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Original Article

Effects of an Intervention Based on Cognitive-Behavioral Therapy on Emotional Well-being of Athletic Adolescents with Injuries

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Abstract

Introduction: Adolescent athletes face a heightened risk of injury relative to their adult counterparts, largely due to ongoing growth and developmental changes.
Objective: This study aims to explore the impact of a cognitive-behavioral therapy (CBT) intervention on the psychological well-being of school students who are athletes and have sustained injuries.
Methods: This research adopts a semi-experimental design characterized by a pre-test-post-test structure, complemented by a control group. A total of 28 male adolescent athletes who experienced injuries were chosen and randomly allocated to either the intervention or control groups. The CBT sessions were conducted bi-weekly over an eight-week duration, with each session lasting 75 minutes. To assess levels of burnout, anger, anxiety, and depression, the study utilized the Sports Burnout Questionnaire, the State-Trait Anger Expression Inventory 2, the Beck Anxiety Inventory, and the Beck Depression Inventory. Data analysis was performed using independent t-tests and analysis of covariance.
Results: A total of 76.6% of participants in the intervention group and 78.1% in the control group indicated that they had experienced injuries either before or during the primary event. The post-test results revealed a statistically significant difference between the intervention and control groups concerning athlete burnout (t=-6.528, P<0.001), anger (t=7.854, P<0.001), anxiety (t=6.947, P<0.001), and depression (t=9.658, P<0.001).
Conclusion: CBT protocol, which concentrated on psychological trauma, was effective in enhancing the psychological well-being of injured adolescent athletes. It is recommended that future studies involve participants with similar injuries to maintain consistency in injury status, thereby facilitating more accurate comparisons.

Keywords: Cognitive Behavioral Therapy, Athletic Injuries, Students, Depression, Mental Health

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1. Introduction

Professional athletes dedicate numerous hours each day to training, which not only depletes their physical and mental energy but also heightens the risk of injury. Sports injuries have historically been acknowledged as critical events in the experiences of athletes (1,2). A sports injury encompasses any injury or physical ailment that arises from training or competitive sports, necessitates medical intervention, or hinders participation in athletic activities for a specified duration (3). A commonly accepted definition characterizes a sports injury as damage to tissue or a functional impairment resulting from physical exertion, often confined in research to incidents that require medical attention and lead to time lost from participation or the ability to engage in sports activities (4,5).

Sports injuries among athletes can lead to significant repercussions, impacting their physical, mental, and emotional well-being (4,6,7). As sports evolve into a multifaceted phenomenon that transcends mere entertainment, the demand for professional athletic activities has surged, consequently resulting in a notable increase in sports-related injuries. Such injuries represent one of the most critical threats to the careers of professional athletes, with thousands experiencing serious injuries each year (3,6). Although advancements in sports rehabilitation science have facilitated considerable improvements in the recovery of injured athletes, overlooking the psychosocial aspects of recovery can hinder this process and may even prevent athletes from returning to the field at their previous performance level (7,8). The financial implications of these injuries are substantial for both the athletes and their respective sports organizations, prompting efforts to reduce the likelihood of injuries and, when they do occur, to create conditions that enable a quicker and more effective return to play (9). Following severe injuries, many professional athletes find it challenging to regain their pre-injury performance levels, despite having addressed physical damage and fitness, which ultimately shortens their athletic careers. This situation results in economic,

psychological, and professional losses for both the athletes and the clubs (1,5,10).

