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Injuries and the Quality of Life of Collegiate Athletes: A Pilot Study

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ABSTRACT

Purpose: To explore the relationship between injury severity and athletes' quality of life, as well as the role of cognitive appraisal during participation restrictions. **Method:** A descriptive quantitative survey research design was used. Ten NCAA Division III athletes completed two self-report instruments: the *SF-12v2™ Health Survey* and a scale that ranked injury severity based on time-loss from sport. **Results:** Data analysis yielded three main findings: (a) mean mental health scores were lower than mean physical health scores in all injury severity categories; (b) three participants had higher mental than physical health scores; and (c) only four scores were beyond the range of average health by *SF-12v2™* standards. **Conclusions:** While no definitive relationship between injuries and quality of life was found, results suggested that injuries have greater psychological implications than physical implications, that the recovery process is unique for each individual, and that the *SF-12v2™* may not be the most optimal instrument for this context. The findings of this study were consistent with that of the literature, which states cognitive appraisal has a significant role in the experience of injuries and participation restrictions; thus, athletes need to be treated holistically in order for them to achieve full recovery and increase their quality of life.

INTRODUCTION

An increase in participation in intercollegiate athletics has occurred in the United States in recent years, with a 20% increase among males and an 80% increase among females.[1] This increase in participation creates a larger pool of people who are at risk for sports injuries, and many more athletes are experiencing the recovery process as a result. Severe injuries create physical impairments, which often lead to participation restrictions in daily life and the need for rehabilitation. Studies suggest that the success of rehabilitation is affected by the interaction between the severity of the athlete's injury and the intensity of the athlete's emotional response.[2] It seems, then, that a severely injured athlete would experience many participation restrictions, more negative emotions, and require longer rehabilitation, leading to a greater decrease in quality of life compared to an athlete recovering from a less severe injury. However, the way an athlete thinks about his or her injury and resulting situation has a potentially greater impact than the existence of the injury itself, and these perceptions influence rehabilitation outcomes.[3,4] Therefore, the severity of the injury and duration of rehabilitation may not be as influential on an athlete's quality of life as assumed. The purpose of this study, then, is to explore the relationship between the level of severity of an injury and the quality of life of collegiate athletes.

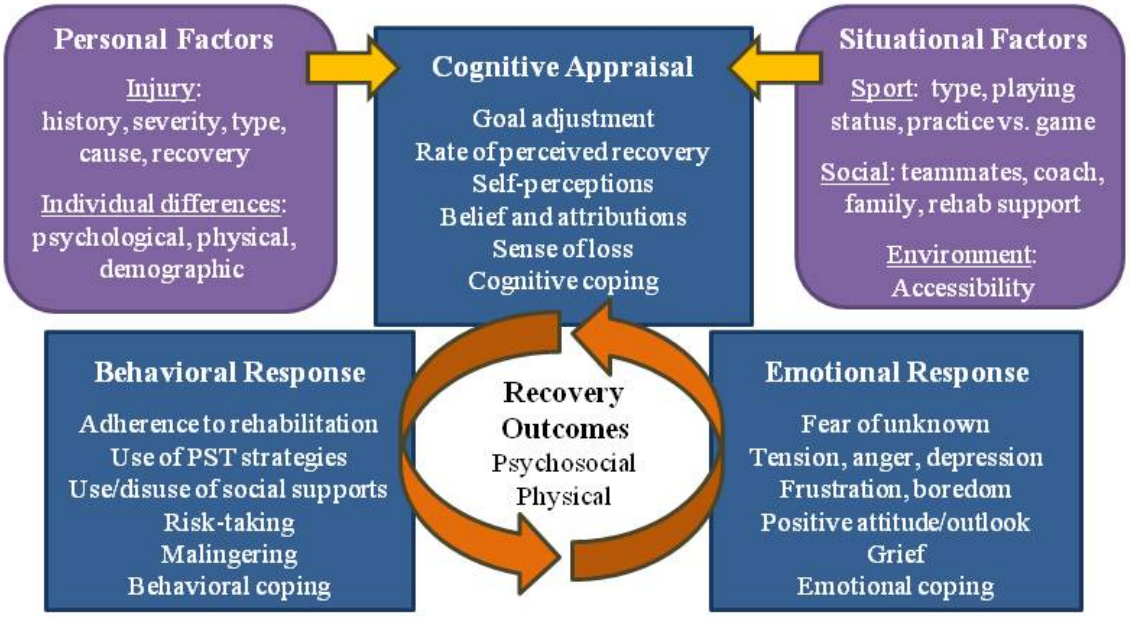
Quality of life incorporates "a person's physical health, psychological state, level of independence, social relationships, and his or her relationship to salient features of their environment."[5] Experiences essential to the quality of life of an individual (e.g., personal achievement and group membership) exist only when patterns of activity in daily life are maintained.[6] When these patterns are interrupted and involvement in life becomes problematic, a person experiences a dysfunction termed by the World Health Organization (WHO) as "participation restriction."[7] According to the model described by the *International Classification of*

