



Re-injury Anxiety in Elite Iranian Handball Players: A Cross-Sectional Study

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Abstract

Background: Fear of re-injury is a common psychological challenge in athletes that can negatively impact the rehabilitation process and return to sport.

Objectives: This study aimed to investigate the prevalence and related factors of fear of re-injury among elite Iranian male and female handball players.

Methods: In 2023, a descriptive cross-sectional study was conducted involving elite handball players from Iran's Premier League and Divisions One and Two. Participants were distributed an online questionnaire, including the Re-injury Anxiety Inventory (RIAI) and a Sports Injury History Questionnaire. Two hundred twenty players (164 men and 56 women) completed the survey. Data on injury type, location, and timing were also collected. Statistical analysis was performed using independent *t*-tests with SPSS22 software.

Results: Most handball players had a history of serious sports injuries, with higher rates in women (98.21%) than men (93.90%). Non-contact injuries were more common in men (60.36%), while contact injuries were slightly more common in women (51.78%). Injuries occurred more frequently during training in women (53.57%) and competition in men (49.39%). Men had a significantly higher fear of re-injury than women ($P = 0.002$), and this fear was greater in athletes with a history of injury ($P = 0.014$).

Conclusions: Fear of re-injury is prevalent among elite handball players, especially men and those with prior injuries. Injury patterns differ between men and women, and protective equipment prevents injuries. These insights can aid in creating intervention programs to reduce re-injury fears and enhance return-to-sport outcomes in handball players.

Keywords: Psychological Factors, Injury Prevention, Athletic Performance, Anxiety in Athletes, Sports Psychology, Return to Play

1. Background

Handball, a sport characterized by physicality and excitement, poses significant health risks for athletes. During competitions and training sessions, handball players frequently sustain various injuries. Statistics reveal that, on average, 13 to 20 handball players per 1,000 hours of competition and 0.6 to 0.96 per 1,000 hours of training experience injuries (1, 2). These injuries, commonly occurring in the ankle, knee, thigh, and lower leg, can be severe and result in prolonged recovery periods (3).

Beyond the physical pain, sports injuries also have considerable psychological consequences for athletes.

Losing training and competition time can negatively impact their mood and motivation. Returning to sports after an injury presents unique challenges for handball players. One such challenge is the fear of re-injury, or "fear of re-injury." This fear can significantly impact players' performance, motivation, and quality of life (4).

Sports injuries can leave deep emotional scars on athletes, extending beyond physical pain and injury. Anxiety, depression, isolation, and fear of re-injury are common struggles faced by athletes in various sports, including handball (5). Numerous studies have shown that fear of re-injury is prevalent among athletes and can significantly hinder the return-to-play process (6-8). This fear slows the rehabilitation process, decreases the

likelihood of a successful return (6), and undermines the athlete's confidence in returning to their previous activity level (8). Fear of re-injury can even affect an athlete's decision-making abilities. A study revealed that anxious athletes are less likely to adhere to rehabilitation programs and may make poor choices regarding their return to sport (7).

Given the detrimental effects of fear of re-injury, addressing this issue alongside the physical aspects of sports injuries is crucial. Psychological support, mental training, and psychological education are some strategies that can help athletes manage anxiety and return to sports successfully.

In the past, sports injuries were viewed solely from a biomechanical perspective (9). However, contemporary approaches recognize the significant role of psychological factors in both the occurrence and recovery of injuries (9). Sports medicine professionals should pay attention to the mental health of injured athletes alongside physical rehabilitation. Integrating strategies such as counseling, motivational techniques, goal setting, and social support into rehabilitation programs can help address athletes' psychological issues and facilitate a quicker and more successful return to play (5).

Williams and Anderson's stress-injury model examines the factors that increase the risk of re-injury among athletes. This model encompasses three primary components: Personality traits, stressful experiences, and coping resources. A history of stressful experiences, particularly previous injuries, plays a key role. Research has shown that a history of injury can not only lead to anxiety and negative thoughts in athletes but also increase the probability of re-injury in the same area (10, 11).