Athletes participating in sports competitions face scrutiny from referees and spectators, as well as the inherent risk of injury. These factors contribute significantly to the pressure they experience. This stress intensifies when athletes fail to meet their own performance expectations. Furthermore, the anxiety surrounding the possibility of being sidelined from their team or disqualified from competitions due to injury - particularly when their athletic pursuits serve as a primary source of income - exacerbates their psychological pressure. Research indicates that athletes are particularly susceptible to emotional disturbances following injuries, which may manifest as heightened symptoms of depression and anxiety, as well as diminished self-confidence (11-14). Studies have identified that the predominant emotions experienced by athletes shortly after sustaining an injury include despair, depression, and anger (11,13,15-17). Furthermore, findings reveal that athletes often contend with stress, anxiety, anger, and challenges related to adherence to treatment in conjunction with their injuries (14,15,18). It has been observed that elevated stress levels can adversely affect athletes' health and self-esteem, potentially leading to increased anxiety. This anxiety, which negatively impacts cognitive processes, can hinder athletes' concentration and increase the risk of further injuries, a critical concern (19,20). If athletes perceive anxiety as a debilitating influence, they may face numerous adverse outcomes, such as diminished self-confidence and impaired performance. Various mood disorders, including heightened depression, tension, and anger, have been documented among injured athletes (15,17,19). Research has consistently shown that depression is prevalent among this population, with injured athletes reporting elevated levels of depressive symptoms (17,19-21). Moreover, depression is frequently cited as a primary reason for medical professionals to refer injured athletes to psychological support. Interviews conducted with collegiate and elite athletes across a range of sports, from basketball to wrestling, revealed that these individuals experienced a spectrum of emotions, including disbelief, fear, anger, depression, tension, fatigue, gastrointestinal distress, insomnia, and loss of appetite (12,14,15,21).

The existing literature indicates that athletes must be permitted to resume competition only when they are completely prepared both physically and mentally (22-24). Consequently, it is essential for psychologists and team physicians to evaluate emotional responses alongside physical assessments. If the emotional reactions associated with sports injuries mirror those experienced following a concussion, it follows that the management of sports injuries and concussions may also share similarities. Thus, sports injuries are one of the problems that most athletes face during their sports life and are among the concerns of athletes and coaches (2,5). Therefore, awareness and prevention of injury and dealing with it seems necessary. For this reason, in recent years, interest in this field of research has increased to investigate the nature of injuries and how they occur. With the hope that through comprehensive investigation of the nature of injuries, more knowledge and awareness will be gained and while preventing them, it will also help the process of rehabilitation and getting rid of injuries. Various factors are involved in this field. Therefore, sports psychology researchers have tried to show the possible role of thoughts, feelings and personality traits in the prevalence and occurrence of injuries.

In the current discourse on psychology, a wide array of treatment approaches has been examined for individuals experiencing mental distress, with several of these methods demonstrating their efficacy. Among the effective interventions aimed at enhancing various psychological attributes in those affected by mental trauma is cognitive-behavioral therapy (CBT). The cognitive behavioral approach has been fundamentally developed to aid individuals in coping with various mental health issues, such as depression, anxiety disorders, obsessive-compulsive disorder, eating disorders, and borderline personality disorder (25,26). Presently, interventions derived from CBT are also being employed to enhance the functioning of individuals without mental health issues. This therapeutic approach is predicated on the belief that erroneous and unsatisfactory beliefs, ineffective coping mechanisms, and negative emotional states contribute significantly to the development and persistence of various issues (27,28). CBT employs a structured psychoeducational model and places considerable emphasis on the importance of homework assignments. This treatment modality possesses distinctive characteristics, which encompass cognitive strategies such as identifying cognitive distortions, developing a positive self-concept, cognitive restructuring, and enhancing effective self-dialogue (25,27-29). Additionally, it incorporates behavioral strategies, including modeling, exposure therapy, role-playing, muscle relaxation techniques, and skills training aimed at improving coping abilities and boosting self-confidence and self-efficacy. Research has confirmed the efficacy of cognitive-behavioral stress management training in alleviating anxiety among patients; nevertheless, its effects on injured athletes have been relatively underexplored (25,29,30).

CBT currently holds a significant position within the domain of sports psychology. Strategies including mental imagery, self-talk, relaxation techniques, concentration exercises, and goal-setting are acknowledged as valuable approaches for supporting athletes in improving and maintaining their performance (31). While CBT is primarily focused on performance enhancement, its application in sports psychology also contributes to the restoration, development, and preservation of mental health. CBT in the realm of sports can be regarded as a form of cognitive-behavioral training, wherein athletes learn to modify behaviors linked to suboptimal performance - such as evading anxiety-inducing situations - into constructive and necessary actions, like strategizing for a game (32-34). This process involves the athlete persisting with a penalty kick despite feelings of anxiety. The essence of CBT lies in facilitating a transformative experience, leading to a shift towards more favorable outcomes. Research has shown that cognitive behavioral interventions are successful in regulating psychological conditions and improving the performance of athletes (32,34,35). Furthermore, the cognitive behavioral approach can assist in transforming athletes' positive cognitive assessments during high-pressure scenarios (32). Consequently, performance anxiety, which can positively influence performance, is reduced. However, there is a lack of published research concerning the effectiveness of CBT

in assisting athletes in managing stressful situations, including those related to sports injuries.