Functioning, Disability and Health (ICF), participation is affected by activity, which is influenced by body functions and structures and, ultimately, impacted by a person's health condition and contextual factors.[7] In the context of sports, athletes' injuries lead to health problems and body impairments, which affect activity levels and create participation restrictions from their sport.

The interruptions to life resulting from participation restrictions impact all domains of an athlete's quality of life. One environmental feature affected is the athlete's financial resources due to medical bills. Social relationships are negatively impacted as a result of the usual development of maladaptive coping through high-risk behaviors, alcohol consumption, and other less desirable emotional expressions.[8] Independence is curtailed due to increased reliance on medical personnel, family and friends. Effects on physical health are easily observed due to the visible dimensions of the injury; however, the influence on the psychological state of an athlete is less obvious. Despite their non-observable nature, psychological consequences of injuries are numerous.[9-11] Their existence is confirmed by observing the way athletes with similar injuries recover at different rates and with different issues.[4]

Studies show that psychological factors impact the occurrence of and recovery from injury and are more influential to an athlete's performance than physical factors alone.[11-13] Wiese-Bjornstal, et al. developed a dynamic model to conceptualize the significant impact of psychological factors on the lives of athletes with injuries.[14] The Cognitive Appraisal Model (see Figure 1) involves cognitive, emotional and behavioral responses. Personal factors and situational factors influence an athlete's cognitive appraisal of the situation. This cognitive response interacts with the athlete's emotional and behavioral responses, resulting in individualized recovery outcomes in both physical and psychosocial domains.[3,15-18]

Figure 1. Graphical representation of the Cognitive Appraisal Model developed by Wiese-Bjornstal, et al.[14]



The straight arrows indicate the influence of personal and situational factors on cognitive appraisal. The circling arrows signify the dynamic interactions between the cognitive, emotional and behavioral responses to sports injuries. These interactions lead to individualized outcomes in both physical and psychosocial domains.[3,15]

Stress is the main psychological factor linked to injury. Williams and Andersen's stress-injury model explains that a person who perceives situations as stressful experiences physiological arousal (e.g., increased muscle tension, reduced coordination, diminished fluidity of movements and narrowed visual fields), distractibility, and a higher risk of injury.[19-21] Memories that involve stressful events, personality traits that intensify stress (e.g., anxiousness, aggressiveness, frustration), and maladaptive coping can cause a person to appraise situations as stressful.[19,22,23]

A person's capacity to tolerate stress has been linked to decreased vulnerability to injury; moreover, psychological interventions have been noted to reduce stress and injuries.[20,21] Naoi and Ostrow found that collegiate athletes believed cognitive interventions

were critical to their psychological and physiological recoveries from injuries.[17] Thus, addressing psychological factors improves sport injury prevention and treatment.[20, 23]

In summary, research indicates that participation restrictions negatively impact quality of life and cognitive appraisal influences an athlete's injury experience. But, how does the severity of an athlete's injury relate to quality of life? And, how is cognitive appraisal related to participation restrictions? The purpose of this study is to explore these relationships by comparing the severity of athletes' injuries to their quality of life. The overall intent is to increase understanding of the impact that injuries have on athletes' lives in order to determine how to best support these individuals during their recovery. Additionally, this project aims to relate these findings to occupational therapy.

METHOD

A descriptive quantitative survey research design was utilized to explore the relationship between the quality of life of athletes and the severity of their injuries. Ethical approval for this study was obtained from the Institutional Review Board of the participating college. No conflicts of interest have been identified by the researchers.