Athletes with a history of injury are more susceptible to negative thoughts and anxiety about re-injury (10). This mental anxiety can disrupt their focus and impair their on-field performance. Furthermore, if an injury does not heal completely, the likelihood of re-injury in the same area increases significantly, especially for injuries to muscles, ligaments, and joints (12).

Anxiety about re-injury is a significant concept in competitive sports. Studies have revealed that athletes with a history of injury exhibit higher levels of anxiety compared to their counterparts. This anxiety can lead to maladaptive behaviors, such as improper execution of rehabilitation exercises, which increase the risk of re-injury (13). Additionally, when injured athletes return to competition, they may excessively focus on the technique of skill execution. This overemphasis can

hinder the fluidity of movement and consequently increase the probability of re-injury (14).

During recovery, athletes must diligently follow a tailored rehabilitation program to return to their pre-injury fitness level and excel in future competitions (15). However, this journey is not always straightforward. Anxiety about re-injury and low confidence in preventing re-injury are among the psychological challenges faced by athletes with a history of injury (16).

Research has indicated that psychological readiness is paramount for a robust return to sport after an injury (17). This readiness comprises three essential components: Self-confidence, realistic expectations, and motivation. Athletes must believe in their ability to return to the field and compete at a high level. This unwavering belief empowers them to overcome challenges. Additionally, setting achievable goals for returning to optimal form is crucial in maintaining motivation and preventing frustration. Sustaining passion and love for the sport is a critical factor in the success of the return-to-play process (17, 18).

Research has focused on the direct relationship between previous injuries and the risk of re-injury in sports (19). Some studies have demonstrated a positive correlation between injury history and the frequency of subsequent injuries. In other words, athletes with a history of injury are at a higher risk of future injuries (20). However, other research has refuted this association and found no relationship between injury history and the frequency or severity of subsequent injuries (21).

Moreover, inadequate rehabilitation and insufficient recovery time are among the most evident reasons for increased re-injury rates upon returning to competition (22).

Athletes should remember that returning to the field after an injury requires patience, effort, and commitment. By following a suitable rehabilitation program and focusing on mental preparedness, they can overcome the challenges of this journey and return to their previous fitness level (23).

For many athletes, injury signifies physical pain and marks the entrance into a world of fear of re-injury. This fear, rooted in the human psyche, can cast a shadow over the rehabilitation process, performance, and return to sports, much like a terrifying nightmare, significantly disrupting them (6). Studies have shown that a positive, motivated, confident mindset with minimal fear can significantly increase the likelihood of returning to pre-injury fitness levels and accelerate recovery (24).

Conversely, fear of re-injury encompasses not only concerns about the recurrence of the injury but also anxieties about performance levels and long-term pain (7). Given the significance of this issue, incorporating psychology-based approaches into athlete rehabilitation programs, including measuring fear of re-injury and providing appropriate interventions to reduce it, can significantly improve outcomes for athletes grappling with high levels of this fear (6).

At the same time, evidence suggests that overall emotions trend positively during recovery; fear of re-injury remains a fundamental challenge in returning to sport (24). Studying this phenomenon and identifying effective strategies to address it is of paramount importance. Addressing the fear of re-injury and providing suitable solutions is pivotal in enhancing rehabilitation, increasing performance, and facilitating a successful return to athletic activities. By assisting athletes in overcoming this fear, we can help them return to their sport safely and confidently, reaching their full potential.

2. Objectives

This research investigated the fear of re-injury in Iran's elite male and female handball players.

3. Methods

This retrospective cross-sectional study aimed to assess the levels of re-injury anxiety among elite Iranian handball players in 2023. The sample size for the descriptive cross-sectional design was determined using a specific formula, resulting in a target of 248 participants. We distributed an online questionnaire to 250 randomly selected players, of whom 220 (56 women and 164 men) from the Premier League, Division One, and Division Two completed the survey (Figure 1). Data were gathered using two main instruments: The Re-injury Anxiety Inventory (RIAI), a 28-item questionnaire designed to measure anxiety associated with re-injury, and the Sports Injury History Questionnaire, which recorded details about previous injuries, including their type, location, and timing. All participants provided informed consent before participation, and the data were collected via online questionnaires sent to players from the specified leagues.

