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Psychological Readiness after Injury and Its Impact on Fear of Return and Re-injury in Young Football Players

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A B S T R A C T

Objective: Given the importance of psychological factors following injury, this study aimed to examine the impact of psychological readiness on the fear of returning to training and competition, as well as the fear of re-injury, among young football players.

Methods and Materials: A total of 265 young football players aged 17 to 25 from Mashhad, Iran, participated in this cross-sectional, descriptive-correlational study. Data were collected using measures of psychological readiness after a serious injury, fear of returning to sport post-injury, and fear of re-injury.

Findings: The findings indicated that psychological readiness significantly predicts fear of returning to sport and fear of re-injury, with effect sizes of 0.55 and 0.52, respectively. The t-statistics for these pathways were 9.21 ($p = 0.002$) and 9.20 ($p = 0.001$), demonstrating strong statistical significance.

Conclusion: Our findings suggest that sports coaches should collaborate with sports psychologists and maintain effective communication with the families of injured athletes. Such support can enhance athletes' psychological readiness, thereby reducing their fears related to returning to sport and re-injury.

Keywords: *Psychological readiness, Fear of returning to sports, Fear of re-injury, Football.*

1. Introduction

Physical activity and participation in sports programs have been encouraged due to their numerous positive effects, including improved physical and mental health (1). Regular physical activity reduces the risk of hypertension, obesity, other diseases, and premature mortality. However, participation in sports activities, especially competitive

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sports, also carries risks of injury, which may have consequences for the athlete and society (1) and is a concern for coaches and athletes themselves (2). Besides physical pain and disability, sports injuries can also lead to psychological effects like feelings of discouragement, anxiety, depression, anger, or loneliness (3). Sports injuries have a negative emotional impact on the health and performance of the injured athlete and result in high economic costs to health and sports (4-7). After a sports injury, the athlete undergoes physical rehabilitation (7-9). So, paying attention to these psychological responses is critical, as they may influence an athlete's behavior during rehabilitation and its outcome. This may even impact how the athlete returns to training, competition, and the sports field after rehabilitation (10, 11). Thanks to technological and medical advances, 90% of athletes undergo rehabilitation and regain normal function of the injured area. However, only 63% return to pre-injury level, and 44% return to competition (12). These results indicate that factors other than physical factors play a role in a successful return to sport; that is, after completing the rehabilitation process, a decision is made as to whether the injured athlete can return to sport (13, 14). Common psychological reactions after an injury include negative emotions related to the injury, stress, and anxiety caused by the injury, as well as pain and fear (10, 11).

Fear of sports injuries can impact an individual's athletic performance and raise the likelihood of injuries in sports (15). It is thought that fear of injury is common among all athletes. This fear seems to stem from physiological and psychological changes that can affect performance and heighten the actual risk of injury. Fear of re-injury contributes to decreased psychological readiness, including lowered self-esteem and poor concentration, which can hinder progress in returning to sports (15). Fear of re-injury is important in determining the return of athletes to sports and is among the issues related to sports injury prevention, rehabilitation, and return to sports (16) because it can lead to refusal to perform certain technical movements and reduced performance in the athlete, for example, in jumping and landing it may be associated with unbalanced movement patterns or disruption of joint mechanics and kinematics, and subsequently movement biomechanics (17).

Fear of movement is an important factor affecting the level of disability perceived by the patient (18), and according to research results, it is more dependent on specific psychological variables of pain than on the severity of pain (19). According to the "fear-avoidance" model proposed by Lethem et al. (20) to explain the diversity of human reactions to pain or injury, there are two possibilities for an injured person who experiences pain. In the absence of fear of re-injury, the person returns to a relatively normal cycle of usual activities after a short period of rest and regains mobility by performing activities. But in the second case, the person catastrophizes and enters a vicious cycle consisting of pain-related fear, anxiety, negative emotions, and avoidance. Avoidance also causes a decrease in physical and social activities, psychological disorders, and feelings of helplessness. This phenomenon intensifies the person's experience of pain, and the previous vicious cycle continues (20). In other words, fear of physical harm in its most severe form leads to fear of movement (21). In this type of fear, which is very irrational and disabling, the patient is extremely concerned about the possibility of re-injury or worsening of the initial injury, as a result, they avoid performing motor and physical activities (22, 23). Avoidance of activity, especially activities that require the use of the painful area, receives positive reinforcement through pain prevention and subsequent reduction of the patient's tension and anxiety, leading to the continuation of avoidance behaviors in the individual (21). Although these avoidance behaviors may reduce pain-related distress in the short term, if they persist, they become a maladaptive response that increases fear and limits the patient's activities (24).