An "Introductory Letter" was emailed to the coaches at the college, which they forwarded to their teams. The letter introduced the purpose of the study and asked for volunteers who met the following inclusion criteria: (a) belonged to a NCAA Division III sports team, (b) had been injured while participating in their sport, and (c) had consulted with an athletic trainer or physician concerning the injury and/or received treatment or self-administered treatment within the past week. Since there is no universal method for describing a sport injury, injury was operationally defined as any injury sustained during participation in sport that required treatment but may or may not have resulted in restriction from competition or practice.[10] Treatment within a one-week period was required to prevent recall biases.[24]

A convenience sample of 10 NCAA Division III athletes from a small comprehensive college in the United States participated in this study. Athletes who met the inclusion criteria and agreed to participate completed a survey packet that was available in the athletic training room at the college. The packet contained a consent form, questionnaire and the *SF-12v2™ Health Survey*. Participants were instructed to fill out the packet and insert it into a closed drop-box. Upon collection of the packets, each of the participants' forms were assigned an identification number to protect confidentiality. Also, the researcher signed each consent form and sent the originals to the participants via mail; a copy of each was kept in a secure location.

Questionnaire

This form gathered demographic characteristics as well as sport and injury information. Participants described their injury experience using the *Injury Severity Scale* (see Figure 2), a four-point scale designed by the researcher based on increasing amounts of participation restriction. Category 1 represented the least severe injuries while Category 4 represented the most severe, in accordance with literature that indicated time-loss from sport was more consistent with athletes' perceptions of injury severity and more consequential to the athlete and team.[10,25,26] Additionally, this operational definition was chosen since time-loss injury definitions are typically used in the competitive sports arena.[26] Moreover, time restricted from participation can be reliably measured, reducing biases associated with self-report descriptions of injury severity.[10,21]

Figure 2. The *Injury Severity Scale* as it appeared in the survey packet questionnaire.

Severity of Current Injury:

CIRCLE the one that bests describes you. Estimate the DAYS spent in that category.
(If you cannot decide between categories, complete all that you feel applicable.)

While receiving treatment this past week…

1. _____ I played full time in practices and competitions.
2. _____ I played but with some restrictions during practice.
3. _____ I was not allowed to practice at all.
4. _____ I was not allowed to play in practices or competitions.

Participants were grouped into the category in which they had spent the most days during the last week.

SF-12v2™ Health Survey

This multi-purpose health survey contains twelve questions and measures eight domains of health, which are labeled physical functioning, role physical (i.e., problems resulting from physical health), bodily pain, general health, vitality, social functioning, role emotional (i.e., problems resulting from emotional health), and mental health.[27] Participants answers were aggregated and yielded two overall scores: a Mental Component Score (MCS) and Physical Component Score (PCS).[27] These scores were determined to be appropriate measurements of quality of life for a couple of reasons. First, physical health and mental health represent two of the six domains used by WHO to describe quality of life. Second, well-being contributes to quality of life and is also described as including physical and mental health components.[5]

SF-12v2™ scores are standardized on a scale from 0-100, with a mean of 50 and *SD* of 10. Scores above 60 signify increasing health, while those below 40 indicate decreasing health. Norm-based scoring was generated from the 1998 general U.S. population. Extensive empirical research has been conducted to establish the reliability and validity of this tool.[27]

Statistical Analysis

After completed *SF-12v2™* forms were scored, MCS and PCS scores were analyzed using SPSS 16.0 for Windows. Comparisons were made between these scores and the categories of injury severity based on descriptive statistics and visual analysis.

Table 1. *SF-12v2™* Scores, Injury and Demographic Data Grouped by Participants' Injury Severity

Injury Severity Scale	Case	*SF-12v2™*		Injury Data				Other Data	
		MCS	PCS	Type	Days Injured	Treatment	History	In-season	Sex
1	7	36.11	55.10	Strain	64	Therapy	First	Y	F
	9	60.49	45.36	Strain	28	Therapy	Repeated	Y	M
	M	**48.30**	**50.23**						
2	2	42.19	51.28	Sprain	16	Therapy	Repeated	Y	F
	3	52.23	47.75	Strain	13	Therapy	New	Y	M
	6	47.86	49.66	Sprain	23	Therapy	New	Y	F
	10	44.48	58.02	Strain	17	Therapy	Repeated	Y	F
	M	**46.69**	**51.68**						
3	4	54.69	57.47	Sprain	40	Therapy	First	Y	F
	M	**54.69**	**57.47**						
4	1	23.56	41.55	Concus-sion	49	Medical	Repeated	Y	F
	5	52.47	54.51	Surgical	184	Both	First	N	F
	8	60.91	46.58	Surgical	198	Both	First	N	M
	M	**45.65**	**47.55**						

Note. ***M*** = mean. Y = yes. N = no. M = male. F = female.