3.1. Inclusion and Exclusion Criteria

Participants were included if they were elite handball players competing in the Iranian Premier League, Division One, or Division Two in 2023 and agreed to complete the questionnaires. Participants who did not

fully complete the questionnaires were excluded from the study.

3.2. Re-injury Anxiety Inventory Questionnaire

This questionnaire was developed by Walker et al., the RIAI is a 28-item questionnaire measuring two factors:

(1) RIA-R: Anxiety about re-injury during rehabilitation.

(2) RIA-RE: Anxiety about re-injury upon returning to training or competition (25).

In this questionnaire, the injured athlete was asked to read each statement and mark the number that most closely matched their feelings when completing the form. The RIAI score was calculated by computing a separate score for the two factors above, summing the scores of the items related to each construct. Items 25, 24, 21, 18, 16, 14, 11, 9, 7, 5, 3, 1, and 27 were summed to calculate the athlete's RIAI score (Item 24 required reverse scoring). A minimum score of zero indicated a complete absence of RIAI, while a score of 39 indicated the athlete was anxious about re-injury during rehabilitation. Items 20, 19, 17, 15, 13, 12, 10, 8, 6, 4, 2, 28, 26, 23, and 22 were also summed to indicate an athlete's anxiety about re-injury related to returning to training or competition (item 13 required reverse scoring). A score of zero indicated a complete absence of RIA-RE, and a score of 45 indicated that the injured athlete was highly anxious about re-injury when returning to the field of play or competition. All items in this questionnaire had four options, which were scored using the Likert Scale (3, 2, 1, 0).

3.3. Reliability and Validity

Mardaneh et al. evaluated the reliability of the RIAI questionnaire through three methods. The overall reliability was strong, with a Cronbach's alpha of 0.847. The temporal stability was confirmed with a correlation coefficient of 0.986 between the two administrations, and internal consistency was supported by a correlation coefficient of 0.778 between the two halves of the questionnaire. Thus, the questionnaire shows good reliability. Validity was tested using group difference methods, revealing significant differences in re-injury anxiety scores between men and women across three sections, demonstrating the questionnaire's ability to distinguish between different levels of anxiety ($P < 0.001$) (26).

3.4. Data Analysis

Table 1. Statistical Indices Related to the Participant's Age, Height, and Weight

Variables and Groups	Number	Mean \pm SD
Age		
Woman	56	19.30 \pm 4.79
Man	164	25.70 \pm 7.76
Height		
Woman	56	168.29 \pm 5.20
Man	164	182.60 \pm 6.48
Weight		
Woman	56	63.79 \pm 9.64
Man	164	84.88 \pm 17.39

Data was analyzed using SPSS 22 software. Independent *t*-tests and ANOVA were used to compare the mean scores of re-injury anxiety among different groups. Pearson's correlation coefficient was also used to examine the relationship between re-injury anxiety scores and variables related to the history of sports injuries.

4. Results

The statistical indices of age, height, and weight of the participants are shown in [Table 1](#).

[Table 2](#) presents the frequency and percentage of injuries among elite male and female handball players. Results indicated that 98.21% of women and 93.90% of men had previously experienced severe sports injuries. Furthermore, 23.21% of women and 46.95% of men had previously sustained injuries to the same body part.

The type of injury was categorized as contact or non-contact, with 51.78% of women and 39.63% of men reporting contact injuries. Conversely, 48.21% of women and 60.36% of men experienced non-contact injuries.

Regarding the timing of injuries, 53.57% of women and 40.24% of men were injured during training, while 39.28% of women and 49.39% of men were injured during competitions.

Moreover, 37.5% of women and 32.31% of men reported using protective gear such as knee pads, wristbands, and braces, whereas 62.5% of women and 67.68% of men did not use any protective equipment.

The results from the independent samples *t*-test in [Table 3](#) show that male athletes experienced significantly higher levels of RIAI than female athletes, with a statistically significant difference ($P = 0.002$).

Additionally, both subcomponents of re-injury anxiety, the fear of re-injury during rehabilitation (RIA-R) and the fear of re-injury upon returning to training or

competition (RIA-RE), were also significantly higher in male athletes ($P = 0.000$ and $P = 0.019$, respectively).

