

Perceived Barriers and Facilitators of Sports Rehabilitation Adherence in Injured Volleyball Athletes: A Qualitative Study From Greece

Eleftherios Paraskevopoulos, Georgios Gioftsos,
Georgios Georgoudis, and Maria Papandreou

University of West Attica

Adherence to exercise rehabilitation has been shown to be an important factor that may influence successful treatment. In professional athletes, a significant reduction in exercise adherence delays recovery. The aim of this study was to explore barriers to and facilitators of exercise rehabilitation adherence in injured volleyball athletes. Eight professional volleyball athletes were recruited, and qualitative data were collected using semistructured interviews. All athletes had completed their rehabilitation program after they had suffered a musculoskeletal injury. All data were analyzed using thematic analysis after the investigators ensured that saturation had been reached. Pain was identified as a significant barrier to exercise adherence by all athletes. The provision of social support, including mental, practical, and task related, also had a significant positive impact. The athletes' ability to develop the necessary coping strategies and confidence on performing exercises at home was also mentioned as a factor that affected exercise adherence, although less often.

Keywords: home exercise, physiotherapy, sports injury, treatment plan

Adherence to exercise rehabilitation has been shown to be an important factor that may influence successful treatment in patients and athletes (Jack, McLean, Moffett, & Gardiner, 2010; Spetch & Kolt, 2001). In sports, it is well known that athletes are frequently involved in rigorous training activities that highly increase the risk of injury (Spetch & Kolt, 2001). Rehabilitation in athletes requires adherence to an exercise rehabilitation program as prescribed by their physiotherapists. Adherence to an exercise rehabilitation program does not involve only home- or gym-based exercises but training modifications or restrictions according to the

Paraskevopoulos, Gioftsos, Georgoudis, and Papandreou are with the Department of Physiotherapy, University of West Attica, Athens, Greece. Paraskevopoulos, Gioftsos, and Papandreou are also with the Laboratory of Advanced Physiotherapy, University of West Attica, Athens, Greece. Paraskevopoulos (lefteris.15@hotmail.com) is corresponding author.

level of injury and the training period. However, research has shown that adherence rates fall, in some cases, to 40% of the required therapeutic exercise program (Taylor & May, 1996). Adherence to an exercise rehabilitation program is essential for successful recovery and return to sport for injured athletes (Brewer et al., 2003).

Several factors have been identified in the past that seem to affect exercise rehabilitation adherence (ERA) in injured athletes, including motivation, confidence/self-efficacy, social support (SS), locus of control, cognitive appraisal, coping, and psychological skills. However, recurring themes across studies on factors affecting adherence have not been found due to the heterogeneity of the samples used and the range of athletes assessed (Goddard, Roberts, Byron-Daniel, & Woodford, 2020). To date, only two qualitative studies have explored factors related to ERA in injured athletes.

In the first study, Levy, Polman, Nicholls, and Marchant (2009) found that motivation, confidence, coping, SS, and pain were important themes that emerged from their semistructured interviews in recreational athletes (RA) with tendinopathies at the ankle, knee, and shoulder who participated in distance running, squash, and soccer. The second qualitative study that was found was related to ERA in injured athletes with lower limb and back injuries as a result of a muscle strain who competed at both club and international levels; this study was from Marshall, Donovan-Hall, and Ryall (2012) and found two main themes. The first theme was related to the athletes' perceived factors of adherence, whereas the second theme was related to perceptions of the physiotherapist's impact on adherence with subthemes relating to characteristics of and strategies used by the physiotherapist.

Thus, findings so far remain limited and inconclusive with only a few qualitative studies examining perceived barriers to and facilitators of adherence to exercise rehabilitation, thereby increasing the need for more research in this area. Furthermore, factors that affect adherence have not been qualitatively explored in professional athletes. This is an important aspect as exercise rehabilitation in RA may have an impact on their daily routine, but for professional athletes who rely on competition for their livelihood, the impact of their injury may be detrimental, and thus, their motivation may be largely different (Levy et al., 2009). Moreover, reinjury rates in volleyball players have been shown to be high (fourfold increase), particularly during the first-year postinjury (Bahr & Bahr, 1997), indicating low adherence to rehabilitation regimes in this population. Also, examining these factors in a population of professional volleyball athletes (PVA) remains highly important as evidence has shown that injury rates remain high during games in professional PVA (Bele, Östenberg, Sjöström, & Alricsson, 2015), highlighting the need for more research in this population.

It has been previously stated that in the process of understanding something that is unknown or known thinly and without certainty, proper qualitative research can powerfully aid these ends and illuminate tenuously known problems by providing rich descriptions that may explode faulty thoughts (Streat, 1998). Thus, conducting a study using a qualitative approach in this population would help researchers to investigate and understand PVA experiences and perceptions from physiotherapy treatment that include possible barriers to and facilitators of ERA both in the short and longer term. Moreover, a qualitative approach would provide a novel understanding of PVA perceptions on factors that may optimize future exercise interventions in the long term. Finally, it is well known that ERA

affects the outcome of the treatment with factors such as pain, function, and performance improving significantly in patients with higher adherence rates, thus making adherence an important consideration in clinicians who prescribe exercise rehabilitation programs (Pisters et al., 2010; Room, Hannink, Dawes, & Barker, 2017). Therefore, the purpose of this study was to identify factors that may affect ERA in PVA after sport injuries, using a qualitative approach to gain an in-depth understanding of rehabilitation behavior in a homogenous group of athletes.

Methods

Design

A qualitative methodology was used in this study to understand the barriers to and facilitators of ERA from the perspective of PVA with a musculoskeletal sport injury. A thematic analysis approach was employed to identify, analyze, organize, describe, and report themes that emerged from our data set (Nowell, Norris, White, & Moules, 2017). Thematic analysis has been described as a flexible approach in any study that provides rich and detailed information even in more complex data (Braun & Clarke, 2006).

Recruitment

A purposive sampling of eight participants (five women and three men) from professional teams was used. All athletes were adults (>18 years) and had a diagnosis of a sport injury within the last 2 years. Five athletes had suffered a shoulder injury and three an ankle sprain injury. From the eight athletes who were recruited, all had received physiotherapy, but they had been discharged from it. Physiotherapy program durations varied from 3 to 6 months, and training abstinence ranged from 2 to 4 months. Athletes were Greek native speakers. They were approached through the phone, and informed consent was obtained verbally as all interviews were completed via telephone calls. Ethical approval was obtained from the University of West Attica.

Procedures for Data Collection

The research team included two physiotherapists (first and last author) with more than 10 years of experience in musculoskeletal physiotherapy and with a post-graduate diploma in sport rehabilitation. All semistructured interviews were transcribed verbatim from the athletes after we received their permission. All interviews lasted <20 min. To ensure anonymity, pseudonyms were used throughout the study.

A piloted, semistructured interview was designed based on previous research (Levy et al., 2009; Marshall et al., 2012; Vader, Doulas, Patel, & Miller, 2019) and tested in two independent athletes with an aim to explore barriers to and facilitators of exercise rehabilitation. From the pilot testing, minor changes to the wording of the final questions were made to improve clarity. The final body of the interview guide was centered around four main areas to gather information related to (a) the type and mechanism of injury, (b) the physiotherapy treatment that they received, (c) information regarding any factors that negatively affected their

adherence to either home- or practice-based exercise, and finally, (d) an opportunity to reflect on their experience and propose ways that could have positively influenced their adherence to their exercise rehabilitation program (Table 1). Demographics were also recorded before initiating the interview. Interviews were not repeated. All data were collected and stored securely by the primary author.