How an athlete responds to an injury is dependent on the individual's cognitive appraisal of the injury. According to cognitive appraisal models, emotional and behavioral responses to injury are related to how the individual mentally evaluates and interprets the injury (25). Therefore, how the individual perceives the injury (cognitive appraisal), not the injury itself, is important in the athlete's response to the injury (26). In support of the cognitive appraisal model, it has been shown that patients who were unable to regain pre-injury activity levels had a greater fear of re-injury due to movement than patients who returned to pre-injury levels (27). Not only is cognitive appraisal important in the face of injury, but how the pain resulting from injury is interpreted can also be influenced by cognition. Pain is an integral part of injury, and pain perception occurs in various brain regions, which are also involved in memory and emotion processing (28). Pain perception can also influence a chain of underlying psychological processes that aim to give meaning to pain. Pain is interpreted in light of memories of past painful events, current physical limitations, and other painful events that are imagined by the individual in the

future following the injury (future expectations) (29, 30). For athletes, past events that have led to injury and fear of losing their athletic position in the future (29, 30) directly influence the meaning and interpretation of pain resulting from the injury (31).

Prevention of sports injuries is one of the areas of interest for researchers today. For this reason, a comprehensive study of the nature of injuries and understanding the risk factors for injury, while preventing them, will greatly contribute to the rehabilitation and prevention of re-injury (32). To address psychological problems, including fear of return to sports and fear of re-injury, in addition to pharmacological and physical treatment, numerous psychological interventions and instruments have been developed over the years (16). One of the practical instruments in this field is the scale of psychological readiness after a serious sports injury (33, 34).

In this regard, a lack of psychological readiness has been recognized as a factor hindering a proper return to sports (35-37) and may continue to impact individuals even after physical disabilities have resolved (38-40). While psychological interventions enhance performance after sports injuries, it remains unclear how psychological readiness influences the risk of re-injury (41). Several studies (42-45) have shown that many athletes who return to their previous level of activity experience re-injury, which highlights the importance of psychological readiness (46). Recent research indicates that psychological testing is the least-reported criterion when determining the readiness to return to sport among patients undergoing anterior cruciate ligament (ACL) reconstruction (47). Psychological readiness is under examined, and now, perhaps more than ever, requires attention (48). Therefore, it is necessary to develop specific strategies to facilitate decision-making regarding the ideal time for an injured player to return to sport (49-51).

Although there is currently consensus on the need to consider physical and psychological factors surrounding return to sport (8, 52-61), existing criteria do not comprehensively consider psychological readiness for competition. For this reason, it is necessary to develop strategies for the proper follow-up of injured individuals that allow for objective decisions by sports physicians (33, 62). According to Glazer (63) and Webster et al. (34), been pointed out that today there are not enough tools that specifically assess the mental aptitude of the injured person at the moment before the injury occurs and include specific questions about this stage and the characteristics of the injury. Hence, Gómez-Piqueras et al. (62) developed an instrument that measures the injured athlete's perception regarding his/her return to training after injury. Therefore, it can be seen how important psychological readiness is for athletes after a serious injury and can affect their return to training and competition. Given that no research similar to this study has been found, this research seeks to determine whether a suitable level of psychological readiness can influence young football players' fear of returning to training and competition, and alleviate their fear of re-injury.

2. Methods and Materials

2.1 Study Design and Participants

The participants included all young football players aged 17 to 25 in the city of Mashhad, Iran, who had a history of serious injury in football (Including ligament injury, muscle tears, fractures, etc., due to which the athlete has been away from training and competition for at least three months). Due to the unavailability of information on the exact number of them, to select the sample, the method of 10 times the number of questionnaire items was used (64), based on which 265 young football players were selected. The inclusion criteria were: 1) Male; 2) Age 17 to 25; 3) Individual consent to participate in the study; 4) Having at least one history of serious injury in the last 12 month; and 5) Having a history of at least one month away from training and competition due to injury. Also, the exclusion criteria were: 1) Age less than 17 or more than 25 years; 2) No history of serious injury and avoidance of training and competition; 3) The individual's lack of consent to participate in the study.