Sports injuries are prevalent among young adults and children. According to estimates from World Children's Health Statistics, over 3.5 million children and adolescents sustain injuries each year while participating in organized sports or physical activities. Approximately one-third of all injuries in children are associated with sports. The most frequently occurring sports injuries in this demographic include muscle sprains and strains. Contact sports, such as football and basketball, result in a higher incidence of injuries compared to non-contact sports like swimming and running. A study conducted in 2016 revealed that 8.6 million individuals in the United States, aged 5 to 24, experience sports-related injuries annually. The research indicated that males within this age group represent more than half of all sports injuries. The likelihood of sustaining a lower body injury is 42%, surpassing injuries to other areas. Injuries to the upper limbs account for 30.3%, while head and neck injuries make up 16.4% of the total (36). Although fatalities resulting from sports injuries are uncommon, when they do occur, they are most often due to head injuries. Then, it can be stated that young athletes face a heightened risk of injury compared to adults due to their ongoing growth and development. Here, the report highlighted that this increased susceptibility to injury is attributed to the presence of open growth plates in their bones. Nevertheless, the effects of therapeutic methods such as CBT on psychological wellbeing caused by injuries in adolescent athletes has been less noticed. Therefore, this research was designed to investigate the effect of an intervention based on CBT on the psychological well-being of injured athletic school-students.

2. Methods

2.1. Design and Participants

This research adopts a semi-experimental design that incorporates a pre-test-post-test methodology in conjunction with a control group. The statistical population consists of male athletes aged 15 to 18 years who have sustained injuries. For the sample of this research, 28 male adolescent athletes who sustained injuries while participating in professional sports competitions (including football, volleyball, basketball, martial arts, etc.) and exhibited mental health issues (specifically, those scoring above 14 on the Beck Depression Inventory) were selected. The participants were chosen through a convenience sampling method. The physical injuries and psychological conditions of all participants were verified by experts from the Sports Medicine Federation, and their involvement in the study was entirely voluntary. This selection process involved consulting with the Sports Medicine Federation and coordinating with its specialists. Initially, a list of athletes meeting the specified physical and mental injury criteria was compiled. Subsequently, an introductory interview was conducted with each individual to explain the research objectives. Those who expressed a willingness to participate voluntarily were included in the study. The sample size was established based on the experimental nature of the research, which typically requires a minimum of 8 to 12 participants. To address the potential effects of participant attrition, which poses a risk to the internal validity of the study, a final sample size of 28 was established. This sample was subsequently randomized into two groups of 14 participants each: one designated as the intervention group and the other as the control group. Inclusion criteria were: 1) being male adolescent athletes who, as determined by specialists from the Sports Medicine Federation, had sustained injuries due to sports-related activities; 2) not exhibiting any significant mental health issues requiring treatment; and 3) completion of a consent form by both the athlete and their parents. Exclusion criteria were: 1) missing more than two sessions during the intervention period; and 2) a lack of willingness to continue the involvement in the research.

2.2. Measurements

2.2.1. Sports Injuries

Sports injuries were characterized as injuries sustained during participation in athletic activities. For an injury to be included, it must have occurred during a practice session or a competitive event, and the affected individual must have been sidelined from athletic participation for a minimum of one day due to the injury. The classification of injury severity was categorized into three levels: 1) mild (one to seven days), 2) moderate (one week to one month), and 3) severe (exceeding one month), determined by the duration of the athlete's inability to engage in physical activity. The evaluation of sports injuries was conducted using a questionnaire developed from existing instruments found in the research literature. This questionnaire encompasses inquiries regarding both the athlete's current injury. Questions pertaining to the current injury include: the specific type of sports injury was diagnosed by a medical professional (identification of the injury), the circumstances under which the injury occurred (with three options: training prior to the main event, the main event itself, and seasonal training), the number of days since the injury took place, and the duration of time the injury has prevented the athlete from resuming sports participation (absence duration due to the injury), with three response options: one to seven days, one week to one month, and more than one month.