Saturation Assessment

Saturation assessment was performed as a criterion to discontinue data collection (Saunders et al., 2018). Saturation is an essential process in qualitative research that ensures qualitative rigor and that a complete range of theoretical data, based on the number of interviews that make up the theory, is fully represented by the data (Saunders et al., 2018). Although a relatively small sample was interviewed, the investigators of the study ensured that saturation was achieved based on previously established methods (Guest, Namey, & Chen, 2020). Adequate saturation rate was achieved when the proportion of new information themes was below the 5% threshold that we initially established, as in Guest et al. (2020). After the eighth athlete that we interviewed, it was evident that new information was diminishing based on the subjective metric of <5%. Thus, using a base size of four interviews, we reached the $\leq 5\%$ new information threshold at 6^{+2} interviews.

Data Analysis

Interview transcripts were analyzed using a thematic approach based on the process outlined by Braun and Clarke (2006). This process includes initial familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing a report. The two authors of the study read the transcripts twice to become familiar with the entire body of the data. Then initial codes were generated that reduced lots of data into small chunks of meaning based on prominent responses that led the authors to develop a coding document. For the purpose of verification, the last author repeated this process. Preliminary themes emerged from the extracted codes that described patterns in the data relevant to the research question.

The NVivo qualitative software (version 12; QSR International Pty Ltd, Melbourne, Australia) was used to support data analysis. Then, preliminary themes were reviewed based on the following questions: (a) Do the themes make sense?

Table 1 The Main Questions Used for Interviewing the Athletes

Questions used for the interviews

1. What kind of sport injury have you had that you needed physiotherapy for?
 2. Please tell me more about the physiotherapy interventions that you received? Did the physiotherapist prescribe to you any exercises either at his/her practice or at home?
 3. Did you find it difficult to adhere on the physiotherapist's exercise plan? If yes, what were the reasons for not adhering to the exercise plan either at home or at his/her practice?
 4. What factors do you think increased your adherence to the exercise plan and why? Is there anything else that you would like to add about your experience?
-

(b) Do the data support the themes? (c) Am I trying to fit too much into a theme? (d) If themes overlap, are they really separate themes? (e) Are there themes within themes (subthemes)? and (f) Are there other themes within the data? In case of disagreement between the researchers, a third researcher was available to aid the process and modify the themes to generate the final themes. At the end of this process, quotations were selected to be used in the “Results” section and aid understanding of the authors’ interpretation of the data from the interviews. Analytic rigor was established using peer debriefing, reflexivity, and multiple online team meetings (Miles & Huberman, 1994).

Results

From the eight athletes that were interviewed, five were women and three were men with a mean age of 28.3 (range: 25–31 years); they were all PVA competing in the Hellenic Volleyball League for the last 5 years and attended team trainings at least 3 times per week prior to their injury. From the data that were collected by the athletes, four main themes emerged relative to their ERA. These were issues regarding their (a) pain, (b) SS, (c) coping strategies (CS), and (d) confidence. Figure 1 outlines the major themes and subthemes.

Pain

Pain was one of the most important barriers to exercise for all of the eight athletes. For example, Nick believed that having pain during exercise was a sign of further injury, thus it was something that made him discontinue his exercises:

I knew I had to do my exercises everyday . . . However, sometimes I had pain during exercise and I was not aware whether I was actually harming my shoulder even more rather than helping the rehabilitation process.

Mary stated that having had a negative experience in regard to her pain and the rehabilitation process was one of the factors that kept her away from exercising properly based on her individualized rehabilitation program:

I had sustained an ankle injury in the past and I believed that some rest would help. However, I did not attend my physiotherapy sessions back then and I started training quite early. That resulted in an unbearable pain that kept me away from my training for a long time. This was a very stressful experience since every time I feel pain anywhere in my body stress me out and I try to avoid any kind of physical activity.

Furthermore, from Georgia’s account, it was evident that pharmaceutical pain management was something that she wanted to avoid as she knew that several analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs) may increase the risk of serious adverse effects, and she was already taking NSAIDs to manage her menstrual cramps:

Sometimes I felt that exercise increased my painful symptoms and my doctor advised me to take NSAIDs to manage it. However, I want to avoid taking any

drugs, such as NSAIDs that may cause stomach ulcers or kidney disease. I have been taking NSAIDs during menstruation to reduce menstrual cramps and I want to avoid drug abuse. So, I avoided exercise as prescribed by my physiotherapist just because I was afraid that these would hurt and I would have to take medication for this.

Social Support

Another important theme that emerged from the data was that of SS from friends and family as well as from the physiotherapist. For example, Anne stated that at home, having someone to help you with the exercises was something that facilitated the process:

My friend used to come at my place [home] to hold the TheraBand while I was doing all the exercises. I did not really need her just for that [holding the

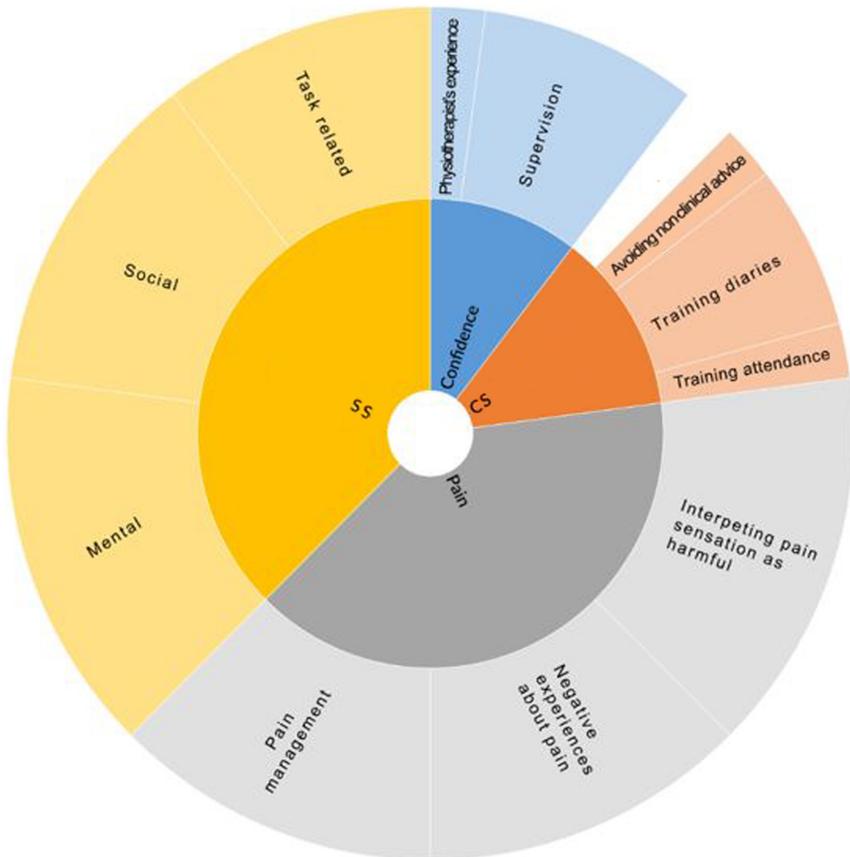


Figure 1 — Themes and subthemes related to exercise rehabilitation adherence among professional volleyball players after sport injury. SS = social support; CS = coping strategies.

TheraBand], but to keep me company, provide some sort of supervision and remind me what I had to do for every exercise.

So, the mental support from others seemed to be an important facilitator to ERA. However, from a practical point of view, practical support was also an important facilitator for Georgia that influenced her rehabilitation process:

The only way to get to the physiotherapy practice was by car. I couldn't drive due to my injury and thus my father had to take me to the physiotherapist. I don't know what I would have done without him since taking the bus at that time was not an option for me [due to pain].