2.2 Procedures

The method of the study involved a cross-sectional design, which was applied based on the descriptive-correlational method. Participants were thoroughly informed about the aims of the study and the confidential and anonymous data handling. Next, they gave their written informed consent. After that, participants underwent thorough testing for psychological readiness, fear of returning to training and competition, and fear of re-injury. The study was executed with the rules laid down in the Declaration of Helsinki and its later amendments. Also, this research has been approved by the Ethics Committee of the Iranian Research Institute of Sport Sciences under the approval code (IR/ssri.rec.2023.16007.2551). Moreover, at

the beginning and before the distribution of the questionnaires, the necessary coordination was made with these people, and the necessary explanations about the research plan and how to answer the questions were provided to the participants. Also, the questionnaires were distributed in person among these people.

2.3 Instruments

2.3.1 Psychological readiness following a serious injury

To assess psychological readiness following a serious injury, a questionnaire adapted from Gómez-Piqueras et al. (33) and Webster et al. (34) was used. This test has 13 items and 4 components of post-traumatic readiness (items 1 to 3), emotions (items 4 to 7), risk assessment (items 8 to 10), and confidence in performance (items 11 to 13). Points were adjusted based on a 5-point Likert scale (very good = 5, good = 4, no opinion = 3, bad = 2, very bad = 1). The Cronbach's alpha for the present sample was 0.86.

2.3.2 Fear of returning to sports following a serious injury

To assess fear of returning to sports following serious injury, Podlog & Eklund's (65) questionnaire was used. This test has 10 items. Points were adjusted based on a 5-point Likert scale (strongly disagree = 5, disagree = 4, no opinion = 3, agree = 2, strongly agree = 1). The Cronbach's alpha for the present sample was 0.75.

Fear of re-injury

To assess fear of reinjury, the Tampa Scale, a Measure of Kinisophobia (66), was used. This test has 6 items and 2 components: fear of movement (items 1 to 3) and beliefs (items 4 to 6). Points were adjusted based on a 5-point Likert scale (strongly disagree = 5, disagree = 4, no opinion = 3, agree = 2, strongly agree = 1). The Cronbach's alpha for the present sample was 0.80.

3. Data Analysis

Descriptive and inferential statistics were used. Descriptive statistics were used to classify raw scores, calculate frequencies, and calculate scattering indices such as mean and standard deviation. In the inferential statistics section, the Kolmogorov–Smirnov test was used to determine the normality of the data, and the partial least squares method (PLS) was used to investigate the effect of the independent variable on dependent variables. The nominal level of significance was set at alpha $p \leq 0.05$. The statistical analyses were performed with SPSS 24.0 (IBM Corporation, Armonk, NY, USA) for Apple Mac and SMART PLS (version 3.2.9).

4. Results

In this section, first, the demographic characteristics of the participants are presented (Table 1).

Table 1. Demographic characteristics of the participants

Variable	Range/type	Number	Percentage
Age (Years)	17 to 20	133	50.2
	21 to 23	51	19.2
	24 to 25	81	30.6
		265	100
Longest time away from training and competition due to injury	Less than 3 months	31	11.7
	3 to 6 months	79	29.8
	6 to 12 months	36	13.6
	More than a year	119	44.9
		265	100
The level of competition	Intracity	45	17
	Provincial	79	29.8
	National	131	49.4
	International	10	3.8
		265	100
Type of injury	Fractures	40	15.1
	Tear	127	47.9
	Dislocations	43	16.2
	Other injuries	55	20.8
		265	100
Duration of recovery	Less than 3 months	25	9.4
	3 to 6 months	82	30.9

	6 to 12 months	41	15.5
	More than a year	117	44.2
		265	100

The highest and lowest frequencies based on age, with 50.2% and 19.2%, respectively, were "17 to 20 years" and "21 to 23 years". The highest and lowest frequencies based on the longest time away from training and competitions due to injury were 44.9% and 11.7% for "more than a year" and "less than 3 months," respectively. The highest and lowest frequencies based on the level of competition were "national" and "international", with 49.4% and 3.8%, respectively. The highest and lowest frequencies based on the type of injury were "tear" and "fracture" with 47.9% and 15.1%, respectively. Finally, the highest and lowest frequencies based on the duration of recovery were "more than a year" and "less than 3 months" with 44.2% and 9.4%, respectively.