2.2.2. Athlete Burnout

The sports burnout questionnaire created by Raedeke and Smith (38) was utilized to evaluate sports burnout levels. This instrument comprises 15 items, each assessed using a five-point Likert scale, where one indicates strong disagreement and five indicates strong agreement. It is organized into three subscales, with each subscale containing five items that focus on emotional and physical exhaustion, a diminished sense of accomplishment in swimming, and the devaluation of swimming. In the context of this study, the validity of the questionnaire was affirmed by eight experts, resulting in a CVI of 0.94 and a CVR of 0.94. Additionally, the Cronbach's alpha coefficient for the instrument was determined to be 0.96.

2.2.3. Anger

The State-Trait Anger Expression Inventory 2 (STAXI-2) was employed to assess the anger expression of participants. This instrument evaluates the experience, expression, and regulation of anger. Comprising 57

items, the questionnaire includes six scales, five subscales, and an Anger Expression Index that offers a comprehensive measure of overall anger expression. Responses are recorded on a four-point Likert scale, ranging from never (0) to always (3). The total score can vary from 0 to 171, with higher scores reflecting greater levels of anger expression. In the context of this study, the instrument's validity was affirmed by eight experts, resulting in a CVI of 0.96 and a CVR of 0.96. Additionally, the Cronbach's alpha coefficient for the instrument was determined to be 0.90.

2.2.4. Anxiety

The Beck Anxiety Inventory (BAI) (40) was used to measure anxiety of the participants. The BAI is a self-administered tool intended to assess the severity of anxiety in both adolescents and adults. Comprising 21 items, this scale requires respondents to select one of four possible answers for each item, reflecting their level of anxiety. The response options are scored on a scale from 0 to 3, allowing for a nuanced evaluation of anxiety symptoms. Each item addresses a typical symptom associated with anxiety, encompassing mental, physical, and panic-related manifestations. Consequently, the overall score derived from this questionnaire can range from 0 to 63. In this study, the validity of this instrument has been confirmed by eight experts, yielding a CVI of 0.92 and a CVR of 0.92. The Cronbach's alpha coefficient for the survey was found to be 0.94.

2.2.5. Depression

The Beck's Depression Inventory (BDI) was employed to assess the depression levels of the participants. This self-report instrument consists of 21 items that encompass a range of symptoms related to depression. Participants are instructed to answer each item using a four-point scale, which ranges from zero to three. The inventory categorizes its items into different domains: 2 items pertain to emotional aspects, 11 items focus on cognitive factors, 2 items relate to observable behaviors, 5 items address physical symptoms, and 1 item concerns interpersonal communication. This scale is adept at measuring varying degrees of depression, from mild to extremely severe, with total scores that can range from 0 to 63. By aggregating the scores from all categories, one can ascertain the individual's overall depression score. The interpretation of these scores is as follows: a score between 0 and 13 indicates no or minimal depression; a score from 14 to 19 suggests mild depression; a score ranging from 20 to 28 indicates moderate depression; and a score between 29 and 63 reflects severe depression. In the context of this study, the instrument's validity has been corroborated by eight experts, resulting in a CVI of 0.94 and a CVR of 0.92. Additionally, the Cronbach's alpha coefficient for the inventory was determined to be 0.96.

2.3. Intervention

CBT sessions for injured athletes were organized in a group format (35). These sessions took place twice a week over a period of eight weeks, with each session lasting 75 minutes. The protocol for the cognitive-behavioral approach was specifically developed to identify, challenge, and modify the negative thought patterns of injured athletes. The structure of the sessions not only focused on cognitive techniques but also incorporated behavioral strategies, such as relaxation through music and mental imagery exercises. During the initial session, the therapist engaged with the injured athletes to discuss their treatment expectations and facilitate introductions among participants. The second session focused on exploring the challenges faced by the injured athletes, examining how their problems, thoughts, and life experiences were formed. Subsequent sessions introduced the ABC model, which encompassed the events experienced, the interpretations of those events, the emotional repercussions of such interpretations, and a discussion on negative thoughts. Participants were encouraged to identify their negative thoughts, confront them, and gradually replace them with more positive or rational alternatives. Additionally, the injured athletes received instruction on recognizing negative thoughts, coping strategies, stress management techniques, and potential responses to these thoughts.

