

# An in-depth analysis of elite taekwondo athletes' thoughts and behaviors during non-surgical rehabilitation following knee injuries

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*This study explores the experiences and perceptions of elite Taekwondo athletes during nonsurgical rehabilitation following knee injuries. We conducted semi-structured interviews with 30 athletes aged  $\geq 16$  years who had sustained knee injuries (ACL, PCL, medial, and lateral collateral ligaments) between 2020 and 2024, employing a qualitative study design. Thematic analysis, guided by qualitative reporting standards, revealed four key themes: "Support for Rehabilitation and Return to Sport," "Strategies for a Safe Return," "Rehabilitation as a Worthwhile Path," and "Re-injury or New Injuries Are Beyond Our Control." Athletes reported fluctuating emotions, varying levels of confidence, and complex risk appraisals regarding return to sport. Fear, both as a barrier and a motivator, emerged as a central experience throughout the rehabilitation process. These findings could enhance rehabilitation programs for elite athletes, with active involvement from coaches and therapists in each case to improve return-to-sport outcomes and reduce the risk of relapse.*

KEY WORDS: Rehabilitation Process, Return to Sports, Re-injury, Psychological factors

## Introduction

Taekwondo is included in the modern Olympics and is one of many popular combat sports (Park & Song, 2018). Like other combat sports, it poses a risk of sports injuries due to direct contact with opponents (Lee & Park, 2024). These injuries can have adverse effects not only physically but also financially, as well as causing mental and psychological pain (Saragiotto et al. 2014; von Rosen et al. 2018). Previous studies have shown that Taekwondo athletes often use kicking strategies to score points efficiently and adjust their

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distance from opponents by moving in various directions (Aloui et al. 2022; Geßlein et al. 2020). As a result, injuries among Taekwondo athletes tend to be concentrated in the lower extremities (Kim & Park, 2021). Athletes, especially in contact sports such as Taekwondo, face a high risk of new knee injuries. Studies by Wiggins et al. (2016) and Paterno et al. (2014) indicate that athletes have a 20-42% chance of experiencing a new injury to either the same knee or the opposite knee within two years of a primary knee injury. These subsequent injuries can lead to negative outcomes, including reduced knee function, decreased physical activity, and a lower quality of life (Fältström et al. 2023). Despite these risks, many athletes aspire to return to their sport following an injury (Fältström et al. 2024). Support from elite athletes seeking to return to their sport and physical therapists aiming for a common goal is often needed (Charmant et al. 2021). The success or failure of rehabilitation treatments depends on various factors, including the relationship between therapists and athletes (Hall et al. 2010; Kidd et al. 2011). These interactions may involve more physical touching and active participation from athletes than encounters with other medical professionals (Monnin & Pernerger, 2002). To optimize recovery after an injury, physical therapists should adopt a comprehensive rehabilitation approach that centers on the athlete (Jenkins et al. 2022). However, challenges such as insufficient knowledge and facilities in rehabilitation, inadequate programs, and time constraints can hinder optimal recovery (Dunphy et al. 2023). These factors can contribute to a reduction of up to 40% in the effectiveness of necessary therapeutic rehabilitation programs (Paraskevopoulos et al. 2021). This highlights the need for new insights into rehabilitation strategies to minimize the risks associated with returning to sports and the recurrence of injuries. Previous studies have identified several factors that influence the rehabilitation of injured athletes. These include motivation, confidence/self-efficacy, social support, the ability to control the situation, cognitive evaluation, coping strategies, and psychological skills (Burland et al. 2018; DiSanti et al. 2018). Additionally, factors like fear of recurrence and uncertainty regarding recovery have been noted (Mahood et al. 2020). While athletes must gradually manage their training and competition exposure after an injury and address their fears of reinjury, qualitative studies investigating these factors remain limited. (Fältström et al. 2024). Understanding psychological factors, such as the fear of relapse and confidence in recovery, is crucial when evaluating an athlete's readiness to return to sports. Therefore, this study aimed to conduct an in-depth qualitative analysis of the fear and impact of injury and recurrence during participation in a rehabilitation program among elite taekwondo athletes undergoing non-surgical rehabilitation after knee injuries.