Furthermore, athletes with a history of previous injuries reported significantly greater overall re-injury anxiety ($P = 0.014$) and higher levels of both subcomponents (RIA-R, $P = 0.006$; RIA-RE, $P = 0.032$) compared to those without prior injuries.

However, no statistically significant difference was found in re-injury anxiety between athletes studying physical education and those studying in other fields ($P > 0.05$).

5. Discussion

The aim of this study was to investigate re-injury anxiety among elite Iranian male and female handball players. Most elite handball players (98.21% of women and 93.90% of men) had previously experienced severe sports injuries. The prevalence of re-injury at the previously injured site was significantly higher in men (46.95%) than women (23.21%). Non-contact injuries were more prevalent in men (60.36%) than contact injuries (39.63%), while contact injuries were slightly more common in women (51.78%) compared to non-contact injuries (48.21%). Injuries occurred more frequently during training in women (53.57%) and less frequently during competition (39.28%), whereas injuries in men occurred more often during competition (49.39%) and less frequently during training (40.24%).

The prevalence of injuries while using protective equipment such as knee and wrist braces was significantly lower in men (32.31% vs. 67.68%) and women (37.5% vs. 62.5%) than when no protection was used.

Men experienced significantly higher levels of re-injury anxiety than women. Athletes with a history of previous injuries experienced significantly higher levels of re-injury anxiety compared to those without a history of previous injuries. This study suggests that re-injury

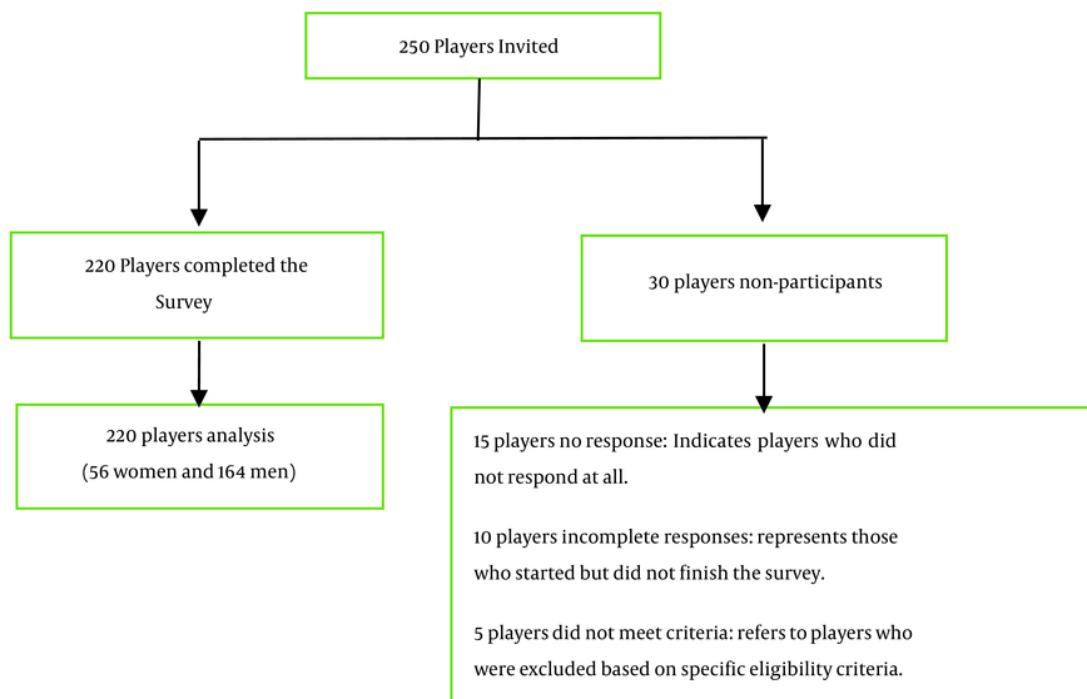


Figure 1. Flow diagram showing the number of participants at each stage

anxiety is a significant concern for athletes, particularly men and those with a history of previous injuries. Female handball players were more likely to experience injuries during training, while male handball players were more likely to be injured during competition. Injuries were less common when using protective equipment in both genders.