2.4. Procedure

The initial assessment was conducted during the first intervention session. Following this, the members of the intervention group underwent CBT for a duration of eight weeks, while the control group received no specific training during this time. Upon completion of the intervention period, all participants took part in a post-test, which was administered under the same conditions as the pre-test.

2.5. Data Analysis

In this research, descriptive statistical methods, including mean, standard deviation (SD), and frequency percentage, were utilized to define the research variables. An independent t-test was conducted to assess the demographic data of the participants. Furthermore, a chi-square test was employed to analyze the incidence of sports injuries among different groups. To evaluate the differences between pre-test and post-test results of the research variables, both independent t-tests and analysis of covariance were implemented. All statistical analyses were performed using SPSS software, with a significance threshold set at 0.05.

3. Results

Demographic characteristics of the participants are presented in Table 1. The analysis reveals that the mean age and standard deviation (SD) for participants in the intervention group were 16.87±0.58 years, while those in the control group had a mean age of 16.69±0.47 years. In terms of weight, the intervention group had a mean of 63.21±3.85 kg, compared to 62.58±3.42 kg in the control group. Additionally, the mean height for the intervention group was 176.96±5.45 cm, whereas the control group had a mean height of 175.84±4.55 cm. Furthermore, the mean body mass index (BMI) for participants in both groups was 20.2±0.78 kg/m^2 for the intervention group and 20.2±0.69 kg/m^2 for the control group. The results from the independent t-test indicated that there were no statistically significant differences across all demographic variables ($P>0.05$).

Table 1. Demographic Data across Groups.

	Age	Weight	Height	BMI
Intervention	16.87±0.58	63.21±3.85	176.96±5.45	20.2±0.78
Control	16.69±0.47	62.58±3.42	175.84±4.55	20.1±0.69
Comparison	t=0.045	t=0.235	t=-0.035	t=0.003
	P=0.965	P=0.748	P=0.986	P=0.993

Table 2 presents the findings related to sports injuries across different groups. In evaluating the severity of a sports injury, the duration of time an athlete is unable to engage in sports activities is regarded as a significant factor (absence duration due to injury). This study categorized the duration of absence into three groups: less than one week, one week to one month, and more than one month. The research findings indicated that 65.7% of participants in the intervention group and 63.8% in the control group reported that their injury prevented them from participating in sports for less than a month. Conversely, 34.3% of the intervention group and 36.2% of the control group indicated that they were unable to resume their sports activities for over a month. This suggests that 65.7% and 63.8% of the participants in the intervention and control groups, respectively, experienced mild to moderate sports injuries, while 34.3% and 36.2% reported severe injuries. Furthermore, the results revealed that 76.6% of the intervention group and 78.1% of the control group reported sustaining injuries prior to or during the main event, while 23.4% and 21.9% of the participants in the intervention and control groups, respectively, indicated that their injuries occurred during seasonal training.

Table 2. The Results of the Sports Injuries across Groups.

	Absence Duration			Circumstances Under which the Injury Occurred		
	<1week	1week to 1 Month	>1 Month	Prior to Event	During Event	Seasonal Training
Intervention	35.1%	30.6%	34.3%	12.1%	64.5%	23.4%
Control	34.7%	29.1%	36.2%	13.0%	65.1%	21.9%
Comparison	X^2=3.170	X^2=2.425	X^2=3.658	X^2=1.470	X^2=0.269	X^2=1.023
	P=0.204	P=0.365	P=0.128	P=0.568	P=0.857	P=0.685