## Methods

### STUDY DESIGN

This qualitative study collected data through semi-structured individual interviews, guided by a constructivist paradigm emphasizing knowledge construction through active experience and interpretation (Baxter & Jack, 2008). Qualitative methods enable an in-depth examination of individuals' attitudes, thoughts, and behaviors within their natural contexts and can enhance the broader understanding of medical studies (Greenhalgh, 2018; Ong, 2006). A qualitative study reporting standard checklist was employed to ensure clear and comprehensive reporting of the study (O'Brien et al. 2014).

### PARTICIPANTS AND SETTING

Participants in the study were selected from elite taekwondo athletes aged  $\geq 16$  ( $17.52 \pm 1.53$ ) who experienced knee injuries during competitions and training between January 2020 and December 2024. Athletes of all who sustained knee injuries received medical treatment and evaluation from sports medicine professionals. Ultimately, 30 elite taekwondo athletes (17 males, 13 females) diagnosed with injuries to the anterior cruciate ligament, posterior cruciate ligament, and medial and lateral collateral ligaments were selected to participate in a non-surgical rehabilitation program (Figure 1)

The study design was conducted according to the Declaration of Helsinki, and Taekwondo athletes were provided with both verbal and written information about the study. After agreeing to participate, they answered background questions and scheduled interviews through a secure web-based survey system. All athletes were interviewed using a combination of face-to-face and virtual (phone) methods. These interviews were conducted by

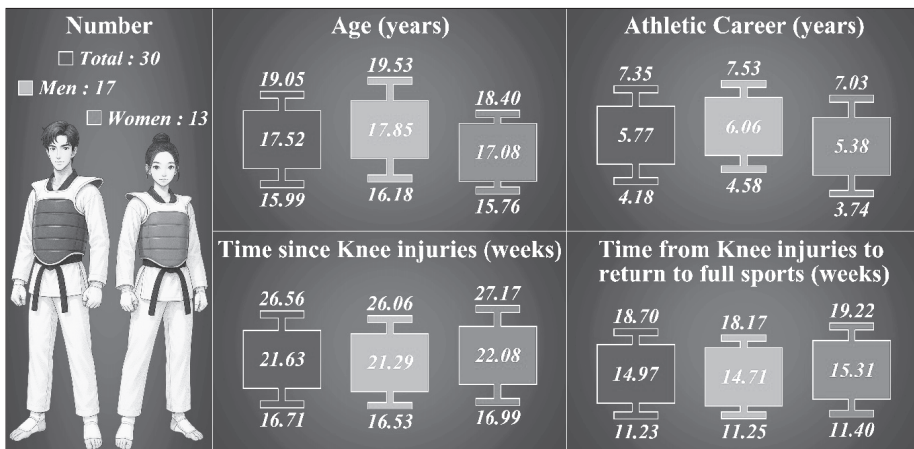


Figure 1. - Background information about the participating athletes.

TABLE I  
Presents examples of the analysis process, including meaning units, condensed meaning units, codes, subcategories, and the main category.

Meaning unit	Condensed meaning units	Code	Subcategory	Main Category
Let me provide an example of fear related to injuries in Taekwondo. Athletes typically compete in national and international competitions three to seven times a year. However, many athletes miss these competitions due to knee injuries. Despite our efforts to coordinate training methods and volume, as well as implement injury prevention programs, knee injuries remain a persistent issue.	Many Taekwondo athletes do not participate in competitions due to knee injuries. Despite significant efforts to prevent these injuries, they frequently occur.	Many elite taekwondo athletes have been unable to compete due to knee injuries, despite participating in preventive programs.	There is a high risk of re-injury.	Re-injury or other injury is something that is beyond control.
Re-injury occurs despite my intentions. When I dwell on this too much, it negatively impacts my performance in competitions and training. A recurrent injury can occur suddenly or even without me realizing when it happens, so I choose not to dwell on the potential risks.	Re-injury can happen at any time, negatively impacting competition and training. Excessive worry about recurrent injuries is unhelpful.	Re-injury can happen at any time, so worrying excessively is unhelpful.	If a re-injury or other injury occurs, it occurs.	