Furthermore, support from the physiotherapist was also a factor that was mentioned as an important facilitator for some athletes. Nick stated that having proper supervision at all times from the physiotherapist facilitated the process:

Having the physiotherapist close at all times during therapy sessions and asking all kinds of questions related to the injury helped me a lot. I felt that this kind of mental support that he [the physiotherapist] was providing was essential at that time.

Coping Strategies

The use of CS was found to be beneficial for the athletes to adhere to their exercise rehabilitation program. Alex stated that while he was injured, being able to watch training sessions and games with his team from the bench increased his willingness to get better, and he was keener on doing his exercises later on:

Being there [volleyball court] during training and games was something that made me feel an important member of the team. I knew that my team mates needed me the most as I was the tallest one and missing games was an important advantage for my team. After leaving the court I was keen on doing my exercises as I had to get back [return to play].

Furthermore, Anne stated that having a training diary to keep note of exercise duration and repetitions, as well as any questions that she had regarding her exercises that were prescribed by her physiotherapist, aided her ERA:

I used a diary just to write down any questions I had at home. In my diary I used to write how often I was doing my exercises and at the end when I was planning to do them again.

Georgia revealed during the interview that talking about her injury with other athletes was a factor that, most of the time, reduced her willingness to do her exercises as some of them misinformed her as to how safe her exercise plan was:

Initially I used to chat with other athletes that had suffered similar injuries [musculoskeletal sport injuries] and some of them were advising me to rest and

avoid working out. This created some doubts about my exercise plan so I had to phone my physiotherapist almost every day in order to make sure that I was not harming my ankle. However, after a while I stopped asking for advice from others [other athletes] and I was following my doctor's and physiotherapist's advice which increased my willingness to adhere to my exercise programme.

Confidence

Some of the athletes felt less confident on performing exercises at home as the lack of professional advice and feedback created insecurity. Nick acknowledged that the complexity of the exercises was a major barrier as he did not know whether he was performing all of the exercises properly:

When I was performing my exercises at the physiotherapy practice the physiotherapist was always there to supervise and correct me if needed. So, when I was at home I was afraid that doing the exercises without supervision would lead to further injury.

Although supervision was important from the athlete's perspective, the amount of experience that the physiotherapist had in treating sport injuries was also something that boosted their confidence. However, the only criterion used by the athletes to judge experience was the physiotherapists' previous work experience in famous teams, which was not necessarily related to volleyball:

I used to go to a physiotherapy clinic for all of my sport-related injuries in my neighbourhood. However, for this recent injury that I had I went to [physiotherapist's name] for the first time. I knew him because he used to work for [famous Greek football team] and I felt confident that he knew what he was doing. I can say that this was something that increased my exercise adherence to 100%.

Discussion

The aim of this qualitative study was to explore the perceived barriers to and facilitators of ERA in injured PVA. A qualitative design was selected as it focuses on understanding patients' experiences (Smith & Sparkes, 2020). As long as people rely on verbal communication to make sense of their experiences, produce meaning, understand their emotions, and communicate intelligibly with each other in an attempt to carry out an intended action, an interview-based qualitative study seems the most appropriate to capture and understand behaviors beyond appearance and manifest meanings (Smith & Sparkes, 2020).

This is the first study that has examined the perceived barriers to and facilitators of ERA in such a homogenous group of professional athletes, providing a unique opportunity for clinicians to manage reduced adherence in this population. Furthermore, similar studies have not been replicated in the past in the Greek athletic population, highlighting unique cultural factors that affect adherence. Four main themes emerged from semistructured interviews that were related to pain, SS, CS, and confidence. In this discussion, the authors comment on other similar studies and provide an explanation for the themes that emerged from the analysis of the interviews.

Pain

Pain was one of the most reported factors that affected ERA. It is well known that people believe that any kind of physical activity may be harmful when it leads to pain (Jack et al., 2010). Although studies have shown that professional athletes possess higher pain tolerance compared with normally active people (Tesarz, Schuster, Hartmann, Gerhardt, & Eich, 2012), this study found that the major barrier to ERA was pain during execution for all PVA interviewed. Research in regard to the factors that affect exercise or ERA in professional athletes after sport injury is very limited. Levy et al. (2009) showed that RA were less likely to perform their exercise rehabilitation program when they were in pain. Furthermore, the descriptive study of Fields, Murphey, Horodyski, and Stopka (1995) showed that adherers were less likely to be concerned about their pain levels during exercise, whereas nonadherers were more likely to stop exercising due to pain. The only qualitative study on professional athletes with sport injury (muscle strain injuries) that examined the barriers to ERA was by Marshall et al. (2012). Interestingly, similar to this study, they demonstrated that pain had an impact on ERA in athletes competing at a national and international level.

However, in all of the aforementioned studies, either the type of sport was not mentioned (Fields et al., 1995; Marshall et al., 2012) or a range of athletes from different sports were recruited (Levy et al., 2009). Heterogeneous sample of athletes forming separate study groups has been shown to have varying degrees of pain perception levels due to the large differences in the nature and physical demands of each sport (Tesarz et al., 2012). Pain perception has been shown to vary between sports (endurance athletes vs. athletes performing extremely intense efforts for short durations; Assa, Geva, Zarkh, & Defrin, 2019). Research has shown that endurance athletes have an increased pain tolerance compared with strength athletes. In reality, strength athletes may be more familiar with painful stimuli of short duration, which may explain the delayed pain detection and increased threshold. However, Assa et al. (2019) suggested that when a painful stimulus is detected, the strength athletes are less able to tolerate it in comparison with the endurance athletes. Thus, a homogenous group of athletes may provide more accurate results for a specific population, as in this study.

Our study recruited a homogenous group of athletes and demonstrated that volleyball players are much more likely to perceive pain as a significant barrier to exercise, adding to the findings of previous studies in strength and endurance athletes (Assa et al., 2019). This can be explained by the fact that negative experiences of pain from previous injuries may further create a sense of insecurity toward exercise. This feeling of insecurity may create more illness perceptions toward exercise and negatively affect adherence to therapeutic exercise. Similar findings have been reported in patients engaging in cardiac rehabilitation (Flora, Anderson, & Brawley, 2015).

Social Support

This study found that SS was one of the main factors that affected ERA. Previous studies have shown that SS can have a significant positive impact on ERA in RA

(Levy, Polman, & Clough, 2008; Levy et al., 2009) and professional rugby players (Corban, Snape, & Taylor, 2003). However, this was not evident in the descriptive study of Fields et al. (1995), who recruited RA without mentioning the type of sport of their sample. In addition, the study of Albinson and Petrie (2003), who recruited athletes participating in Division I-A university football, explored SS as a variable for examining relationships among pre- and postinjury stress, coping, personality, mood state, and ERA. However, SS did not significantly affect adherence in their sample, although their study was not qualitative, and from the sample of 84 athletes, only 19 were injured.

In this study, SS, including mental, practical, and task-related support, was found to affect ERA. Mental support has been previously mentioned as an exercise facilitator in studies with RA (Levy et al., 2008). However, this study showed that professional athletes consider SS as an important determinant of their ERA. To explain this finding, it is important to state that the sample of this study remained out of training and did not compete during rehabilitation. It has been suggested that athletes competing at elite levels form supportive relationships with their teammates, which positively affects their motivation to exercise (Levy et al., 2008). Thus, it can be speculated that our sample's loss of this type of support may have created the need for additional support from friends. The findings of this study have been discussed previously, and it has been suggested that SS acts as a suppressive mechanism of the stressful events that occur during rehabilitation (Vahedparast, Mohammadi, Ahmadi, & Farhadi, 2017). Support perception positively affects appraisal processes, and athletes who feel that they receive adequate SS increase their ability to adopt new coping mechanisms during rehabilitation (Rees, 2007). Interestingly, this is the first study that highlights this factor and provides an explanation for it in professional athletes.