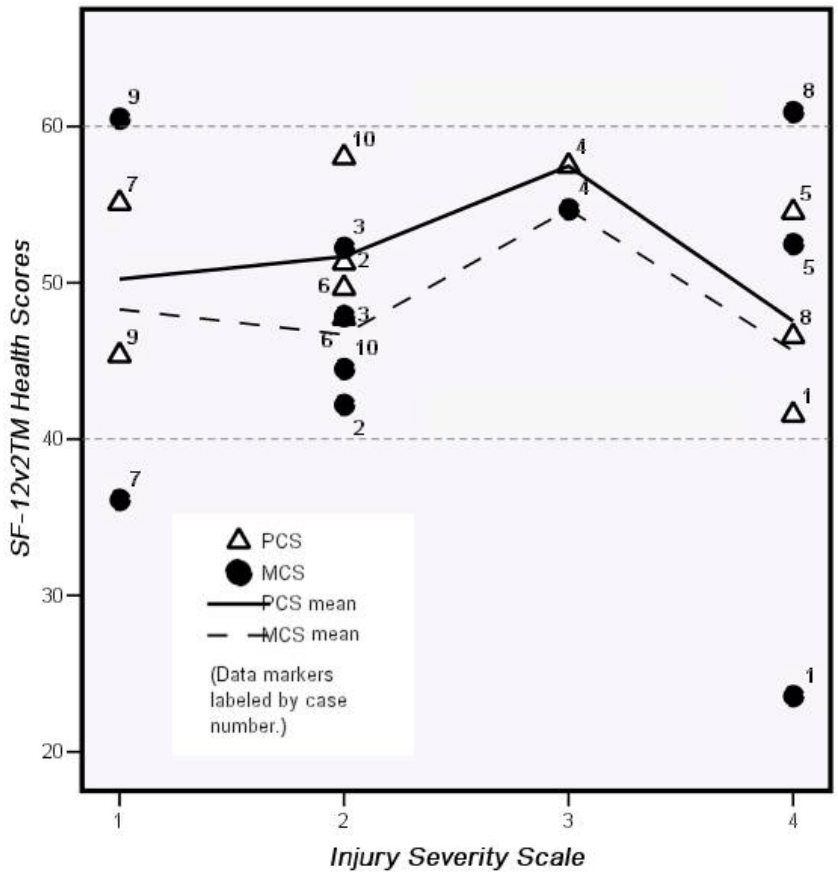
Comparisons of this data were conducted via a scatter plot (see Figure 3). Visual analyses indicated numerous changes in level and trend of the data. Comparison of the mean SF-12v2™ scores between each injury severity category revealed lower MCS scores compared to PCS scores. Category 4 had the lowest mean MCS and PCS scores. While the majority of participants had higher PCS than MCS scores, Cases 3, 8, and 9 scored higher on the MCS scale. Also, only four out of the 20 scores were significant according to SF-12v2™ norm-based scoring; MCS scores for Cases 1 and 7 were significant for decreasing health, while those for Cases 8 and 9 were significant for increasing health.

RESULTS

Seven females and three males participated in this study, ranging in age from 18 to 22 (*M* = 20.20 years old). There was one first-year, one sophomore, five junior, and three senior students. At the time of the study, two of the ten athletes played out-of-season sports: field hockey and soccer. The other eight played in-season sports: lacrosse, track-and-field, and baseball. Participants' injuries included one concussion, three sprained ankles, four strained muscles, and two injuries that required surgical reconstruction. Time since onset of injury ranged from 13 to 198 days (*Mdn* = 34 days). Reported treatments were assigned to one of three groups: (a) medical, consisting of medication, surgery, and medical imaging; (b) therapeutic, consisting

of modalities, stretches, and exercise routines; or (c) both. Of the ten participants, 40% received treatment for a repeated injury; 20%, for a new injury; and, 40%, for the first time in their college careers. Two injuries were classified as Category 1, four as Category 2, one as Category 3, and three as Category 4, according to the *Injury Severity Scale.* Participants' MCS and PCS scores were grouped by injury severity, and mean MCS and PCS scores for each category were calculated. Refer to Table 1 for representation of the data according to the category of injury severity attributed to each case.