a different physical therapist who was not involved in the athletes' care, minimizing any potential interviewer bias. Efforts were made to encourage the athletes to share their thoughts and behaviors extensively. Before the interviews began, the athletes were informed about the interview content, and their consent was obtained. All interviews were recorded, and a written consent form was signed, stating that the recordings would only be used for study purposes.

## DATA COLLECTION

Data was collected by printing and distributing a structured questionnaire created in Google Forms, which the athletes were asked to complete in writing. This included background data on the athletes, such as age, sex, and the time elapsed since their knee injury. More background information, including general sports history, injury history, rehabilitation progress, and current knee status, was collected through structured questions before con-

TABLE II  
Offers An Overview Of The Main Categories And Subcategories.

Main Category	Subcategory
Support for rehabilitation and return to sports	Prerequisites for Effective Rehabilitation
	There is a lack of support from the physical therapists and coaching staff
	Medical professionals provide valuable guidance and reassurance
	Gradual increase in rehabilitation and training programs
	Returning to sport without anxiety and impatience is crucial

ducting interviews. The interviews followed the athlete interview guide developed by Fältström et al. (2024). This guide included open-ended questions about the athletes' experiences, thoughts, and actions during the final stages of their rehabilitation, as well as their concerns about the risk of recurrence and strategies for preventing it after returning to their sport. All interviews lasted approximately 40 minutes, with some athletes conducting additional interviews until no new information was available.

## DATA ANALYSIS

We conducted a qualitative content analysis using an inductive approach for the data analysis. This approach was chosen to explore the athletes' perspectives in their own words (Fältström et al. 2024). The data analysis was carried out in four stages. In the first stage, we read the transcript to gain a general understanding of the content. In the second stage, we reviewed the manuscript and identified semantic units. In the third stage, we summarized these semantic units, and in the fourth stage, we coded the summarized units. Codes with similar contexts were classified into subcategories, and subcategories with common core content were further grouped into major categories using Excel sheets. We selected representative quotes to illustrate the subcategories and capture the essence of the athletes' statements. Through discussions on the classification process and categories, we ensured that the resulting categories captured the data and accurately represented the athletes' perspectives on end-stage rehabilitation, returning to sport, and the risk of recurrence (Table II).

## Results

The average time following a primary knee injury in elite taekwondo athletes was two months. Additionally, a wide range of scores regarding athletes' emotions, their confidence in performance, and risk assessments related to returning to sports has been reported. The athletes identified four main cat-

TABLE III  
*Overview of the main categories and subcategories*

Strategies for a safe return to sports	Continuing injury prevention programs are important Recovery and return to sports are each athlete's responsibility
The rehabilitation was worthwhile to return to sports	The desire to participate in the competition is the motivation to return to the sport If sustained a re-injury or other injury
Re-injury or other injury is something that is beyond control	There is a risk of re-injury and other injuries If a re-injury or other injury occurs, it occurs

egories related to their experiences: "Support for rehabilitation and return to sports", "Strategies for a safe return to sports", "The rehabilitation was worthwhile to return to sports" and "Re-injury or other injury is something that is beyond control".

#### SUPPORT FOR REHABILITATION AND RETURN TO SPORTS

Taekwondo athletes reported a lack of support needed to minimize the risk of returning to sports and re-injuries. Athletes reported that physical therapists introduce and guide rehabilitation programs; however, this service is only available for national teams and cooperative hospitals, as their teams lack physical therapists. Additionally, it was reported that the coaching staff made decisions regarding the return to high-intensity practice and sports rather than the medical team.

