feelings and higher anxiety were associated with negative outcomes. In contrast, the renewed perspective indicator, measuring positive outcomes, was related to neither anxiety nor alexithymia.

Due to high internal consistency of the SIAS and small sample size in our study, we decided to use the SIAS total score to predict injury recovery. Alexithymia and anxiety predicted 27.7% of the variance in return concerns, $F(2, 54) = 10.78$, $p < .001$, $R = .534$, $R^2_{adj} = .259$. Specifically, identifying feelings, $\beta = .329$, , $t = 2.53$, $p = .014$, $\rho = .326$, and SIAS total scores, $\beta = .294$, , $t = 2.26$, $p = .028$, $\rho = .294$, had very similar contribution to predicting

Table 2. TAS-20 cutoff scores

Category	N	%	M	%	F	%
No alexithymia (0-51)	33	57.9	16	59.3	17	56.7
Possible alexithymia (52-60)	13	22.8	7	25.9	6	20.0
Alexithymia present (61-100)	11	19.3	4	14.8	7	23.3

Note. N – total sample; M – male athletes; F – female athletes.

Table 3. Alexithymia, injury anxiety and recovery outcomes: Correlations

	ID	DE	EOT	LA	BPW	PAIN	LDIO	RI	LSS	ISI	TOTAL	RC	RP
TAS-ID	1												
TAS-DE	.611**	1											
TAS-EOT	0.164	0.198	1										
SIAS-LA	.313*	0.104	0.027	1									
SIAS-BPW	.354**	0.247	.264*	.274*	1								
SIAS-PAIN	.373**	0.204	-0.006	.430**	.460**	1							
SIAS-LDIO	0.246	0.194	0.098	.568**	.482**	.449**	1						
SIAS-RI	.451**	0.118	-0.033	.435**	.393**	.677**	.439**	1					
SIAS-LSS	0.127	0.025	0.162	0.231	.349**	.456**	.391**	.304*	1				
SIAS-ISI	.463**	.269*	0.025	.607**	.419**	.482**	.594**	.447**	.541**	1			
SIAS-TOT	.466**	0.231	0.099	.714**	.656**	.774**	.768**	.734**	.625**	.812**	1		
RSSIQ-RC	.466**	0.253	-0.123	.329*	0.170	.357**	.348**	.565**	0.103	.360**	.448**	1	
RSSIQ-RP	0.051	0.114	-0.242	0.056	-0.187	0.161	0.036	-0.002	0.016	0.210	0.061	0.146	1

Note. * p<.05; ** p<.01; TAS – Toronto alexithymia scale; ID – identifying feelings; DE – describing feelings; EOT – externally oriented thinking; SIAS – sport injury anxiety scale; LA – losing ability; BPW – being perceived as weak; LDIO – letting down important others; RI – reinjury; LSS – losing social support; ISI – impaired self Image; RSSIQ – Return to sport after serious injury questionnaire; RC – return concerns; RP – renewed perspective.

Table 4. Alexithymia, sport injury anxiety and recovery outcomes: Descriptives and scale reliabilities per sport type and gender

		Gender				Sport type			
		Male		Female		Team		Individual	
		M	SD	M	SD	M	SD	M	SD
TAS	Identifying feelings	2.23	0.80	2.63	0.83	2.53	0.77	2.26	0.96
	Describing feelings	2.67	0.82	2.74	0.99	2.84	0.94	2.42	0.79
	Externally oriented thinking	2.58	0.48	2.23	0.52	2.39	0.49	2.41	0.61
SIAS	Losing ability	2.37	1.18	2.54	1.22	2.40	1.14	2.59	1.34
	Being perceived as weak	2.07	1.19	1.93	0.94	1.97	1.13	2.07	0.92
	Pain	2.72	1.01	2.82	1.10	2.73	1.11	2.87	0.94
	Letting down important others	2.14	1.06	1.97	0.99	1.93	0.96	2.30	1.11
	Reinjury	2.37	1.03	2.72	1.28	2.50	1.18	2.69	1.16
	Losing social support	1.98	1.12	1.80	0.78	1.86	0.94	1.93	1.01
	Impaired self-image	2.33	1.22	2.61	1.20	2.52	1.21	2.39	1.22
	Total	2.28	0.86	2.34	0.75	2.27	0.78	2.40	0.85
RSSIQ	Return concerns	3.14	1.44	3.76	1.56	3.49	1.54	3.42	1.52
	Renewed perspective	4.71	1.80	5.35	1.76	5.45	1.63	4.18	1.87

Note. M – mean; SD – standard deviation; TAS – Toronto alexithymia scale; SIAS – Sport injury anxiety scale; RSSIQ – Return to sport after serious injury questionnaire; * p<.05; ** p<.01.