Place Figure 3 here. *SF-12v2™* scores grouped according to participants' injury severity.



The X-axis is labeled with the four injury severity categories. The Y-axis is scaled by tens to measure SF-12v2™ scores. White triangles represent physical component scores (PCS); black circles represent mental component scores (MCS). The solid black line connects the mean PCS scores from each injury severity category; the dotted black line connects the mean MCS scores. The small, dotted gray lines at 60 and 40 enclose the range of average health; above 60 indicates increasing health, and below 40 indicates decreasing health according to SF-12v2™ norm-based standards.[27]

DISCUSSION

The results of this study suggested that there was no clear relationship between the severity of injuries and the quality of life of athletes due to variability in individual scores and multiple changes in level and trend of mean scores. Data outliers may explain these results. For example, Categories 1 and 4 each contained two participants who had significant MCS scores in opposite directions of health, while Category 3 contained only one participant. As a result, it was difficult to determine the score that best represented each category of injury severity. If the MCS scores of Cases 9 and 1 were more representative of Categories 1 and 4, then a negative relationship between increasing injury severity and quality of life might be assumed. This same relationship could be hypothesized to a certain extent if Category 3 was excluded and only Categories 1, 2, and 4 were compared. Excluding data, however, would be data manipulation; therefore, a relationship between *SF-12v2™* scores and injury severity could neither be supported nor negated.

On the other hand, relationships between injuries and physical and mental health were more conclusive. Seven out of ten participants received lower MCS than PCS scores. Comparison of the mean scores across injury severity categories indicated

that mental health was more negatively impacted than physical health. This trend supported and was supported by existing literature which states that the way athletes think about their injury and resulting situation is more consequential than the physical injury itself.[3,4] For example, fear is a prevalent thought that impacts athletes' responses to injury.[3] Loss of playing time in sport leads to fears of physical deconditioning, of losing a spot on the team, and of never being able to play again.[3,15] Fearing and subsequently experiencing this inability to continue sport participation threatens the individuals' identities as athletes and leads to profound emotional challenges that impact rehabilitation.[3]

While the majority of cases suggested injuries impacted mental health more than physical health, three participants' *SF-12v2™* scores did not align with the data trend of having lower mental health. Cases 3, 8, and 9 had higher MCS than PCS scores. This variability in the data may be attributed to the uniqueness of the recovery process as described by the Cognitive Appraisal Model.[14] Gender, personality, adaptive coping skills, and social support networks are only a few of the factors that influence the mental health of an athlete and the manner in which he or she recovers.[16,28] Out of these, this study only measured gender and determined it may be one factor to explain the data's variability.

Reuter and Short noted that fear negatively impacts recovery, and that fear levels are greater in females than males.[13] In this study, the three participants with higher MCS scores were males; everyone else was female. Other similarities between the three cases were hard to identify. For example, Cases 3 and 9 were in-season athletes, while Case 8 was out-of-season. All three reported different injury histories. Time spent injured ranged from 28 days to 198 days. Case 8 received therapy and medical treatments for an injury that required surgical repair, while Cases 3 and 9 received therapy for sprained ankles. Furthermore, while Case 4 shared the same treatment and injury type as Cases 3 and 9, her MCS score was lower than her PCS score. This disparity in commonalities suggests that the existence of personal and situational factors is not as consequential to the health of athletes as the athletes' perceptions of these factors, which aligns with the tenets of the Cognitive Appraisal Model. These perceptions make the recovery process unique regardless of similarities among injury factors.[4]

Limitations

The small sample size is a limitation as it is unclear whether data correctly represent each injury severity category. Combined with the use of convenience sampling, generalizability of the findings may be limited. Also, the small sample size may be part of the reason no trends between injury severity and quality of life were detected.

Another limitation is the method of defining injury severity. Time-loss definitions reveal the immediate impact that injuries can have, but they are dependent on the characteristics of the sport and athlete, which are both highly variable and individualized.[10] For instance, the same injury may restrict participation from one sport but not influence participation in another.[25] Two athletes may react differently to the same injury based on unique physical and emotional responses; one may refrain from play due to low pain tolerance, while the other may continue playing and ignore the pain.[10,20] Therefore, the validity and reliability of the *Injury Severity Scale* may be questionable as well as the accuracy of using injury severity to indicate participation restrictions.