#### PREREQUISITES FOR EFFECTIVE REHABILITATION

Many athletes have reported a lack of familiarity with the anatomy and function of the knee, highlighting the importance of consulting with a health-care provider specializing in knee injuries. Athletes often feel excluded by their coaches and teammates when they are unable to participate in formal training due to injuries. As a result, they reported that basic exercise and rehabilitation training are conducted within a limited area of the training ground. However, athletes have raised concerns about the insufficient equipment available to meet their rehabilitation needs.

*When I perform a rehabilitation program, it's challenging to know if I'm doing it correctly and whether the movements will positively or negatively impact my knees. I also wish I had someone to assist me, especially when I feel mentally and physically exhausted.*

#### THERE IS A LACK OF SUPPORT FROM THE PHYSICAL THERAPISTS AND COACHING STAFF

Taekwondo athletes seek increased support from physical therapists during their recovery process. When they did not receive adequate assistance from physical therapists, many turned to the Internet and their peers for guidance. Athletes noted that the severity of their injury, the duration of their recovery, and the structured rehabilitation program were crucial factors in their return to sport. However, coaching staff admitted that they lacked the expertise necessary to support athletes effectively, and many teams did not have physical therapists on staff. Furthermore, athletes emphasized the importance of effective communication between physical therapists and coaching staff when making decisions about returning to sport. Some athletes revealed that they had participated in competitions at the urging of coaching staff, despite physical therapists advising against their participation in competitions due to their physical levels. As a result, these athletes felt anxious about the possibility of re-injuring themselves or sustaining new injuries.

*I believe the most challenging aspect is maintaining a relationship with the coaching staff. They lack medical training, which raises questions about the reliability of their knowledge regarding injuries. Since they train us, it can be difficult to disagree with their decisions. Additionally, we don't have a physical therapist on the team, which makes the situation even more confusing.*

#### MEDICAL PROFESSIONALS PROVIDE VALUABLE GUIDANCE AND REASSURANCE

Taekwondo athletes have reported that physical therapists play a crucial role in their rehabilitation process and that they feel able to rely on their expertise. Many athletes noted improvements in their knee pain and function, expressing gratitude for their physical therapists' sound judgment and effective rehabilitation programs, which helped boost their confidence to return to sport. However, some athletes experienced instances where physical therapists relied solely on simple electrotherapy for the knee without offering comprehensive rehabilitation programs or insights. Athletes emphasized the importance of consulting with a sports medicine specialist to ensure their re-

habilitation process is progressing effectively and that their knee function is improving. This consultation reassured athletes and clarified their concerns when faced with sudden pain or lack of progress in their recovery.

*The day before, my knee felt great with no pain. However, the next day, it suddenly swelled, and I experienced pain and heat. This was frustrating and made me worry that I might not be able to return to my sport. Fortunately, my physical therapists would reassure me that this was a normal reaction in the recovery process and that I shouldn't worry. They would then adjust my rehabilitation program, which helped restore my confidence. However, this is limited to specialized sports physical therapists. Sometimes, when I visited a primary care physical therapist, they only offered **electrotherapy**.*

#### STRATEGIES FOR A SAFE RETURN TO SPORTS

Taekwondo athletes explained their plans for a safe return to the sport. They emphasized the importance of following sequential rehabilitation programs to ensure proper recovery. The athletes acknowledged that they must resist the urge to return prematurely, especially when their knees are not yet in optimal condition, as anxiety about returning to the sport can lead to hasty decisions. While athletes understand the necessity of continuing injury prevention programs after returning to the sport, many struggle to maintain these routines. This often happens because they prioritize physical strength and technical training to compensate for missed official training sessions due to injuries. Furthermore, they stressed that each athlete is responsible for managing their recovery and adhering to the scheduled rehabilitation and prevention programs.