Table 5. Injury risk: Descriptives

	Min	Max	M	SD	zSk	zKu	SW
Number of injuries	1	15	4.02	3.22	5.576	5.382	.808**
Length of absence (months)	0	18	4.68	3.87	4.264	2.731	.868**

Note. Min – minimum; Max – maximum; M – mean; SD – standard deviation; zSk – standardised skewness; zKu – standardised kurtosis; SW – Shapiro-Wilks test; * p<.05; ** p<.01.

return concerns. The more difficulties in identifying feelings and the higher injury anxiety, the more concerned athletes were about their return to sport following most serious injury they had experienced during their career.

Descriptive statistics on alexithymia, injury anxiety and injury recovery by gender and sport type are presented in Table 4, and the results of sport type x gender ANCOVA with sport experience as covariate are presented in Table 5. On alexithymia, female athletes scored higher on TAS-identifying feelings ($F(1, 52) = 4.15$, $p < .05$, $\eta^2_p = .07$) and males on TAS-externally oriented thinking style ($F(1, 52) = 5.11$, $p < .05$, $\eta^2_p = .09$); however, there were no significant effects of sport type nor interaction effects. On sport injury anxiety, there was a significant interaction between sport type and gender ($F(1, 52) = 4.05$, $p < .05$, $\eta^2_p = .07$), originating from female athletes in individual sports reporting higher injury anxiety compared to team sport athletes ($t(28) = -2.19$, $p < .05$, $d = .70$). Return concerns did not differ by gender and sport type; in contrast, athletes in team sports scored higher on renewed perspective compared to athletes in individual sports ($F(1, 52) = 6.61$, $p < .05$, $\eta^2_p = .11$). Sport experience as a covariate did not reach statistical significance in any of the analyses.

We also analysed the relationship of injury risk and alexithymia, injury anxiety and injury recovery. Descriptive statistics on injury risk are presented in Table 5. Injury risk was measured with the number of injuries athletes reported and their severity as indicated by the length of absence from training and competition. Both training and injury-related measures varied considerably in our sample. As the number of injuries and length of absence were extremely positively skewed, we applied the square-root transformation before correlating them to psychological antecedents and outcomes. Athletes who experienced more injuries during their careers reported a more positive outlook following their return to sport ($r = .382^{**}$). No other correlation with the number of injuries and length of absence was statistically significant.

Discussion and conclusions

In this study, we investigated the relationship between alexithymia, sport injury anxiety and injury recovery. To our knowledge, this is the first study to explore the role of alexithymia in injury

recovery. While we favoured the hypothesis that high alexithymia might impede recovery through emotional processing deficits, we acknowledged an alternative possibility within current theoretical frameworks on sport injury. Our results should be interpreted as an exploratory first step to studying alexithymia in the injury recovery context. Regarding sport injury anxiety, we hypothesised that anxiety, especially an injury-focused anxiety measure would reliably predict recovery outcomes. While previous studies have linked trait anxiety to injury risk (Appaneal & Habif, 2013; Cagle, et al., 2017; Ford, et al., 2017; McKay, et al., 2022), our study was also the first to directly examine its relationship to injury recovery.

Both hypotheses were partially confirmed: one component of alexithymia, difficulties in identifying feelings, and sport injury anxiety predicted negative consequences of injury (return concerns following most serious injury), but not positive consequences (renewed perspective to sport and injuries). While this study is the first evidence for the negative role of alexithymia in injury recovery, our results are in line with previous research suggesting that traits indicative of emotional difficulties are important for injury recovery process (Ardern, et al., 2013; Masten, et al., 2014). We did not lay out predictions regarding specific components; however, differential effects of alexithymia components align with previous studies on alexithymia and stress-related outcomes (Pollatos, et al., 2011), suggesting that alexithymia might not be a unitary construct. Findings that higher injury anxiety predicted worse recovery outcomes confirms the importance of anxiety in sport injury research (Ford, et al., 2017) and extends its domain of influence to recovery process as well; however, injury anxiety did not predict injury risk, thereby leaving the question of general vs. specific anxiety measures unresolved. Moreover, alexithymia and anxiety predicting only negative but not positive aspects is not in line with previous research registering effects of personality on both (e.g., Ardern, et al., 2013; Osborne & Doty, 2022).

Sport injuries provoke an array of negative feelings that could hinder rehabilitation and return to sport (Tamminen, Dunn, & Gairdner, 2020; Walker & Heaney, 2013). While the Integrated Model of sport injury (Wiese-Bjornstal, et al., 1998) suggests that personality shapes cognitive appraisals, which in turn influence emotional and behavioural responses, its circular core allows for reverse influences as well. We believe that traits like injury anxiety and alexithymia could affect our emotional responses both through appraisals and directly, by determining the type of emotional responses that typically arise and the athlete's capacity to regulate them. For example, injury anxiety could intensify negative responses via catastrophic beliefs and heightened emotional reactivity, thus disrupting coping. Alexithymia could impair recovery through emotion recognition deficits, poor regulation strategy selection, and ineffective implementation (Luminet & Zamariola, 2018; Preece, et al., 2023). In our study, only one component of alexithymia—difficulties in identifying feelings—predicted return concerns, despite theoretical relevance of the entire construct. Moreover, difficulties in identifying feelings and injury anxiety contributed equally to predicting return concerns, consistent with studies suggesting these constructs overlap (Berthoz, Consoli, Perez-Diaz, & Jouvent, 1999; Marchesi, Brusamonti, & Maggini, 2000; Motan & Gençöz, 2007). Without assessing rehabilitation process, any interpretation of the mechanism of influence of these traits on recovery would be tentative. Nevertheless, athletes with high injury anxiety and difficulties in identifying feelings reported greater return concerns, which emphasises the importance of emotion-related traits for negative recovery outcomes.

