



Literature Review

What are the current practices of sports physiotherapists in integrating psychological strategies during athletes' return-to-play rehabilitation? Mixed methods systematic review

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ABSTRACT

Objective: The primary aim was to identify the current practices of sports physiotherapists in implementing psychological strategies during athletes' return-to-play rehabilitation and, secondly, to explore their attitudes and challenges to do so.

Methods: An electronic search of the PubMed, CINAHL, Scopus, Medline, Google Scholar, Cochrane Library, AMED, and PsycINFO databases was performed. Studies were considered eligible if they explored physiotherapists' implementation of psychological strategies during athletic rehabilitation. Methodological quality of included studies was assessed using the Guidelines for Critical Review Form. Data were synthesised using thematic analysis.

Results and conclusions: Eleven studies involving 1440 sports physiotherapists were included: six were quantitative, three were qualitative, and two were mixed-method studies. Most sports physiotherapists recognised the importance of implementing psychological strategies during athletes' rehabilitation but were unsure whether it is within their scope. Common psychological strategies implemented included goal setting and encouraging positive self-thoughts. Barriers to implementing psychological strategies include lack of knowledge and training at undergraduate level, lack of postgraduate psychology courses available, and perceived stigma from athletes toward seeking psychological support. Strategies for sports physiotherapists to incorporate psychological strategies during athletes' return-to-play rehabilitation could include targeted professional development opportunities to gain confidence in implementing psychological strategies.

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1. Introduction

Athletic injuries can have severe consequences, affecting the physical, psychological and emotional wellbeing of athletes (Appaneal, Levine, Perna, & Roh, 2009; Edmonds & Dengerink, 2014; Erickson & Sherry, 2017; James, Kelly, & Beckman, 2014). Throughout their rehabilitation from injury, athletes can experience depression, report feelings of frustration and anger, and suffer a loss of identity (Appaneal et al., 2009; Arvinen-Barrow, Hemmings, Weigand, Becker, & Booth, 2007; Johnston & Carroll, 1998). These psychological effects can negatively influence the rehabilitation of athletes, increasing duration of rehabilitation, and

decreasing an athletes' confidence in their ability to return to competition (Covassin, Beidler, Ostrowski, & Wallace, 2015; Forsdyke, Smith, Jones, & Gledhill, 2016; Podlog, Dimmock, & Miller, 2011).

Sports physiotherapists have a significant role in rehabilitation of musculoskeletal injuries, and exercise prescription is vital for an athletes' return-to-play rehabilitation (Loudon, Reiman, & Sylvain, 2014; Ramos et al., 2017). There are also various psychologically-informed strategies that physiotherapists can include in rehabilitation, such as goal setting, relaxation techniques, and the use of mental imagery (C. Heaney, 2006; Lafferty, Kenyon, & Wright, 2008).

Evidence suggests sports physiotherapists show desire to incorporate psychological strategies during athletes' rehabilitation, but consider themselves ineffective at their implementation (Driver, Kean, Opreescu, & Lovell, 2017; Heaney, Rostron, Walker, & Green, 2017). A previous review identified poor understanding of

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psychological strategies by physiotherapists, and low confidence when implementing psychological techniques that they are not familiar with (Driver et al., 2017). However, the review was not specific to sports physiotherapists and athletic rehabilitation. Although sports physiotherapists expressed desire to increase their knowledge regarding psychological strategies and their clinical implementation, there appears to be a gap between wanting to implement psychological strategies, and having the knowledge to successfully do so (Ford & Gordon, 1997; Heaney et al., 2017). Understanding the current practices of sports physiotherapists in incorporating psychological strategies could inform improved care pathways for athletes' return-to-play rehabilitation and identify professional development opportunities for better integration of such strategies in their clinical practice.

Therefore, the aims of this mixed methods systematic review were to identify the current practices of sports physiotherapists in implementing psychological strategies during athletes' return-to-play rehabilitation, secondarily to explore their attitudes toward and challenges to do so.

2. Methods

The review protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) database (CRD42018106680) (Annear & Devan, 2018). The review was reported based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines for conducting search and reporting the systematic reviews (Moher, Liberati, Tetzlaff, & Altman, 2009).