#### GRADUAL INCREASE IN REHABILITATION AND TRAINING PROGRAMS

Taekwondo athletes have reported that they are preparing to return to their sport by undergoing sequential rehabilitation programs after experiencing knee injuries. Initially, general physical therapy was used to reduce pain and swelling, followed by strength training with resistance bands, weight-bearing exercises, and step workouts. After returning to sports, the athletes did not immediately participate in competitions; instead, they focused on physical strength and technique-oriented training to regain their lost sense of movement. Athletes indicated a preference for sparring-oriented training due to the significant differences in physical strength and technique

required for competition compared to regular training. Athletes also reported that physical and mental training are essential for returning to sports after an injury.

*Eight weeks after my knee injury, I joined official training to focus on my physical strength and technique. Two months later, I competed in the national championships, marking my first real competition since the injury. I am still working on increasing my training volume and improving my overall condition.*

#### RETURNING TO SPORT WITHOUT ANXIETY AND IMPATIENCE IS CRUCIAL

Athletes have reported that managing anxiety during rehabilitation and avoiding a hasty return to their sport is essential for a safe comeback. They believe that returning too soon with a knee that isn't fully healed can lead to re-injury and other injuries. Therefore, athletes have reported that it is important to keep anxiety levels low throughout the rehabilitation process, adhere to a structured rehabilitation program, and practice patience.

*I have observed that several male and female colleagues have suffered multiple injuries to the same knee. I also know colleagues who have returned to sports after knee injuries, only to sustain injuries to their ankles or the opposite knee. I believe the reason these situations keep occurring is that they are too quick to return to sports after their injuries.*

#### CONTINUING INJURY PREVENTION PROGRAMS ARE IMPORTANT

Taekwondo athletes recognize the importance of adhering to various programs designed to prevent injuries. Some athletes reported that they continued physical and balance training to strengthen their injured knees, and they also utilized the injury prevention program GET-SET. However, some athletes reported a lack of motivation and a desire to regain their lost sense of movement due to injuries, leading them to spend more time on physical training and sparring. As a result, they often neglect their injury prevention programs. While they recognize that this behavior may negatively impact their knees and overall health, they feel compelled to prioritize training to participate in a competition.

*I understand that weak knee strength and poor balance can increase the risk of re-injury. To combat this, I am dedicating time before and after official training sessions to focus on muscle strengthening and balance*

*exercises. Some of my colleagues have used the GET-SET program for similar purposes. I also recognize that overtraining can increase the risk of injury, so I make sure not to push myself too hard. Therefore, I follow the program 2-3 times a week to help prevent injuries.*

Recovery and return to sports are each athlete's responsibility. Taekwondo athletes emphasized that the ultimate responsibility for recovering from knee injuries and returning to their sport lies with themselves. They believe it is essential for them to actively participate in structured rehabilitation and injury prevention programs. Many athletes have reported that their efforts to prevent re-injury and other injuries are important factors. However, some athletes expressed concerns about the inadequate application of physical therapy by primary medical physiotherapists, who sometimes provided only basic electrotherapy.

*My physical therapist informed me that my injured knee needs to regain at least 90% of the function of my uninjured knee before I can return to sports. Therefore, I'm consistently working on my uninjured knee to maintain its full 100% function. I feel responsible for returning to sports and preparing myself to compete normally. If I lack motivation, rush my return, and fail to perform at my best, or if I experience a re-injury, I acknowledge that the biggest issue would be my failure to follow the rehabilitation program properly.*

#### THE REHABILITATION WAS WORTHWHILE TO RETURN TO SPORTS

Taekwondo athletes were eager to return to the sport even after experiencing knee injuries. They reported that their desire to return to the sport and participate in the competition motivated them to complete the physically and mentally demanding rehabilitation programs. However, there was some disagreement among the athletes regarding whether they would be willing to undergo another intensive rehabilitation program if they sustained a re-injury or other injury.

#### THE DESIRE TO PARTICIPATE IN THE COMPETITION IS THE MOTIVATION TO RETURN TO THE SPORT

Many athletes reported that their longing to participate in competitions motivated them to complete difficult rehabilitation programs. Some athletes expressed concerns about the possibility of retiring unexpectedly due to in-

juries. Therefore, they felt grateful for the opportunity to return to sports after undergoing sequential rehabilitation programs, as well as for the chance to participate in the competition following physical strength and technical training courses. They also emphasized that returning to sports and participating in competitions would not have been possible without a systematic rehabilitation program.