Practical support has been found to affect ERA in RA (Levy et al., 2009) as well as in other clinical populations (Damush, Plue, Bakas, Schmid, & Williams, 2007; Hislop, Gray, Melling, Paraskevopoulos, & Baer, 2015). In this study, athletes believed that the provision of transportation by relatives was an important factor for their rehabilitation process as some of them were not able to drive or use public transportation due to the severity of their injury. Clinicians should consider this factor when providing rehabilitation in athletes and eliminate transportation by providing home-based rehabilitation if possible, as previously suggested (Rodrigues, Armstrong, Adachi, & MacDermid, 2017).

Task-related support was also a factor that improved ERA in athletes. This is in line with previous studies exploring adherence in other clinical populations (Campbell et al., 2001; Sluijs, Kok, & Van der Zee, 1993). An explanation for this was that athletes needed the supervision to properly undertake their therapeutic exercise and avoid mistakes that would delay their rehabilitation process. Although this was not a barrier in practice-based rehabilitation, patients undertaking physiotherapy exercises at home should be able to receive proper support from their clinicians. Lambert et al. (2017) found that patients with musculoskeletal conditions increased their adherence to home-based exercise programs with the provision of a web-based application and supportive text messages or phone calls. Thus, the authors of this study suggest that clinicians should identify possible ways to remotely provide additional support, if needed, using web-based applications to increase adherence.

In this study, oversupport by friends or family was not mentioned in any of the athletes, as previously found in RA (Levy et al., 2009). The authors of the study speculate that due to the higher incidence of sport-related injuries in professional athletes (Moses, Orchard, & Orchard, 2012), people surrounding this population are more educated in regard to sport-related rehabilitation, and they are less likely to oversupport them, hindering their rehabilitation process.

Coping Strategies

This study found that CS also affected ERA in PVA. It is important to note that lack of CS has been shown to affect adherence in other clinical populations (Dalle Grave, Calugi, Centis, El Ghoch, & Marchesini, 2011; Kim et al., 2019; O'Brien, Bassett, & McNair, 2013) and in healthy individuals who aim to engage in regular exercise (Annesi, 2001; Long & Haney, 1988). This finding is in line with the main themes found in the studies of Levy et al. (2009) in RA and in the study of Marshall et al. (2012) in elite athletes. However, the CS (subthemes) used in the aforementioned studies were different when compared with the findings of this study. RA needed a thorough understanding of the physiological mechanisms that underlined their injury or rehabilitation process by receiving educational information from other athletes (Levy et al., 2009). In this study, athletes did not provide similar CS, presumably due to the fact that professional athletes know that injuries are part of their sport careers (Arvinen-Barrow, Massey, & Hemmings, 2014) and probably have gained a better understanding of the expected duration of the rehabilitation process.

Again, the study of Marshall et al. (2012) showed that CS related to memory aid, such as written instructions, increased the athletes' adherence. In our study, a similar problem was tackled by athletes with the use of training diaries. This is a strategy that has been used successfully in the past to increase ERA in patients with complex regional pain syndrome (Moseley, 2006). However, caution should be taken when clinicians rely on training diaries to estimate adherence as patients tend to overestimate ERA by more than 10–20% (Moseley, 2006; Nicolson, Hinman, Wrigley, Stratford, & Bennell, 2018).

New CS emerged from the data of this study that have not been mentioned previously. For example, not participating but just attending trainings and matches from the bench was found to be an important CS that increased ERA. Drawing upon the organizational development literature and Samendinger et al.'s (2019) results on the effectiveness of team building interventions to increase ERA, it can be suggested that promoting a greater sense of unity and cohesiveness in team athletes may have a positive influence on their ERA. As a positive relationship exists in professional athletes between cohesion and task satisfaction (Samendinger et al., 2019; Spink, Nickel, Wilson, & Odnokon, 2005), ERA may be increased further in this population of PVA by increasing team building interventions.

Furthermore, this study found that when athletes were seeking advice from friends and family and not from the clinician, their commitment to the exercise program was decreasing. This finding has been previously mentioned by Argent, Daly, and Caulfield (2018), who explored adherence rates in patients with chronic low back pain undertaking home-based exercise programs, and by Taylor and May

(1996) in a mixed group of recreational and competitive athletes. Again, it can be speculated that false beliefs and misinformation may hinder ERA, especially in patients with an external locus of control, who are more likely to be influenced by others (Sluijs et al., 1993). As previously stated (Argent et al., 2018), the authors of this study also suggest that clinicians should assess athletes' beliefs and properly educate them to avoid them being misinformed by nonclinicians.

Confidence

Confidence in properly performing the prescribed exercises was also found to affect adherence, as in the study of Levy et al. (2009). In our study, it was expected that professional athletes would have been more confident with home-based exercises as they more frequently incorporate strength training exercises in their daily routine and perform rehabilitation exercises with better quality when compared with RA (Milne, Hall, & Forwell, 2005). Also, previous studies have not mentioned a similar barrier to ERA in professional athletes. However, in our study, lack of supervision affected adherence, probably as a result of reduced confidence when executing the prescribed exercise program, which further reduced their motivation to exercise in the long term.

An important new finding of this study was that the clinician's popularity was a factor that increased the interviewing athletes' confidence to perform their exercise program. Although this study recruited volleyball players, it is evident that due to the popularity of the aforementioned sport (football) in the Greek region, the interviewees believed that having work experience in these football clubs increased the physiotherapist's clinical knowledge. Misjudging physiotherapists' work experience has been previously mentioned in the study of Marshall et al. (2012). However, it is obvious that clinicians who inform patients about their wealth of experience may improve their adherence.

Irrespective of the intended goal of the exercise, either for rehabilitation or performance, direct supervision has been shown to have significant benefits in physiological measures in competitive athletes (Coutts, Murphy, & Dascombe, 2004). As in most cases, rehabilitation should not take place only inside the physiotherapy practice but should also continue at home, remote monitoring of ERA using online platforms for video calling to offer direct supervision may provide superior results. Furthermore, clinicians should be aware that the provision of supervision through online applications has been shown to be equally effective when compared with direct (in-person) supervision (Tousignant et al., 2011), which strengthens our previous statements when suggesting using web applications for monitoring and supervising athletes when undertaking rehabilitation exercises at home.

Overall Findings

This qualitative study provided a novel understanding of the barriers to and facilitators of ERA that can have an impact on the optimization of future exercise interventions for PVA. This study adds to previous research on barriers to and facilitators of ERA in athletes by identifying new factors in PVA in the Greek region. This is an important area of research as volleyball remains a very popular

sport in Greece, and reinjury rates among volleyball athletes remain high when compared with professional athletes from other sports (Bahr & Bahr, 1997; Bele et al., 2015). Barriers unique to the young Greek population were identified, such as transportation. Studies have shown limited accessibility of people with physical disabilities, either acute or chronic, when using public transportation in the Greek region (Stankova, Amoiradis, Velissariou, & Grigoriadou, 2021). This study highlights the importance of accessibility in ERA, even in the younger and more active population, for the first time.

Also, the significance of the patient–provider relationship was highlighted in this study either through task-related support or through confidence in athletes when performing their exercise rehabilitation program. Thus, it can be speculated that an important contributor to ERA may be the development of therapeutic alliance (TA) between patients and therapists. TA has been recognized as an important component of the rehabilitation process that influences the treatment outcome in other fields, such as psychotherapy (Ardito & Rabellino, 2011). Recent studies have also recognized the importance of TA in older patients with chronic low back pain (Ferreira et al., 2013) and knee osteoarthritis (Moore, Holden, Foster, & Jinks, 2020). Thus, this study adds to previous research as it suggests the development of TA to increase ERA in PVA and highlights key features of TA that facilitate ERA, including supervision and task-related support, to create a sense of partnership through the individualization of the rehabilitation program.