Re-injury anxiety is a significant challenge faced by athletes post-injury. This anxiety can negatively impact motivation, performance, and quality of life. Numerous studies have investigated re-injury anxiety in athletes. The findings of the current study are consistent with previous research by Walker et al., Christakou et al., Gkikopoulos et al., Ivarsson et al., Myklebust et al., Podlog et al., and Wadey et al. (25, 27-32).

Christakou et al. found that concerns about re-injury, self-confidence, and attention predicted the likelihood of re-injury during the early and mid-competitive seasons (27). Gkikopoulos et al. discovered that athletes with a history of injury were more likely to experience re-injury anxiety and distractibility (28). Wadey et al. found that higher injury severity and frequency were associated with increased re-injury anxiety and

concerns about returning to sport (32). Walker and Thatcher noted that re-injury anxiety is particularly common in athletes who require surgery or undergo prolonged rehabilitation (14). Christakou et al. demonstrated that psychological factors such as re-injury worry, self-confidence, and attention can predict the occurrence of re-injury (27). Podlog et al. highlighted common psychosocial concerns, including re-injury anxiety and performance-related worries, and proposed self-determination theory as a framework for understanding these issues (31). Myklebust et al. reported that 58% of handball players who underwent surgery could return to their pre-injury level, while 22% experienced re-injury (30). Our results align with prior research on re-injury anxiety among athletes. For instance, Christakou et al. and Gkikopoulos et al. similarly found that athletes with a history of injury were more likely to experience higher levels of re-injury anxiety (27, 28), which is consistent with our findings. Moreover, Wadey et al. also reported that increased injury severity is linked to elevated re-injury anxiety (32), similar to what we observed in athletes with more severe injuries. Additionally, Walker et al. emphasized

Table 2. Frequency and Percentage of Serious Injuries, Previous Injuries, Injury Type, Time of Injury, and Use of Protective Equipment Among Elite Male and Female Handball Players^a

Variables	Woman	Man	Total
Have you ever had a serious sports injury?			
Yes	55 (98.21)	154 (93.90)	209 (95)
No	1 (1.78)	10 (6.09)	11 (5)
Total	56 (100)	164 (100)	220 (100)
Did the injured limb have any prior injuries or pain?			
Yes	13 (23.21)	77 (46.95)	90 (40.90)
No	43 (76.78)	87 (53.04)	130 (59.09)
Total	56 (100)	164 (100)	220 (100)
Type of injury?			
Contact injury	29 (51.78)	65 (39.63)	94 (42.72)
Non-contact injury	27 (48.21)	99 (60.36)	126 (57.27)
Total	56 (100)	164 (100)	220 (100)
When did the injury occur?			
During practice	30 (53.57)	66 (40.24)	96 (43.63)
During competition	22 (39.28)	81 (49.39)	103 (46.81)
Outside of a sports setting	4 (7.14)	17 (10.36)	21 (9.54)
Total	56 (100)	164 (100)	220 (100)
Was there any support for the injured limb at the time of the injury, such as a knee brace, tape, or splint?			
With support	21 (37.5)	53 (32.31)	74 (33.63)
Without support	35 (62.5)	111 (67.68)	164 (74.54)
Total	56 (100)	164 (100)	220 (100)

^a Values are presented as No. (%).

that re-injury anxiety is prevalent in athletes requiring surgery or extensive rehabilitation (25), which parallels the higher anxiety levels we noted in athletes with previous injuries.

These consistencies confirm that re-injury anxiety is a widespread and complex issue, and our study contributes to the existing body of knowledge by reinforcing these findings in the context of elite Iranian handball players.

These studies indicate that re-injury anxiety is a prevalent and complex issue for injured athletes. To help athletes overcome this challenge, comprehensive and evidence-based psychological interventions are needed. These interventions should address concerns related to re-injury, self-confidence issues, and attentional deficits throughout the rehabilitation and return-to-sport process.

Several factors may contribute to these differences, including physiological differences (such as muscle strength, joint stability, and flexibility), technical differences (such as running, jumping, and landing techniques), psychological differences (such as anxiety and motivation), and environmental differences (such as playing surface and footwear).