Table 3 shows the mean and SD of the athlete burnout, anger, anxiety and depression. Regarding athlete burnout, the results showed no significant difference between groups in the pre-test (t=0.024, P=0.984). However, the results showed that there was a significant difference between groups in the post-test (F=6.854, P<0.001). According to the descriptive data (Table 3), exposing to a CBT has significantly improved athlete burnout of the injured athletic school-students. Furthermore, regarding anger, the results showed no significant difference between groups in the pre-test (t=0.039, P=0.963). However, the results showed that there was a significant difference between groups in the post-test (F=8.845, P<0.001). According to the descriptive data (Table 3), exposing to a CBT has significantly reduced anger of the injured athletic school-students. Additionally, regarding anxiety, the results showed no significant difference between groups in the pre-test (t=0.030, P=0.928). However, the results showed that there was a significant difference between groups in the post-test (F=7.364, P<0.001). According to the descriptive data (Table 3), exposing to a CBT has significantly reduced anxiety of the injured athletic school-students. Finally, regarding depression, the results showed no significant difference between groups in the pre-test (t=0.056, P=0.893). However, the results showed that there was a significant difference between groups in the post-test (F=10.527, P<0.001). According to the descriptive data (Table 3), exposing to a CBT has significantly reduced depression of the injured athletic school-students.

Table 3. Mean and SD of the Research Variable's' Scores across Groups in the Pre-test and Post-test.

Variables	Phase	Group	
		Intervention	Control
Athlete burnout	Pre-test	3.2±0.89	3.1±0.93
	Post-test	2.2±0.74	3.2±0.87
Anger	Pre-test	130.25±14.39	131.75±12.84
	Post-test	114.32±11.66	132.56±13.55
Anxiety	Pre-test	34.36±3.54	33.25±3.16
	Post-test	24.63±2.58	33.93±3.47
Depression	Pre-test	23.12±5.93	22.51±4.46
	Post-test	13.52±2.77	23.51±5.89

4. Discussion

Young athletes face a heightened risk of injury compared to adults due to their ongoing growth and development. Nevertheless, the effects of therapeutic methods such as CBT on psychological wellbeing caused by injuries in adolescent athletes has been less noticed. Therefore, this research was designed to investigate the effect of an intervention based on CBT on the psychological well-being of injured athletic school-students. Initial findings related to the sports injuries indicated that 76.6% of the intervention group and 78.1% of the control group reported sustaining injuries prior to or during the main event, while 23.4% and 21.9% of the participants in the intervention and control groups, respectively, indicated that their injuries occurred during seasonal training. The findings indicate that a notable proportion of research participants sustained injuries at times outside the primary duration of the sporting event. This suggests that there is a pressing need for increased attention and care for adolescent athletes from their respective sports team coaches.

In addition, the results of this study showed that exposing to a CBT has significantly improved athlete burnout of the injured athletic school-students. The emergence of burnout among athletes is a highly individualized phenomenon, shaped by a range of

contributing factors. Research, including studies on CBT, demonstrates that such interventions can effectively alleviate symptoms of burnout (42,43). Recent advancements in the third wave of CBT highlight the significance of mindfulness and acceptance as crucial components in both the prevention and treatment of burnout. However, there is a scarcity of detailed descriptions regarding interventions in the sports context (44). Nevertheless, maintaining a focus on the present and minimizing rumination have shown promise in mitigating stress and burnout. Additionally, findings related to perfectionism suggest that perfectionistic tendencies may serve as a risk factor for athletes, increasing their vulnerability to burnout (45). To mitigate this risk, practitioners should consider addressing and reducing perfectionistic concerns among the athletes they support. Clinical evidence indicates that cognitive-behavioral strategies and guided self-help can effectively diminish perfectionistic tendencies (44,45). While further research is necessary to evaluate the effectiveness of these interventions specifically for athletes, both CBT and mindfulness-based approaches hold significant potential for the prevention and management of burnout symptoms.

Moreover, the results of this study showed that exposing to a CBT has significantly reduced anger, anxiety and depression of the injured athletic school-students. In elite sports, the likelihood of sustaining injuries is significantly heightened. For the majority of athletes, injuries incurred during the regular season, although disheartening, are typically deemed tolerable. These injuries usually do not result in severe emotional distress (26). Nevertheless, studies indicate that a considerable number of athletes encounter challenges and, in certain instances, extended recovery periods due to psychosocial elements, including ineffective coping mechanisms and insufficient goal-setting abilities throughout their rehabilitation process (29). Various psychological interventions, both short-term and long-term, have been suggested to enhance psychological health and support physical recovery. The predominant psychological response observed among athletes experiencing injury was anxiety. A significant number of educators and psychologists tend to overlook research focused on anxiety reduction, often dismissing relaxation techniques as ineffective in therapeutic contexts, and they may not prioritize acquiring knowledge about these methods (31,34). This oversight may reflect a limited appreciation for the importance of relaxation techniques, which are commonly employed by psychologists in managing anxiety. In this study, relaxation techniques and mental imagery were implemented within a cohort of injured athletes. Through discussions, sharing emotional experiences, and mutual support during the treatment process, we monitored the alleviation of anxiety across the post-test (35).