Numerous conceptual frameworks have been used previously to explain TA but with limited application in the sports therapy context. Furthermore, outcome measures of TA have been developed mainly for psychotherapy, leading to a ceiling effect when used for patients with musculoskeletal complaints (Moore et al., 2020). This study highlights the need for future studies that will focus on the recontextualization of outcome measures used for TA in athletes with musculoskeletal complaints.

Although there is no research to indicate the superiority of any conceptual framework that may facilitate the development of TA (Moore et al., 2020), our aim at this point is to propose a framework that may address most of the issues raised and, based on previous research in similar populations, to enhance the development of TA. The findings of this study indicated on multiple occasions through the interviews that motivation to perform the prescribed exercise program may have been affected either due to the lack of mental support or the use of inadequate CS or indirectly through the reduction of their confidence to exercise. Increased motivation has been found to positively affect attendance at rehabilitation sessions, completion of prescribed treatment protocols, self-rated adherence, and self-reported home exercise completion in competitive athletes and RA with musculoskeletal injuries (Brewer et al., 2000, 2003; Duda, Smart, & Tappe, 1989). Thus, physiotherapists should be aware of conceptual frameworks that may enhance motivation in this population.

Self-determination theory (SDT) is a psychologic framework that suggests that patients' behavior can be motivated by intrinsic and extrinsic motivation, which mainly differ in terms of patient autonomy (Deci & Ryan, 2000). SDT proposes that intrinsic motivation positively regulates behaviors due to interest and enjoyment and reinforces an autonomy-supportive environment (Ryan & Deci, 2000). This environment of autonomy includes the provision of patients'

opportunities for choice and options and respects their opinions and thoughts by providing a meaningful rationale behind suggested interventions. SDT does not exclude the importance of extrinsic motivation and suggests that within the extrinsic motivation, an autonomous behavioral regulation may be reinforced; however, this should not be based on adopted controlled motivational strategies, such as when we adjust our behaviors to satisfy an external contingency or pressure (i.e., avoid punishment or feeling of guilt by the patient). SDT can include extrinsic motivation at the most autonomous pole of the continuum, using strategies that will aid patients to understand the goals of the interventions and identify their meaningfulness (Chan, Lonsdale, Ho, Yung, & Chan, 2009).

Autonomy support from physiotherapists has been shown to positively influence ERA, enhanced by patients' motivation to adhere to the treatment program (Chan et al., 2009). Especially for long-term maintenance of ERA, adopting higher autonomous motivation results in improved adherence in home-based exercise rehabilitation programs. It is suggested that clinicians should facilitate patients' understanding of the interventions prescribed, provide treatment options, and explain the rationale behind each prescribed intervention to enhance understanding of the meaningfulness of the interventions. This will potentially increase autonomous motivation and result in greater ERA, as previously found in published health-related behavioral studies that aimed to control weight gain (Williams, Grow, Freedman, Ryan, & Deci, 1996), alcohol consumption (Ryan, Plant, & O'Malley, 1995), smoking (Williams, Gagné, Ryan, & Deci, 2002), and diabetes (Williams, Rodin, Ryan, Grolnick, & Deci, 1998).

Clinical Implications

The authors of this study propose that education should be part of the rehabilitation process to explain to the athletes the physiological mechanisms of pain and avoid the adoption of illness behaviors. This aligns with the statements of Levy et al. (2009), who suggested that physiotherapists should provide education to their athletes on factors that may affect their pain levels and practical advice on pain management. Furthermore, as was recently found, pain education may also reduce pain intensity and provide higher expectations of recovery (Mittinty, Vanlint, Stocks, Mittinty, & Moseley, 2018). Thus, clinicians dealing with athletic injuries should provide pain education as part of their multifaceted approach to rehabilitation focused on reconceptualization of pain and its management (Mittinty et al., 2018; Taylor & Taylor, 1998).

Also, in terms of practical support, as transportation seemed to greatly impact adherence in this sample of athletes, clinicians may explore whether home-based rehabilitation on several occasions may increase adherence to exercise. Delivery of the exercise intervention was reiterated again when task-related support emerged as a subtheme. It is further suggested that, in certain cases, additional remote support of the patients during rehabilitation may improve adherence, using a web-based application that would allow supervision of athletes who are not confident with their exercise program yet. This strategy would also be effective to increase confidence in this population when undertaking exercise rehabilitation at home. Remote supervision may provide a unique opportunity for clinicians not only to supervise patients during exercise execution at home but

also to properly progress the exercise rehabilitation plan as part of a complex rehabilitation program design.

Furthermore, since team building interventions resulted in an increased ERA, clinicians should understand that isolating patients with home-based rehabilitation programs may negatively affect the feeling of cohesion that exists in professional athletes and, thus, reduce further task satisfaction. It is suggested that clinicians should employ strategies in cooperation with coaches that maintain an appropriate level of communication of injured athletes with the rest of the team members and avoid self-isolation of this population, especially during extended rehabilitation periods.

This qualitative study provides unique contributions to the field of exercise and sport psychology as research in this field is very limited in the Greek region. Sport and exercise psychology in Greece has developed over the years, and the number of publications that focus on exercise psychology for factors that relate to performance is increasing. However, there is a paucity of studies on the barriers to exercise for rehabilitation (Papaioannou, Machaira, & Theano, 2013). Furthermore, the importance of this study also relies on previous concerning evidence regarding the significantly low levels of physical activity in Greek young people (Papaioannou, Karastogiannidou, & Theodorakis, 2004). The levels of physical activity drop even more in older adults with 40% of men and 30% of women walking on average for <60 min/day (Babatsikou, Gerogianni, Zyga, & Koutis, 2012). Thus, understanding the factors that could affect exercise participation and adherence could not only be life changing for patients but could also support national health policies that aim to increase physical activity and exercise participation.

Limitations

There were some limitations that should be mentioned. Initially, the retrospective nature of the study could have influenced the interviewees' ability to recall information regarding their rehabilitation process, although this study's sample was interviewed relatively soon after they were discharged from physiotherapy. Also, it is unknown whether the interviewees spend an equal amount of time in home-based rehabilitation, which can significantly decrease adherence rates (Goddard et al., 2020), and whether they reported reliable information regarding their perceived barriers and facilitators to their exercise programs. Thus, future designs should recruit professional athletes using home-based protocols of similar duration to ensure better homogeneity of the sample.

Finally, with regard to the sample size of the study, it should be noted that although a small sample of athletes was recruited, saturation assessment ensured completeness of the data and adequacy of our sample size during data collection (Guest et al., 2020). It was decided to use inductive thematic saturation as it has been previously considered as the "gold standard" for sample size determination in qualitative designs (Saunders et al., 2018). Saturation assessment is not a new method for sample size estimation in qualitative designs and has been used extensively in qualitative research for the last five decades as it ensures that within a small sample of interviewees, all the useful information relative to the study objectives will be traced (Guest et al., 2020). It was decided to use the method of data saturation proposed by Guest et al. (2020) as it facilitates prospective

assessment of saturation and offers the advantage to researchers to stop before reaching a prespecified number of interviews (Guest et al., 2020).

Conclusion

The findings of this study highlighted the significance of the psychological impact of ERA in professional athletes dealing with a sport injury. Several barriers to and facilitators of ERA were found to affect professional athletes, including pain, SS, CS, and confidence, highlighting pain as the most reported factor that affected adherence in this population. Physiotherapists treating PVA should aim to address these issues and incorporate the aforementioned suggestions in their daily practice.

Acknowledgments

The authors would like to thank all athletes who volunteered their time to participate in the study. All authors contributed equally to the manuscript and read and approved the final version of the manuscript.