Next, the normality of the data distribution was examined using the Kolmogorov–Smirnov test. Given that the significance level of the test was less than 0.05, it was determined that the distribution of the variables was not normal and that the partial least squares method could be used to test the hypotheses.

For the measurement model analysis, the results indicated that all loadings, Cronbach's alpha (α), composite reliability (CR), and average variance extracted (AVE) values exceed the threshold values of 0.40 to 0.70, 0.70, 0.70, and 0.50, respectively (Figure 1 and Table 2). The criterion for the suitability of factor loadings is at least 0.70, although if the mean of the AVE and CR is higher than normal, factor loadings between 0.4 and 0.7 are also acceptable (67). This indicates the establishment of the variables' internal consistency reliability.

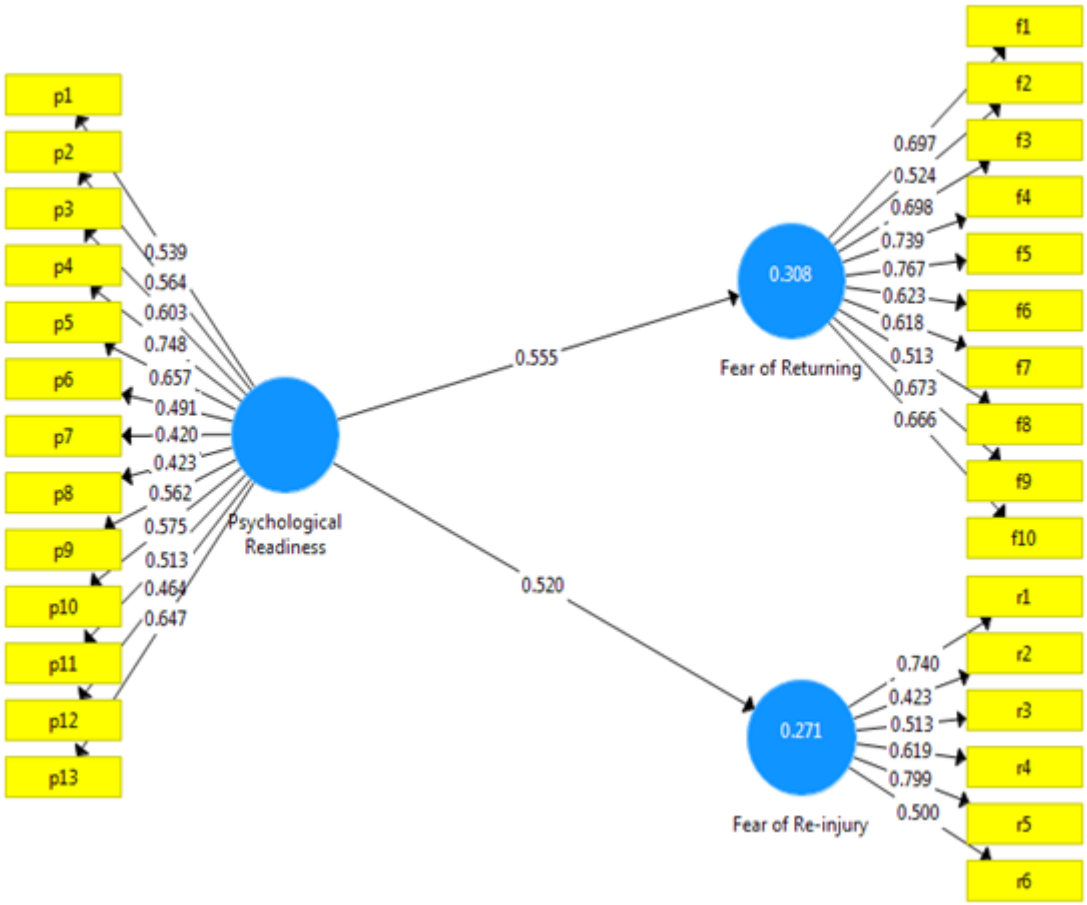

Figure 1. Measurement model in the factor load mode

Table 2. Measurement model and descriptive results

Variable	Component	Indicators	Loadings	Mean	SD	α	CR	AVE
Psychological readiness	Post-traumatic readiness	P1	0.539	3.38	0.61	0.794	0.836	0.294
		P2	0.564					
		P3	0.603					
	Emotions	P4	0.748					
		P5	0.657					
		P6	0.491					
		P7	0.420					
	Risk assessment	P8	0.423					
		P9	0.562					
		P10	0.575					
	Confidence in performance	P11	0.513					
		P12	0.464					
		P13	0.647					
Fear of returning		F1	0.697	3.69	0.69	0.851	0.882	0.431
		F2	0.524					
		F3	0.698					
		F4	0.739					
		F5	0.767					
		F6	0.623					
		F7	0.618					