*When I first sustained the knee injury, I feared it might end my career. However, as I progressed through my rehabilitation program, I noticed a significant improvement in my knee. This fueled my determination to participate in the competition again. Now, I am truly happy to be returning to my athletic career.*

#### IF SUSTAINED A RE-INJURY OR OTHER INJURY

In our studies, some athletes expressed that they could return to sports after completing a rehabilitation program again, even though it would be challenging since they had previously gone through a similar process and successfully returned to competition. In contrast, other athletes expressed that they may lack the courage to try again because they know that the rehabilitation program before returning to sport is difficult and lonely.

*I'm not concerned about re-injuries or other injuries. This could hurt my performance. However, I recognize that a re-injury and other injury could happen at any time. I haven't focused on it much yet, but the thought of going through a rehabilitation program again is intimidating to me. Having experienced the process, I know how challenging it can be.*

#### RE-INJURY OR OTHER INJURY IS SOMETHING THAT IS BEYOND CONTROL

Athletes reported awareness of the high risk of re-injuries or other injuries following knee injuries. They also expressed that injury prevention programs cannot fully prevent injuries and that injuries are inevitable for taekwondo athletes.

#### THERE IS A RISK OF RE-INJURY AND OTHER INJURIES

Athletes have expressed their awareness of the high likelihood of experiencing knee re-injury following an initial knee injury, along with the in-

creased risk of ankle and contralateral knee injuries. This awareness often comes from discussions with colleagues who have previously sustained knee injuries or through guidance from physical therapists during rehabilitation programs.

*I've worked hard to return to the sport, but I'm also a little scared because I've seen some colleagues retire due to knee re-injuries and other injuries.*

#### IF A RE-INJURY OR OTHER INJURY OCCURS, IT OCCURS

Some athletes believe that injury prevention programs cannot prevent all injuries. They acknowledge that, despite their efforts to strengthen their muscles and improve their balance to avoid re-injuries and other injuries, the nature of taekwondo, allowing direct physical contact with opponents, makes injuries inevitable. Additionally, some athletes understand the risks associated with injuries; they believe it is more beneficial to focus on training their physical strength and technique rather than spending excessive time on injury prevention to enhance their performance.

*There is also concern that re-injury to the knee or other injuries may happen. However, due to its physical contact nature, Taekwondo inherently carries the risk of injuries. If I continue to let this fear control me, the only option left will be retirement.*

### Discussion

The study conducts an in-depth analysis of athletes' experiences with rehabilitation programs and return to sports, along with their views on re-injury and various injury risks. Our goal was to understand the athletes' perspectives regarding the break from sports due to injury and their return to sports. The rest of the discussion is organized to address each relevant finding based on available evidence and logical reasoning.

#### SUPPORT FOR REHABILITATION AND RETURN TO SPORTS OUR STUDIES INDICATE THAT ATHLETES DESIRE MORE

Support from physical therapists and coaching staff during their return to sport following a knee injury. Since athletes are not medical professionals, they seek guidance in performing the correct movements for their rehabil-

itation program and assistance with the strength and skill training that will follow. Additionally, they want advice and support when they are mentally and physically exhausted.