In contrast, neither alexithymia nor anxiety predicted positive recovery outcomes. Participants scored higher on renewed perspective than return concerns, consistent with the RSSIQ validation study (Podlog & Eklund, 2005). In addition, athletes with more injuries and team athletes scored higher on renewed perspective. It may be the case that traits other than alexithymia and anxiety are more relevant for positive injury outlook. However, in our view, it may be that the renewed perspective scale of the RSSIQ reflects survivor bias, positive memory bias, or capture socially desirable self-narratives („cultural scripts") frequent among athletes (Howells & Everard, 2020) rather than genuine experiences. Further studies are needed to resolve this issue.

Exploratory analysis of gender and sport type differences revealed that female athletes scored higher on difficulties in identifying feelings, which contrasts previous studies on general population (Mendia, et al., 2024). Moreover, we registered both main and interactive influences of sport type (individual vs. group) on injury anxiety and renewed perspective, which highlights the importance of systematically including those differences into study design. However, these group differences did not extend to return concerns, indicating that the relationships between emotion-related traits and negative recovery outcomes remained consistent across gender and sport contexts.

Alexithymia prevalence in our study was ~20%, higher in females, doubling the general population estimates of ~10%, although the estimates vary (see e.g. Franz, et al., 2008, for a study on a representative sample of the German population;

see also Kokkonen, et al., 2001; Mason, Tyson, Jones, & Potts, 2005; Matilla, Salminen, Nummi, & Joukamaa, 2006; Salminen, Saarijärvi, Äärelä, Toikka, & Kauhanen, 1999). This is in line with recent studies on athlete samples (Graham, et al., 2025; Proenca-Lopes, et al., 2022a,b). However, these estimates should be taken with caution. TAS authors denounced the cutoff scores as they imply alexithymia is categorical rather than dimensional (Bagby, Parker, & Taylor, 2020). Moreover, cross-cultural and cross-language comparisons of alexithymia has also been criticised, especially the externally oriented thinking (Ryder, Sunohara, Dere, & Chentsova-Dutton, 2018), which may reflect preferences rather than difficulties. Lower reliability of this scale is suggested to stem from conceptual issues beyond translation, as certain groups could hold specific norms regarding emotional expression. In our view, this may also be the case with athletes as a highly non-representative population with specific norms and values. In line with this interpretation, EOT scale showed poor reliability in our study (α=.24), contrasting with the acceptable reliability in the Serbian TAS validation study (Trajanović, et al., 2013).

Our study has several important limitations. Firstly, the sample size was relatively small, and the athletes were heterogeneous with respect to the number of injuries and their severity, as well as athletic experience and training load. Moreover, despite we included both the individual and team sports, our selection did not represent well the variety of sport disciplines with respect to important dimensions shaping injury experience (for example, contact vs. no-contact sport, high-risk vs. low-risk, etc). Additionally, we did not control for many potential moderators between personality and recovery outcomes, such as injury severity (beyond the days missed), quality of rehabilitation services, support network, or pre-injury psychological states. Thus, our results should be considered preliminary and replicated with a bigger sample that would enable comparison across different types of sport and different types of injuries and allow for modelling complex relationships between bio-psycho-social variables suggested by theoretical models on injury recovery (Wiese-Bjornstal, et al., 1998). Finally, our design was retrospective and based on self-report, which could be subject to social desirability bias, and we cannot claim for certain that stable traits shape the recovery outcome directly, but only its self-assessment in hindsight. Future studies should adopt a prospective and/or experimental designs and use a wider variety of recovery indicators to provide more reliable conclusions.

This study provides the first empirical evidence that difficulties in identifying feelings (a component of alexithymia) and sport injury anxiety predict negative recovery outcomes in high-performance athletes, together explaining 27.7% of variance in return concerns. Despite stated limitations, our results highlight the importance of emotion-related traits in sport injury recovery. The high prevalence of alexithymia (~20%) combined with its predictive relationship with return concerns suggests that incorporating a brief screening for alexithymia and injury anxiety into pre-season assessments or early rehabilitation could help identify athletes requiring additional psychological support focusing on emotional awareness and anxiety management.

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