		F8	0.513					
		F9	0.673					
		F10	0.666					
Fear of re-injury	Fear of movement	R1	0.740	3.18	0.60	0.737	0.745	0.348
		R2	0.423					
		R3	0.513					
	Beliefs	R4	0.619					
		R5	0.799					
		R6	0.500					

Table 3 shows that heterotrait-monotrait (HTMT) ratios do not exceed the value of 0.90, demonstrating the absence of discriminant validity issues and the establishment of variables' convergent validity.

Table 3. Discriminant validity results

Variable	Psychological readiness	Fear of returning	Fear of re-injury
Psychological readiness	-	-	-
Fear of returning	0.804	-	-
Fear of re-injury	0.655	0.617	-

As illustrated in Table 4, variance inflation factor (VIF) values are below five, indicating the absence of any lateral collinearity among study variables. As shown in Figure 2 and Table 4, the structural model analysis revealed positive effects of psychological readiness after serious injury on fear of returning ($\beta = 0.555$, $t = 9.210$, $p < 0.05$) and fear of re-injury ($\beta = 0.520$, $t = 9.200$, $p < 0.05$). Also, psychological readiness drivers explained 52.3% of the variance in fear of returning ($R^2 = 0.523$), and 49.8% of the variance in fear of re-injury ($R^2 = 0.498$).

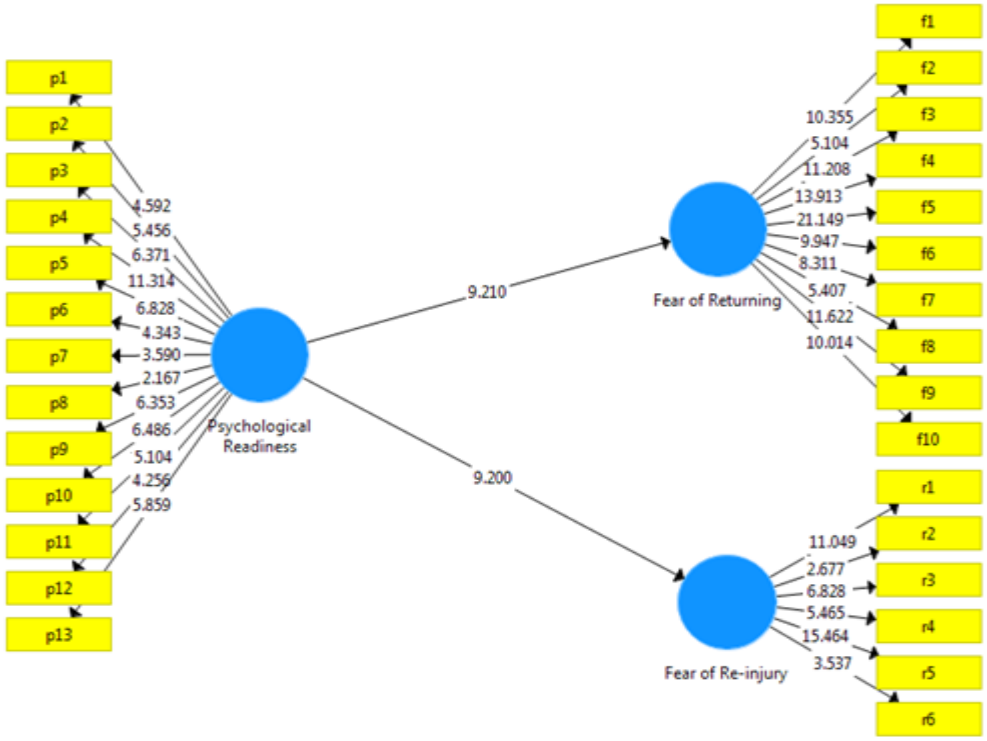

Figure 2. Structural model in T-value mode

Table 4. Hypotheses testing

Hypotheses	β	SE	T-value	P-value	Supported?	VIF	R^2
Psychological readiness → Fear of returning	0.555**	0.035	9.210	0.002	Yes	1.913	0.523
Psychological readiness → Fear of re-injury	0.520**	0.039	9.200	0.001	Yes	1.765	0.498