According to Karlström et al. (2022), social support from physical therapists and coaches is crucial for athletes' recovery after knee injuries. Additionally, setting goals and receiving ongoing guidance throughout the rehabilitation program are crucial. Assessing whether athletes require additional support based on their circumstances is also crucial, a vital responsibility for physical therapists (Nordahl et al. 2014). Another study acknowledged the expertise of physical therapists, emphasizing their role in boosting the confidence of athletes with knee injuries as they work towards returning to sports (Österberg et al. 2013). A study by Nordahl et al. (2014) emphasized that providing various types of support to Alpine skiers following knee injuries is a crucial responsibility of coaching staff, and helps them adapt to their return to sport. Additionally, a study by Johnston & Carroll (1998) found that social support from multiple sources, including coaching staff, is vital in aiding athletes in rehabilitating injuries. However, our study reported that athletes lack trust in the coaching staff's expertise during the rehabilitation process. This highlights the need for professional training in rehabilitation programs for coaching staff. Furthermore, our study reported that athletes require effective communication between physical therapists and coaching staff when making decisions about returning to sports. These differences may be attributed to variations among sports. While our study and previous studies shared a focus on knee injuries, the earlier studies either did not specify the sports involved or involved athletes from sports other than Taekwondo. Nevertheless, these findings align with previous studies suggesting that athletes, physical therapists, and coaching staff can achieve better outcomes through effective communication and that they should collaboratively decide on the return-to-sport process (Fältström et al. 2024). Meanwhile, Carson & Polman (2012), suggested that sports medicine teams, including physiotherapists, hold in-depth discussions with athletes to alleviate concerns about returning to sports. Nevertheless, they noted that support is limited due to various constraints. This implies that injured athletes are not following sequential and systematic programs (Brewer, 1994). Additionally, another study noted that the programs often do not account for individual differences in recovery speed (Podlog & Eklund, 2007). This point may have similar implications to the concerns of athletes in our study, which indicate that physical therapists sometimes do not provide a structured rehabilitation program and only rely on electrotherapy.

## STRATEGIES FOR A SAFE RETURN TO SPORTS

In our study, athletes highlighted the importance of following a structured rehabilitation program and returning to sport once the knee is in optimal condition to ensure a safe return. Brinlee et al. (2021) emphasized that after a knee injury, overcoming the fear of returning to sports and participating in injury prevention programs is vital for reducing the risk of further knee injuries. Hewett et al. (2005) highlighted the need for careful consideration of gradual improvement in knee control abilities when returning to rehabilitation programs and participating in more challenging activities following knee injuries in athletes, both contact and non-contact sports, such as those in soccer, basketball, and volleyball. They highlighted that a preemptive strategy, which includes explaining how to relearn movements such as running and jumping, can enhance the knee's control in the coronal plane, addressing one of the risk factors for knee injuries. Another study indicated that there is no instability in the knee, or that measures can be taken to reduce the risk of instability (Österberg et al. 2013). Additionally, both physical and psychological factors affect athletes' activity levels (Langford et al. 2009), so athletes must manage anxiety during rehabilitation and avoid rushing their return. In our study, athletes emphasized the importance of adhering to various programs to prevent injuries. Previous studies indicate that taekwondo athletes can reduce their risk of knee injuries by strengthening their neuromuscular control and incorporating injury prevention programs (Park & Song, 2018). Moreover, preventing injuries is crucial since past injuries can influence the likelihood and severity of new injuries among all elite athletes (Park, 2024). Additionally, our study reported that the responsibility for recovery and returning to sports lies with each athlete. Thomee et al. (2007), noted that self-efficacy is a crucial factor for patients recovering from knee injuries. They emphasized that physical therapists should enhance their knowledge and understanding of the thoughts and behaviors related to recovery. Furthermore, physical therapists should take into account the current condition of the athlete's knee, as well as psychological factors and anxiety levels, when designing a rehabilitation program. This approach enables adjustments to the program based on any changes in the athlete's condition.

## THE REHABILITATION WAS WORTHWHILE TO RETURN TO SPORTS

In our study, athletes expressed that their motivation to return to their sport and participate in competitions encouraged them to complete the reha-

bilitation program, deeming it worthwhile. According to a study by Mahood et al. (2020), athletes participating in various sports are significantly motivated to adhere to rehabilitation programs due to a strong athletic identity. Additionally, another study indicated that setting goals positively influences performance through various motivational mechanisms (Österberg et al. 2013). In our study, athletes had differing opinions about their willingness to undergo another intensive rehabilitation program if they experienced re-injury or other injuries. Some athletes believed they could return to the sport after completing the rehabilitation program again, which may be attributed to their mental strength, self-confidence, and commitment to the sport (Mahood et al. 2020). Conversely, other athletes expressed concerns about their ability to return to the sport, citing a lack of courage. Such injuries can lead to uncertainty and fear regarding the potential impact on future knee function (Thing, 2006). As a result, the fear of injury or re-injury can deter them from resuming their athletic activities (Österberg et al. 2013).