It is important to note that this study was conducted retrospectively, which is considered a study limitation. Additionally, limitations such as the cross-sectional design, a sample restricted to elite Iranian handball players, issues related to the validity and reliability of measurement instruments, and the inability to fully control for confounding variables may have impacted the accuracy and generalizability of the results.

Numerous studies have shown that sports injuries, particularly in athletes who have undergone surgery, can result in increased anxiety and fear of re-injury. This is especially noticeable when returning to sports after an injury (33). The severity of the injury also influences the duration of return to play and even the possibility of an early end to an athlete's career (34). Athletes with higher motivation and self-confidence are more likely to return to sport successfully (35). However, obstacles such as negative emotions, fear of re-injury, and limited mobility can hinder the recovery process (18, 36, 37). Recent studies have shown that psychological techniques such as imagery can be effective in reducing anxiety and pain and improving recovery in injured athletes (38-40). For instance, studies conducted by Cupal and Brewer and Wilczynska et al. have demonstrated that combining relaxation techniques

Table 3. Independent Samples *t*-Test Results for Re-injury Anxiety Between Women and men, Physical Education Students and Those in Other Fields, and Athletes with and Without a History of Injury

Groups	N	Mean ± SD	SEM	<i>t</i>	df	Sig.
RIAI						
Woman	56	22.1071 ± 16.65	2.22613	-3.147	116.880	0.002
Man	164	30.7561 ± 20.63	1.61105			
PE	94	27.7021 ± 18.07	1.86436	-5.58	214.611	0.577
N-PE	126	29.1905 ± 21.40	1.90677			
HHI	90	32.5111 ± 19.48	2.05427	2.467	218	0.014
N-HI	130	25.8154 ± 19.99	1.75380			
RIA-R						
Woman	56	9.4107 ± 7.48	0.99993	-3.715	120.473	0.000
Man	164	14.0427 ± 9.53	0.74494			
PE	94	12.2660 ± 8.33	0.85952	-0.826	218	0.410
N-PE	126	13.3095 ± 9.91	0.88346			
HHI	90	14.9000 ± 9.05	0.95479	2.752	218	0.006
N-HI	130	11.4538 ± 9.18	0.80533			
RIA-RE						
Woman	56	12.6964 ± 9.64	1.28879	-2.368	218	0.019
Man	164	16.7134 ± 11.36	0.88762			
PE	94	15.4362 ± 10.08	1.04032	-0.301	213.891	0.764
N-PE	126	15.8810 ± 11.79	1.05045			
HHI	90	17.6111 ± 10.68	1.12665	2.158	218	0.032
N-HI	130	14.3615 ± 11.17	0.98049			

Abbreviations: RIAI, re-injury anxiety inventory; RIA-R, re-injury anxiety during rehabilitation; RIA-RE, re-injury anxiety when returning to exercise or competition; SEM, standard error mean; Sig, Sig. (2-tailed); PE, physical education; N-PE, non-physical education; HHI, Has a history of injury; N-HI, no history of injury.

with imagery can help reduce anxiety levels about re-injury and improve pain (38, 40). Overall, sports injuries can have a significant psychological impact on athletes. Fear of re-injury is one of the most significant consequences. Psychological techniques like imagery can be an effective tool in enhancing the recovery process and return to sport.

5.1. Conclusions

Re-injury anxiety is a significant issue among elite Iranian handball players, particularly men and those with a history of past injuries. The study suggests that addressing this anxiety is crucial for effective rehabilitation and return to sport.

It highlights the need for comprehensive rehabilitation programs that integrate psychological and physical recovery, including cognitive-behavioral interventions, to help athletes overcome fear, enhance rehabilitation, and confidently return to their sport. These findings emphasize the importance of a holistic approach to rehabilitation for athletes and sports medicine professionals.

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Footnotes

Authors' Contribution: A. O., and N. B.: Contributed to the study conception, design, and data collection; M. S., and F. K.: Participated in the methodological development and design of the statistical analysis; M. S., and F. K.: Wrote the first draft of the manuscript and provided comments and suggestions that significantly improved the manuscript. Finally, all the authors revised the manuscript critically for important intellectual content, agreed with the content, contributed to the refinement of the study, and approved the final manuscript.

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