References

- Albinson, C.B., & Petrie, T.A. (2003). Cognitive appraisals, stress, and coping: Preinjury and postinjury factors influencing psychological adjustment to sport injury. *Journal of Sport Rehabilitation*, 12(4), 306–322. doi:10.1123/jsr.12.4.306
- Annesi, J.J. (2001). Effects of music, television, and a combination entertainment system on distraction, exercise adherence, and physical output in adults. *Canadian Journal of Behavioural Science*, 33(3), 193. doi:10.1037/h0087141
- Ardito, R.B., & Rabellino, D. (2011). Therapeutic alliance and outcome of psychotherapy: Historical excursus, measurements, and prospects for research. *Frontiers in Psychology*, 2, 270. PubMed ID: 22028698 doi:10.3389/fpsyg.2011.00270
- Argent, R., Daly, A., & Caulfield, B. (2018). Patient involvement with home-based exercise programs: Can connected health interventions influence adherence? *JMIR mHealth and uHealth*, 6(3), e47–e47. PubMed ID: 29496655 doi:10.2196/mhealth.8518
- Arvinen-Barrow, M., Massey, W.V., & Hemmings, B. (2014). Role of sport medicine professionals in addressing psychosocial aspects of sport-injury rehabilitation: Professional athletes' views. *Journal of Athletic Training*, 49(6), 764–772. PubMed ID: 25243737 doi:10.4085/1062-6050-49.3.44
- Assa, T., Geva, N., Zarkh, Y., & Defrin, R. (2019). The type of sport matters: Pain perception of endurance athletes versus strength athletes. *European Journal of Pain*, 23(4), 686–696. PubMed ID: 30379385 doi:10.1002/ejp.1335
- Babatsikou, F., Gerogianni, G., Zyga, S., & Koutis, C. (2012). Physical activity in a sample of elderly Greek people: A research study. *Health Science Journal*, 6, 518–533.
- Bahr, R., & Bahr, I.A. (1997). Incidence of acute volleyball injuries: A prospective cohort study of injury mechanisms and risk factors. *Scandinavian Journal of Medicine & Science in Sports*, 7(3), 166–171. PubMed ID: 9200321 doi:10.1111/j.1600-0838.1997.tb00134.x
- Bele, S., Östenberg, A.H., Sjöström, R., & Alricsson, M. (2015). Experiences of returning to elite beach volleyball after shoulder injury. *Journal of Exercise Rehabilitation*, 11(4), 204–210. PubMed ID: 26331135 doi:10.12965/jer.150213

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. doi:[10.1191/1478088706qp0630a](https://doi.org/10.1191/1478088706qp0630a)
- Brewer, B.W., Cornelius, A.E., Van Raalte, J.L., Petitpas, A.J., Sklar, J.H., Pohlman, M.H., ... Ditmar, T.D. (2003). Age-related differences in predictors of adherence to rehabilitation after anterior cruciate ligament reconstruction. *Journal of Athletic Training*, 38(2), 158–162. PubMed ID: [12937528](https://pubmed.ncbi.nlm.nih.gov/12937528/)
- Brewer, B.W., Van Raalte, J.L., Cornelius, A.E., Petitpas, A.J., Sklar, J.H., Pohlman, M.H., ... Ditmar, T.D. (2000). Psychological factors, rehabilitation adherence, and rehabilitation outcome after anterior cruciate ligament reconstruction. *Rehabilitation Psychology*, 45(1), 20. doi:[10.1037/0090-5550.45.1.20](https://doi.org/10.1037/0090-5550.45.1.20)
- Campbell, R., Evans, M., Tucker, M., Quilty, B., Dieppe, P., & Donovan, J.L. (2001). Why don't patients do their exercises? Understanding non-compliance with physiotherapy in patients with osteoarthritis of the knee. *Journal of Epidemiology and Community Health*, 55(2), 132–138. PubMed ID: [11154253](https://pubmed.ncbi.nlm.nih.gov/11154253/) doi:[10.1136/jech.55.2.132](https://doi.org/10.1136/jech.55.2.132)
- Chan, D.K., Lonsdale, C., Ho, P.Y., Yung, P.S., & Chan, K.M. (2009). Patient motivation and adherence to postsurgery rehabilitation exercise recommendations: The influence of physiotherapists' autonomy-supportive behaviors. *Archives of Physical Medicine and Rehabilitation*, 90(12), 1977–1982. PubMed ID: [19969157](https://pubmed.ncbi.nlm.nih.gov/19969157/) doi:[10.1016/j.apmr.2009.05.024](https://doi.org/10.1016/j.apmr.2009.05.024)
- Corban, R., Snape, R., & Taylor, J. (2003). Investigation of differences in coping styles of professional and amateur rugby players. *Journal of Sports Sciences*, 21, 345.
- Coutts, A.J., Murphy, A.J., & Dascombe, B.J. (2004). Effect of direct supervision of a strength coach on measures of muscular strength and power in young rugby league players. *Journal of Strength Conditioning and Research*, 18, 316–323. doi:[10.1519/R-12972.1](https://doi.org/10.1519/R-12972.1)
- Dalle Grave, R., Calugi, S., Centis, E., El Ghoch, M., & Marchesini, G. (2011). Cognitive-behavioral strategies to increase the adherence to exercise in the management of obesity. *Journal of Obesity*, 2011(11), 348293. doi:[10.1155/2011/348293](https://doi.org/10.1155/2011/348293)
- Damush, T.M., Plue, L., Bakas, T., Schmid, A., & Williams, L.S. (2007). Barriers and facilitators to exercise among stroke survivors. *Rehabilitation Nursing*, 32(6), 253–260, 262. PubMed ID: [18065147](https://pubmed.ncbi.nlm.nih.gov/18065147/) doi:[10.1002/j.2048-7940.2007.tb00183.x](https://doi.org/10.1002/j.2048-7940.2007.tb00183.x)
- Deci, E.L., & Ryan, R.M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. doi:[10.1207/S15327965PLI1104_01](https://doi.org/10.1207/S15327965PLI1104_01)
- Duda, J.L., Smart, A.E., & Tappe, M.K. (1989). Predictors of adherence in the rehabilitation of athletic injuries: An application of personal investment theory. *Journal of Sport and Exercise Psychology*, 11(4), 367–381. doi:[10.1123/jsep.11.4.367](https://doi.org/10.1123/jsep.11.4.367)
- Ferreira, P.H., Ferreira, M.L., Maher, C.G., Refshauge, K.M., Latimer, J., & Adams, R.D. (2013). The therapeutic alliance between clinicians and patients predicts outcome in chronic low back pain. *Physical Therapy*, 93(4), 470–478. PubMed ID: [23139428](https://pubmed.ncbi.nlm.nih.gov/23139428/) doi:[10.2522/ptj.20120137](https://doi.org/10.2522/ptj.20120137)
- Fields, J., Murphey, M., Horodyski, M., & Stopka, C. (1995). Factors associated with adherence to sport injury rehabilitation in college-age recreational athletes. *Journal of Sport Rehabilitation*, 4(3), 172–180. doi:[10.1123/jsr.4.3.172](https://doi.org/10.1123/jsr.4.3.172)
- Flora, P.K., Anderson, T.J., & Brawley, L.R. (2015). Illness perceptions and adherence to exercise therapy in cardiac rehabilitation participants. *Rehabilitation Psychology*, 60(2), 179. PubMed ID: [26120743](https://pubmed.ncbi.nlm.nih.gov/26120743/) doi:[10.1037/a0039123](https://doi.org/10.1037/a0039123)
- Goddard, K., Roberts, C.-M., Byron-Daniel, J., & Woodford, L. (2020). Psychological factors involved in adherence to sport injury rehabilitation: A systematic review. *International Review of Sport and Exercise Psychology*, 13, 1–23. doi:[10.1080/1750984X.2020.1744179](https://doi.org/10.1080/1750984X.2020.1744179)
- Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. *PLoS One*, 15(5), 1–17. doi:[10.1371/journal.pone.0232076](https://doi.org/10.1371/journal.pone.0232076)