Legend: *p<0.05; **p<0.01; ***p<0.001; β=*Path coefficients*; *SE=Standard error*; *VIF=Variance inflation factor*

5. Discussion and Conclusion

This study aimed to investigate the impact of psychological readiness following a serious injury on the fear of returning to training and competition and the fear of re-injury in young football players.

The research findings indicated that the effect of psychological readiness following a serious injury on the fear of returning to training and competition is 0.55. Additionally, the t-statistic value for this pathway is 9.21, which is greater than 1.96, signifying its significance; thus, this pathway is significant at the 0.01 level. In other words, it can be concluded that psychological readiness following a serious injury positively and significantly impacts the fear of returning to training and competition. This finding is consistent with the results of Gomez-Espejo et al. (68), Conti et al. (14), Burland et al. (69), Grant (70), Monahan (71), Podlag et al. (72), Ardern et al. (36), and Ardern et al. (73).

Gomez-Espejo et al. (68), examining return to play and the psychological aspects associated, state that the results obtained confirm the characteristics of Morgan's iceberg and the impact that subjective psychological perceptions and assessed emotional states have on the integration of athletes into their sports practice, ensuring success. Conti et al. (14), examining professional basketball players' perceptions of psychosocial and behavioral factors influencing a return to pre-injury levels, state that participants consider social support, investment in rehabilitation and training programs, coping skills, and motivation to be essential for achieving pre-injury performance levels. Athletes also reported that realistic performance expectations focus on performance, positive emotions, motivation, arousal, and social support facilitated their return to sport. However, low confidence in personal abilities, declines in skill performance, and feelings

of ineffective physical functioning hindered their return to pre-injury levels. Burland et al. (69), by qualitatively examining the decision to return to sport after anterior cruciate ligament reconstruction, stated that doubt and lack of self-confidence lead to self-limiting tendencies, the level of awareness of athletes increased after a serious injury, expectations and assumptions about the recovery process influenced the decision to return to sports after a serious injury, and having a strong support system, both in and outside of rehabilitation, was the main key factor in building self-confidence in the athlete. Grant (70), examining the effect of psychological response on recovery of sport injury, states that given that social support is a very important part of the process of helping athletes return to play and that psychological skills can be used effectively to aid the recovery process and prevent further injuries, athletes may experience several negative psychological stresses at any point in the recovery process and can help accelerate their recovery by maintaining positive thinking and adhering to their specific rehabilitation program. Monahan (71), examining psychological readiness of athletes to return to play following injury, states that the prepared group reported significantly less fear avoidance compared to the unprepared group. Podlag et al. (72) examined psychosocial factors in sports injury rehabilitation and return to play, stating that cognitive appraisals, emotional reactions, and behavioral responses to injury affect the quality and nature of athletes' rehabilitation. Ardern et al. (36) examined the impact of psychological readiness to return to sport and recreational activities after anterior cruciate ligament reconstruction and found that 40% of the athletes studied returned to their pre-injury activity. Those who returned had more positive psychological responses, reported better performance in knee function in sports and recreational activities, had a higher quality of life, and were more satisfied with the current function of their knee. Ardern et al. (73), also examining the psychological factors associated with returning to sport following injury, stated that positive psychological responses, including motivation, self-confidence, and low fear, were associated with a greater likelihood of returning to pre-injury participation levels and a faster return to sport.