A third limitation is the nature of data collection. The survey packet included self-report questionnaires, which were completed in uncontrolled environments. Consequently, survey results may be biased due to persons feeling pressured to respond in certain ways based on physical and social contexts. Since subjective responses were not compared to objective measurements, potential biases remain undetected.

Not assessing or controlling for the various factors that affect recovery poses a fourth limitation. Team dynamics, intensity of treatment, academics, and other concerns beyond the sport setting may have influenced participants' responses and, thus, their mental health scores.[17] Any number of these in combination with other physical, psychological, and emotional factors may have confounded the data.

Finally, the appropriateness of using the *SF-12v2™ Health Survey* to assess the impact of participation restrictions on the quality of life of athletes is questionable as the majority of athletes' scores fell within the range of average health. According to this assessment, then, these athletes were mostly healthy both physically and mentally. Sports injuries are typically physical ailments, which create participation restrictions as indicated by their classification in injury severity categories two through four. Additionally, empirical research, which states that there are numerous psychological and physical implications of injuries, suggests that injured athletes do not remain physically and mentally healthy during the recovery process.[9-11,13] As a result, the *SF-12v2™* may have poor responsiveness to the athletic population and may not be the best instrument for this context.

Future Research

More research is needed to discover if the conclusions of this pilot study can be supported. Future studies may be able to determine (a) if injuries consistently impact mental health more than physical health; (b) if correlations between the *SF-12v2™ Health Survey* and the *Injury Severity Scale* can be found, or if inconsistencies remain continuing to emphasize the uniqueness of the recovery process; and (c) if the *SF-12v2™* is an appropriate instrument to measure participation restrictions and quality of life of injured athletes.

IMPLICATIONS

Addressing the psychological domain of injured athletes is critical.[20,23,29] Recovery will only be efficient and successful if athletes' mental health and physical health are treated simultaneously.[30] To do so, coaches and rehabilitation professionals need to work together. They must be aware of athletes' social networks in order to determine if these are adequate and supportive, particularly if that person is a freshman, transfer student, or far from home.[17,28] They must educate athletes about the injury and rehabilitation plan, including possible setbacks.[17] If necessary, they must refer athletes to sports psychologists who can enhance athletes' rehabilitation by discussing and rehearsing barriers and other difficult situations, setting goals with the individuals, encouraging positive self-talk, and providing relaxation training.[22,31] In conclusion, injured athletes are best supported through the recovery process when they are treated holistically.[28]

While empirical research supporting these statements is prevalent, Washington-Lofgren, et al found that nearly half of the 365 athletic trainers that participated in their study reported limited capacities to use psychological interventions. They expounded that athletic trainers would benefit from more formal education to increase familiarity with these techniques.[32] This is where occupational therapy can be useful.

Occupational therapy is rooted in the belief that a person should be viewed and treated holistically. Moreover, it revolves around client-centered and occupation-based interventions.[6] Incorporating these philosophies into the treatment of athletes would be helpful. Client-centered treatment would ensure athletes are involved in rehabilitation planning and prompt them to assume internal loci of control. Internally controlled events have been shown to strengthen motivation and increase adherence to rehabilitation programs, leading to positive outcomes for treatment.[4] In addition, athletes would benefit from the use of meaningful activity. It has been stated that "…the way to improve the quality of life is not primarily through thinking, but through doing."[33] Thus, occupational therapy's philosophy of occupation-based treatment might be the next step to eliciting a more efficient and successful recovery process for injured athletes.

CONCLUSIONS

The purpose of this study was to explore the relationship between the severity of athletes' injuries and their quality of life, as well as the role of cognitive appraisal during the experience of participation restrictions. The results of this pilot study suggest that various levels of injury severity do not directly relate to quality of life, but rather that mental health is impacted more than physical health regardless of injury severity or extent of participation restriction. This study suggests that the impact of the injury and subsequent participation restrictions on quality of life is related to how the athlete thinks about his or her situation. Thus, our findings reinforce the idea that cognitive appraisal plays a significant role in the experience of injuries and participation restrictions.[14,15,18]

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