- Hislop, J., Gray, S., Melling, S., Paraskevopoulos, L., & Baer, G. (2015). An exploration of physical activity experiences in people with Parkinson's disease. *Physiotherapy, 101*, e572–e573. doi:[10.1016/j.physio.2015.03.3393](https://doi.org/10.1016/j.physio.2015.03.3393)
- Jack, K., McLean, S.M., Moffett, J.K., & Gardiner, E. (2010). Barriers to treatment adherence in physiotherapy outpatient clinics: A systematic review. *Manual Therapy, 15*(3), 220–228. PubMed ID: [20163979](https://pubmed.ncbi.nlm.nih.gov/20163979/) doi:[10.1016/j.math.2009.12.004](https://doi.org/10.1016/j.math.2009.12.004)
- Kim, S., Ko, Y.H., Song, Y., Kang, M.J., Lee, H., Kim, S.H., ... Han, J. (2019). Development of an exercise adherence program for breast cancer survivors with cancer-related fatigue—An intervention mapping approach. *Supportive Care in Cancer, 27*(12), 4745–4752. PubMed ID: [30972643](https://pubmed.ncbi.nlm.nih.gov/30972643/) doi:[10.1007/s00520-019-04785-2](https://doi.org/10.1007/s00520-019-04785-2)
- Lambert, T.E., Harvey, L.A., Avdalis, C., Chen, L.W., Jeyalingam, S., Pratt, C.A., ... Lucas, B.R. (2017). An app with remote support achieves better adherence to home exercise programs than paper handouts in people with musculoskeletal conditions: A randomised trial. *Journal of Physiotherapy, 63*(3), 161–167. PubMed ID: [28662834](https://pubmed.ncbi.nlm.nih.gov/28662834/) doi:[10.1016/j.jphys.2017.05.015](https://doi.org/10.1016/j.jphys.2017.05.015)
- Levy, A.R., Polman, R., & Clough, P.J. (2008). Adherence to sport injury rehabilitation programs: An integrated psycho-social approach. *Scandinavian Journal of Medicine & Science in Sports, 18*(6), 798–809. PubMed ID: [18208427](https://pubmed.ncbi.nlm.nih.gov/18208427/) doi:[10.1111/j.1600-0838.2007.00704.x](https://doi.org/10.1111/j.1600-0838.2007.00704.x)
- Levy, A.R., Polman, R.C., Nicholls, A.R., & Marchant, D.C. (2009). Sport injury rehabilitation adherence: Perspectives of recreational athletes. *International Journal of Sport and Exercise Psychology, 7*(2), 212–229. doi:[10.1080/1612197X.2009.9671901](https://doi.org/10.1080/1612197X.2009.9671901)
- Long, B.C., & Haney, C.J. (1988). Coping strategies for working women: Aerobic exercise and relaxation interventions. *Behavior Therapy, 19*(1), 75–83. doi:[10.1016/S0005-7894\(88\)80057-1](https://doi.org/10.1016/S0005-7894(88)80057-1)
- Marshall, A., Donovan-Hall, M., & Ryall, S. (2012). An exploration of athletes' views on their adherence to physiotherapy rehabilitation after sport injury. *Journal of Sport Rehabilitation, 21*(1), 18–25. PubMed ID: [22100700](https://pubmed.ncbi.nlm.nih.gov/22100700/) doi:[10.1123/jsr.21.1.18](https://doi.org/10.1123/jsr.21.1.18)
- Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: SAGE Publications, Inc.
- Milne, M., Hall, C., & Forwell, L. (2005). Self-efficacy, imagery use, and adherence to rehabilitation by injured athletes. *Journal of Sport Rehabilitation, 14*(2), 150–167. doi:[10.1123/jsr.14.2.150](https://doi.org/10.1123/jsr.14.2.150)
- Mittinty, M.M., Vanlint, S., Stocks, N., Mittinty, M.N., & Moseley, G.L. (2018). Exploring effect of pain education on chronic pain patients' expectation of recovery and pain intensity. *Scandinavian Journal of Pain, 18*(2), 211–219. PubMed ID: [29794302](https://pubmed.ncbi.nlm.nih.gov/29794302/) doi:[10.1515/sjpain-2018-0023](https://doi.org/10.1515/sjpain-2018-0023)
- Moore, A.J., Holden, M.A., Foster, N.E., & Jinks, C. (2020). Therapeutic alliance facilitates adherence to physiotherapy-led exercise and physical activity for older adults with knee pain: A longitudinal qualitative study. *Journal of Physiotherapy, 66*(1), 45–53. PubMed ID: [31843425](https://pubmed.ncbi.nlm.nih.gov/31843425/) doi:[10.1016/j.jphys.2019.11.004](https://doi.org/10.1016/j.jphys.2019.11.004)
- Moseley, G.L. (2006). Do training diaries affect and reflect adherence to home programs? *Arthritis Care & Research: Official Journal of the American College of Rheumatology, 55*(4), 662–664. doi:[10.1002/art.22086](https://doi.org/10.1002/art.22086)
- Moses, B., Orchard, J., & Orchard, J. (2012). Systematic review: Annual incidence of ACL injury and surgery in various populations. *Research in Sports Medicine, 20*(3–4), 157–179. PubMed ID: [22742074](https://pubmed.ncbi.nlm.nih.gov/22742074/) doi:[10.1080/15438627.2012.680633](https://doi.org/10.1080/15438627.2012.680633)
- Nicolson, P.J.A., Hinman, R.S., Wrigley, T.V., Stratford, P.W., & Bennell, K.L. (2018). Self-reported home exercise adherence: A validity and reliability study using concealed accelerometers. *Journal of Orthopaedic & Sports Physical Therapy, 48*(12), 943–950. doi:[10.2519/jospt.2018.8275](https://doi.org/10.2519/jospt.2018.8275)