#### RE-INJURY OR OTHER INJURY IS SOMETHING THAT IS BEYOND CONTROL

In our study, athletes reported a high risk of re-injury or other injuries following knee injuries, emphasizing that injuries are an inevitable part of a taekwondo athlete's experience. This viewpoint contrasts with their claims that they are implementing programs aimed at preventing injuries. This indicates athletes recognize that rehabilitation programs are essential for returning to the sport, although injuries are not fully preventable (Fältström et al. 2024). According to a study by Junge et al. (2009), over 50% of injuries among taekwondo athletes are contact injuries. However, preventing these types of injuries proves to be challenging, as the specific type and mechanism of the injuries remain unidentified (Nuhu et al. 2021). Furthermore, a study by Hammes et al. (2015), indicated that injury prevention programs are ineffective in addressing contact injuries. Evans & Hardy (2002), suggested that focusing your mind away from the injury could be beneficial. While this approach may initially seem like avoidance or distraction, it can help in gaining better insights. Additionally, another study found that the fear of recurrence and the concern over other injuries could be risk factors for subsequent injuries (An et al. 2019).

Gaining insight into an athlete's experiences and thoughts during their rehabilitation program for returning to sports can help identify factors that enhance the effectiveness of therapy. Therefore, for athletes to return to sports safely and effectively after a knee injury, it is crucial to develop

customized rehabilitation programs through strong communication among athletes, physiotherapists, and coaching staff. This collaborative approach not only helps alleviate anxiety and motivate athletes but also fosters trust between athletes and their physiotherapists. Physiotherapists should tailor rehabilitation programs to meet athletes' individual needs and share performance data by analyzing video footage of their movements, especially when athletes are demonstrating improvement. Moreover, coaching staff can enhance rehabilitation and injury prevention efforts by upgrading equipment and facilities, as well as adjusting training schedules to accommodate each athlete's rehabilitation process.

#### STRENGTHS AND LIMITATIONS

Our studies have several strengths. First, we employed semi-structured interviews, analyzed through inductive content analysis, which is well-suited for capturing athletes' experiences at a clear level. Second, there was no personal or professional relationship between the interviewer and the athletes, allowing them to express their thoughts and experiences freely. Third, as the data were collected and analyzed by a physical therapist with clinical expertise, we gained a comprehensive understanding of the phenomenon from multiple perspectives, ensuring high reliability. Finally, we utilized an interview guide and followed a thorough methodological approach to verify that the results accurately reflected the athletes' perspectives on the phenomenon. However, there are also limitations to our study. First, we were unable to accurately assess the severity of each athlete's injury. Second, our study was limited to athletes undergoing a non-surgical rehabilitation program. Third, while we collected data from physiotherapists with clinical expertise, the interviewers had limited experience in qualitative studies and interviewing. Therefore, we consulted with experts who have experience in qualitative studies and conducting interviews to seek their advice and support. Lastly, our study focused exclusively on taekwondo athletes in Korea, which limits the generalizability of the findings to all taekwondo athletes and may not reflect the sports culture and characteristics in other countries.

#### Conclusion and Outlook

In conclusion, this study provided valuable insights into the experiences and thoughts of taekwondo athletes undergoing rehabilitation programs after knee injuries. These findings can improve rehabilitation programs for

elite athletes. In each case, coaches and therapists can utilize these programs to adjust the intensity and rest periods, thereby enhancing return-to-sport outcomes and reducing the risk of recurrence.

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