An additional significant psychological factor is depression, which can affect injured athletes, who are not exempt from experiencing this condition. Research suggests that there may be specific risk factors associated with the athletic population that heighten the likelihood of depression when compared to the general public (36). The CBT approach has been found to be more effective than other psychological interventions for addressing depression in injured athletes, yielding more consistent treatment outcomes. This effectiveness is attributed to the high level of interaction and feedback within the group, allowing injured athletes to recognize that their experiences are not isolated (24,25). The perception of injury as unique can exacerbate the condition and lead to social isolation, making the stability of this treatment method particularly beneficial. To interpret the findings of this research, which indicate that CBT is more effective in alleviating depression, it is important to recognize that the cognitive framework of an individual suffering from depression is predominantly shaped by negative self-perceptions. These perceptions are influenced by their current experiences of injury and their outlook on the future of their professional sports career. Negative self-perceptions encompass the belief that one is flawed and incapable due to an injury, leading to the conviction that personal fulfillment is unattainable (27,29). Furthermore, the individual's negative interpretations of their experiences contribute to this mindset; they often view challenges as insurmountable, disregarding more optimistic perspectives that may exist. This tendency to adopt the most pessimistic interpretation of events exacerbates their condition. Lastly, a depressed individual's outlook on the future of their sports career is characterized by a sense of helplessness (30,31).

One effective therapeutic method for managing and mitigating aggressive behavior and anger is the cognitive-behavioral approach. This approach highlights that CBT, in conjunction with factors such as genetic predispositions and family history, plays a significant role in both the emergence and persistence of anger following treatment. Anger and frustration often arise in response to genuine and unavoidable challenges (29). For professional athletes, the experience of injuries can exacerbate feelings of frustration, leading to heightened anger as they strive to regain their physical and mental well-being, particularly during the early stages of rehabilitation. It appears that as the rehabilitation process progresses, the growing impatience to return to competitive sports becomes a primary catalyst for frustration and anger (30).

The notable strength of this study was its implementation of an intervention aimed at enhancing the psychological well-being of injured adolescent athletes, a subject that has received limited attention in earlier research. Conversely, the primary limitation of this study is the absence of pre-injury profiles for all assessed variables. Acquiring this information could enhance the comprehension of the comprehensive emotional effects of injury on elite athletes. Currently, certain professional sports teams are implementing physiological and psychological assessments prior to the season, which may facilitate the collection of more pre-injury profiles in the future.

4.1. Conclusion

The current study demonstrated that the CBT protocol, which concentrated on psychological trauma, was effective in enhancing the psychological well-being of injured adolescent athletes. This research appears to be the first of its kind to investigate various facets of the injury recovery process among injured teenage athletes within a brief timeframe. As such, it contributes valuable insights to the existing literature on the psychological impacts of sports injuries, offering essential information for coaches, athletes, and medical personnel to better understand the

recovery process. While these findings are significant, they represent an initial step toward establishing a research foundation for psychological interventions tailored to this demographic. It is recommended that future studies involve participants with similar injuries to maintain consistency in injury status, thereby facilitating more accurate comparisons. Additionally, subsequent research could extend these findings to other affected groups, such as recreational and disabled athletes. Therefore, it is evident that further investigation is necessary to enhance understanding and knowledge in the area of sports injury recovery.

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Footnotes

Authors' Contribution: This study was carried out solely by the corresponding author.

Conflict of Interests: The researcher confirms that there is no conflict of interests in this study with any participant.

Data Availability: The data that support the findings of this study are openly available upon request from the corresponding author.

Ethical Approval: The author confirms that all steps and requirements of this study comply with ethical guidelines. Participants were informed about the characteristics of the study and gave written informed consent.

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