- Nowell, L.S., Norris, J.M., White, D.E., & Moules, N.J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1–13. doi:[10.1177/1609406917733847](https://doi.org/10.1177/1609406917733847)
- O'Brien, D., Bassett, S., & McNair, P. (2013). The effect of action and coping plans on exercise adherence in people with lower limb osteoarthritis: Feasibility study. *New Zealand Journal of Physiotherapy*, 41, 49–57.
- Papaioannou, A., Karastogiannidou, C., & Theodorakis, Y. (2004). Sport involvement, sport violence and health behaviours of Greek adolescents. *The European Journal of Public Health*, 14(2), 168–172. PubMed ID: [15230503](https://pubmed.ncbi.nlm.nih.gov/15230503/) doi:[10.1093/eurpub/14.2.168](https://doi.org/10.1093/eurpub/14.2.168)
- Papaioannou, A.G., Machaira, E., & Theano, V. (2013). Fifteen years of publishing in English language journals of sport and exercise psychology: Authors' proficiency in English and editorial boards make a difference. *International Journal of Sport and Exercise Psychology*, 11(1), 1–10. doi:[10.1080/1612197X.2013.753726](https://doi.org/10.1080/1612197X.2013.753726)
- Pisters, M.F., Veenhof, C., Schellevis, F.G., Twisk, J.W., Dekker, J., & De Bakker, D.H. (2010). Exercise adherence improving long-term patient outcome in patients with osteoarthritis of the hip and/or knee. *Arthritis Care & Research*, 62(8), 1087–1094. PubMed ID: [20235201](https://pubmed.ncbi.nlm.nih.gov/20235201/) doi:[10.1002/acr.20182](https://doi.org/10.1002/acr.20182)
- Rees, T. (2007). Influence of social support on athletes. In S. Jowette & D. Lavallee (Eds.), *Social psychology in sport* (pp. 223–231). Champaign, IL: Human Kinetics. doi:[10.5040/9781492595878.ch-016](https://doi.org/10.5040/9781492595878.ch-016)
- Rodrigues, I., Armstrong, J., Adachi, J., & MacDermid, J. (2017). Facilitators and barriers to exercise adherence in patients with osteopenia and osteoporosis: A systematic review. *Osteoporosis International*, 28(3), 735–745. PubMed ID: [27714441](https://pubmed.ncbi.nlm.nih.gov/27714441/) doi:[10.1007/s00198-016-3793-2](https://doi.org/10.1007/s00198-016-3793-2)
- Room, J., Hannink, E., Dawes, H., & Barker, K. (2017). What interventions are used to improve exercise adherence in older people and what behavioural techniques are they based on? A systematic review. *BMJ Open*, 7(12), e019221. PubMed ID: [29247111](https://pubmed.ncbi.nlm.nih.gov/29247111/) doi:[10.1136/bmjopen-2017-019221](https://doi.org/10.1136/bmjopen-2017-019221)
- Ryan, R.M., & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68. doi:[10.1037/0003-066X.55.1.68](https://doi.org/10.1037/0003-066X.55.1.68)
- Ryan, R.M., Plant, R.W., & O'Malley, S. (1995). Initial motivations for alcohol treatment: Relations with patient characteristics, treatment involvement, and drop-out. *Addictive Behaviors*, 20(3), 279–297. PubMed ID: [7653312](https://pubmed.ncbi.nlm.nih.gov/7653312/) doi:[10.1016/0306-4603\(94\)00072-7](https://doi.org/10.1016/0306-4603(94)00072-7)
- Samendinger, S., Hill, C.R., Kerr, N.L., Winn, B., Ede, A., Pivarnik, J.M., . . . Feltz, D.L. (2019). Group dynamics motivation to increase exercise intensity with a virtual partner. *Journal of Sport and Health Science*, 8(3), 289–297. PubMed ID: [31193273](https://pubmed.ncbi.nlm.nih.gov/31193273/) doi:[10.1016/j.jshs.2018.08.003](https://doi.org/10.1016/j.jshs.2018.08.003)
- Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., . . . Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity*, 52(4), 1893–1907. PubMed ID: [29937585](https://pubmed.ncbi.nlm.nih.gov/29937585/) doi:[10.1007/s11135-017-0574-8](https://doi.org/10.1007/s11135-017-0574-8)
- Sluijs, E.M., Kok, G.J., & Van der Zee, J. (1993). Correlates of exercise compliance in physical therapy. *Physical Therapy*, 73(11), 771–782. PubMed ID: [8234458](https://pubmed.ncbi.nlm.nih.gov/8234458/) doi:[10.1093/ptj/73.11.771](https://doi.org/10.1093/ptj/73.11.771)
- Smith, B., & Sparkes, A.C. (2020). Qualitative research. In G. Tenenbaum, R.C. Eklund (Eds.), *Handbook of sport psychology* (pp. 999–1019). Hoboken, NJ: Wiley. doi:[10.1002/9781119568124.ch49](https://doi.org/10.1002/9781119568124.ch49)
- Spetch, L.A., & Kolt, G.S. (2001). Adherence to sport injury rehabilitation: Implications for sports medicine providers and researchers. *Physical Therapy in Sport*, 2(2), 80–90. doi:[10.1054/ptsp.2001.0062](https://doi.org/10.1054/ptsp.2001.0062)

- Spink, K.S., Nickel, D., Wilson, K., & Odnokon, P. (2005). Using a multilevel approach to examine the relationship between task cohesion and team task satisfaction in elite ice hockey players. *Small Group Research, 36*(5), 539–554. doi:[10.1177/1046496405275229](https://doi.org/10.1177/1046496405275229)
- Stankova, M., Amoiradis, C., Velissariou, E., & Grigoriadou, D. (2021). Accessible tourism in greece: A satisfaction survey on tourists with disabilities. *Management Research and Practice, 13*(1), 5–16.
- Stream, W.B. (1998). Possibilities for qualitative research in sport psychology. *The Sport Psychologist, 12*(3), 333–345. doi:[10.1123/tsp.12.3.333](https://doi.org/10.1123/tsp.12.3.333)
- Taylor, A.H., & May, S. (1996). Threat and coping appraisal as determinants of compliance with sports injury rehabilitation: An application of protection motivation theory. *Journal of Sports Sciences, 14*(6), 471–482. PubMed ID: [8981286](https://pubmed.ncbi.nlm.nih.gov/8981286/) doi:[10.1080/02640419608727734](https://doi.org/10.1080/02640419608727734)
- Taylor, J., & Taylor, S. (1998). Pain education and management in the rehabilitation from sports injury. *The Sports Psychologist, 12*(1), 68. doi:[10.1123/tsp.12.1.68](https://doi.org/10.1123/tsp.12.1.68)
- Tesarz, J., Schuster, A.K., Hartmann, M., Gerhardt, A., & Eich, W. (2012). Pain perception in athletes compared to normally active controls: A systematic review with meta-analysis. *Pain, 153*(6), 1253–1262. PubMed ID: [22607985](https://pubmed.ncbi.nlm.nih.gov/22607985/) doi:[10.1016/j.pain.2012.03.005](https://doi.org/10.1016/j.pain.2012.03.005)
- Tousignant, M., Moffet, H., Boissy, P., Corriveau, H., Cabana, F., & Marquis, F. (2011). A randomized controlled trial of home telerehabilitation for post-knee arthroplasty. *Journal of Telemedicine and Telecare, 17*(4), 195–198. PubMed ID: [21398389](https://pubmed.ncbi.nlm.nih.gov/21398389/) doi:[10.1258/jtt.2010.100602](https://doi.org/10.1258/jtt.2010.100602)
- Vader, K., Doulas, T., Patel, R., & Miller, J. (2019). Experiences, barriers, and facilitators to participating in physical activity and exercise in adults living with chronic pain: A qualitative study. *Disability and Rehabilitation, 43*(13), 1829–1837. doi:[10.1080/09638288.2019.1676834](https://doi.org/10.1080/09638288.2019.1676834)
- Vahedparast, H., Mohammadi, E., Ahmadi, F., & Farhadi, A. (2017). The role of social support in adherence to treatment regimens: Experiences of patients with chronic diseases. *Medical-Surgical Nursing Journal, 7*(1), e69646. doi:[10.5812/msnj.69646](https://doi.org/10.5812/msnj.69646)
- Williams, G.C., Grow, V.M., Freedman, Z.R., Ryan, R.M., & Deci, E.L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70*(1), 115. PubMed ID: [8558405](https://pubmed.ncbi.nlm.nih.gov/8558405/) doi:[10.1037/0022-3514.70.1.115](https://doi.org/10.1037/0022-3514.70.1.115)
- Williams, G.C., Rodin, G.C., Ryan, R.M., Grolnick, W.S., & Deci, E.L. (1998). Autonomous regulation and long-term medication adherence in adult outpatients. *Health Psychology, 17*(3), 269. PubMed ID: [9619477](https://pubmed.ncbi.nlm.nih.gov/9619477/) doi:[10.1037/0278-6133.17.3.269](https://doi.org/10.1037/0278-6133.17.3.269)
- Williams, G.G., Gagné, M., Ryan, R.M., & Deci, E.L. (2002). Facilitating autonomous motivation for smoking cessation. *Health Psychology, 21*(1), 40. PubMed ID: [11846344](https://pubmed.ncbi.nlm.nih.gov/11846344/) doi:[10.1037/0278-6133.21.1.40](https://doi.org/10.1037/0278-6133.21.1.40)