The research findings also indicated that the effect of psychological readiness following a serious injury on the fear of re-injury is 0.52. Additionally, the t-statistic value for this pathway is 9.20, which is greater than 1.96, signifying its significance; thus, this pathway is significant at the 0.01 level. In other words, it can be concluded that psychological readiness following a serious injury positively and significantly impacts the fear of re-injury. This finding is consistent with the results of Fältström et al. (74), Rodriguez et al. (75), McPherson et al. (46), Hsu et al. (10), Christino et al. (76), Beglar et al. (77),

Fältström et al. (74), examining clinical risk profile for a second anterior cruciate ligament injury in female soccer players after anterior cruciate ligament reconstruction, state that there was an interaction between functional performance, clinical assessment, and psychological factors, and it is reasonable to include these factors in return-to-sport decisions and athlete screening after anterior cruciate ligament (ACL) injury. Rodriguez et al. (75), by examining reducing fear of re-injury and pain perception in athletes with first-time anterior cruciate ligament reconstructions by implementing imagery training, stated that fear of re-injury was a unique predictor of return to sport, even in a sample of participants who reported very little or almost no pain. McPherson et al. (46), examining psychological readiness to return to sport is associated with second ACL injuries, stated that younger injured patients were significantly less psychologically prepared to return to sport than younger uninjured patients. Hsu et al. (10), examining fear of re-injury in athletes, stated that athletes with a high fear of re-injury could benefit from a psychologically aware training approach to improve rehabilitation outcomes. Also, Christino et al. (76), examining psychological factors associated with anterior cruciate ligament reconstruction recovery, stated that it is important to recognize and understand the psychological factors associated with patient perception and functional outcomes after serious injury. Issues related to emotional distress, motivation, self-esteem, locus of control, and self-efficacy can have profound effects on patients' adjustment, sports identity, and readiness to return to sport. Beglar et al. (77), by examining the relationship between mental skills and injury in soccer players, stated that there is a negative and significant relationship between the level of mental skills and the incidence of injury in football players.

6. Limitations and recommendations for future studies

The recruited participants chose to be volunteers for this program, so these people already have a positive attitude towards the program, which could influence the results. Unfortunately, since the data in this study were collected using questionnaires and no intervention was used, it is impossible to speak with certainty about the results obtained and the effect of the variables on each other. Also, this study used self-report questionnaires, which may have been

incorrectly answered by the players under study, which could have affected the results of the study. Considering that the present study was conducted on a limited number of young football players, its results cannot be generalized to a larger population. Also, in this study, only male football players were studied, and no female football players participated, so it is suggested that another study examine the relationship between these variables in female football players and compare its results with the results of the present study. Also, it is suggested that another study examine the effect of psychological readiness following a serious injury on fear of returning to sports and fear of re-injury in individual and team sports, and compare the results of these two groups.

The benefits of psychological readiness for athletes after a serious injury can include their preparation post-injury, managing emotions, assessing risk factors, and boosting their confidence in performance. If these factors are addressed, it is expected that athletes will experience low levels of fear and anxiety after rehabilitation and recovery, as well as when returning to training and competition. This, in turn, lowers their apprehension about returning to sport and reduces the risk of re-injury. Consequently, these individuals can return to sport with increased confidence and strive to reach their pre-injury performance levels.

Therefore, it is recommended that sports coaches pay special attention to this issue, considering the importance and role of psychological readiness after injury for athletes' return to competition and training, and with the help of sports psychology experts, improve the mental and psychological state of their athletes and provide suitable conditions for their return to sports and competition. Also, family members and friends can play a vital and important role with their support. As shown in previous research and literature, the fear of movement and re-injury after a serious injury in athletes seems logical and natural, so sports coaches should be aware of this issue and use appropriate knowledge to address this fear in their athletes.

According to the findings, it is suggested that coaches of sports teams, especially in high-contact sports like football, acquire the necessary knowledge and awareness about the psychological readiness of their athletes, and by using the appropriate instruments, assess and examine the mental states of their athletes, thereby helping to reduce and eliminate their fears and negative emotions about injury and re-injury. Also, sports psychologists who are working with sports teams should comprehensively examine the psychological readiness of injured athletes who have completed the recovery process and want to return to training and competition, and provide these individuals with the necessary guidance if there are problems, such as fear of re-injury. Finally, families of athletes who have suffered severe physical injuries should communicate with team coaches, regularly check on the mental and emotional state of their children, and provide them with the necessary support if needed.

Authors' Contributions

M. A.: Study design and data collection, M. H.: Original draft writing and revising manuscript, R. A.: Study design, H. N.: Study design, B. A.: Study design, data analysis and revising manuscript, E. D.: Original draft writing and data collection, M. K.: Original draft writing and data collection, K. D.: Original draft writing.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. This research received approval from the Ethics Committee of the Iranian Research Institute of Sport Sciences under the approval code (IR/ssri.rec.2023.16007.2551).

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