2.1. Inclusion and exclusion criteria

Studies were included if they investigated current practices of sports physiotherapists that included at least one psychological strategy during rehabilitation of athletes. Studies were excluded if they involved physiotherapy students or other sports medical professionals (e.g. athletic trainers, sports psychologists). Review studies, editorials, theses and editorials were excluded, as were any studies where the primary language was not English. Studies published before 1996 were excluded as they were deemed not to reflect the current physiotherapy practice.

2.2. Operational definitions

Psychological strategies were defined based on a previous review (Driver et al., 2017) as techniques including, but not limited to: goal setting, imagery, visualisation, social support, cognitive behavioural therapy, self-talk, positive reinforcement, relaxation or coping strategies.

2.3. Data sources

The following major electronic databases were searched since inception until 18 August 2018: Medline (via Ovid), AMED, PsycINFO, PubMed, CINAHL, Cochrane Library, Scopus and Google Scholar. The search strategy was devised in consultation with a liaison university librarian (Table 1). Secondary searches were conducted by manual searching of the reference lists and citation tracking of included studies to ensure that all relevant studies were identified.

2.4. Study selection

All references were exported to data management software (EndNote X8). The titles and abstracts of studies were screened by the primary researcher (XX). After duplicates removal, the full text

articles were screened by XX and then verified by another researcher (YY).

2.5. Data extraction

The extracted information included study aim, study design, participant number, study methodology, psychological strategies, and key study findings. Any disagreements were resolved by mutual discussion.

2.6. Quality assessment

The Guidelines for Critical Review Form (GCRF) was used to assess the methodological quality of the included studies. This tool was chosen as it can be adapted to both qualitative (Letts et al., 2007), quantitative (Law et al., 1998) and mixed method study designs (Appendix A and B). Studies which were predominantly quantitative, with some open-ended questions, were assessed as quantitative. Assessment items that referred to outcomes and interventions were omitted, as they were not relevant to the aims of this review. The results section of the GCRF was modified to present the descriptive nature of the survey results, hence the statistical significance item was removed. The item referring to dropouts was modified to response rate instead, reflecting the survey design of the included studies. The assessment criteria for the quantitative studies therefore included study purpose, literature, study design, sample, results, conclusions, and clinical implications. For qualitative studies, the criteria included study purpose, literature, study design, sample, data collection, data analysis, trustworthiness, conclusions and implications. Qualitative studies were scored out of 24 and quantitative studies were scored out of nine. Quality of the studies was assessed by XX and verified by YY. Any discrepancies regarding the search results was resolved by mutual discussion.

2.7. Data analysis and synthesis

Data were analysed using a thematic analysis method (Braun & Clarke, 2006). We used an inductive approach to guide our thematic analysis in which the key themes were derived mainly from the data without any pre-existing framework. The results and discussion sections of the included studies were coded into a Microsoft Excel Sheet[®]. Key concepts relevant to the main aims of the review were then re-ordered to form second-order categories. The final third-order categories were formed on discussion of all authors.

3. Results

The search strategy identified 5141 articles (Fig. 1), of which 11 studies were eligible for final synthesis (Fig. 1). Articles were mainly excluded due to involving other health professionals, and not investigating psychological strategies.

3.1. Overview of studies

The 11 included studies included 1440 sports physiotherapists (Table 2). Six of the included studies were quantitative, three were qualitative and two were mixed-methods. A large percentage of these physiotherapists were working in the United Kingdom or Australia. The majority of the physiotherapists were identified as sports physiotherapists working with professional athletes. Many chartered physiotherapists were working with British Olympian athletes, or professional soccer teams in Great Britain. Most of the quantitative studies used the Athletic Trainers Sports Psychology Questionnaire (ATSPQ), or a variant of this. Thematic analysis was the commonly used analysis method in the qualitative studies.

Table 1
Search keywords.

Psychological	Physiotherapists	Athlete	Rehabilitation
Psychological, Psychosocial, Psychological intervention*, Interpersonal, Behavioural, CBT	Physiotherapy, Physiotherapist*, Physical therapy, Physical therapist*	Athlete*, Sport	Injury, Rehab*, Treatment, Intervention, Recovery

52

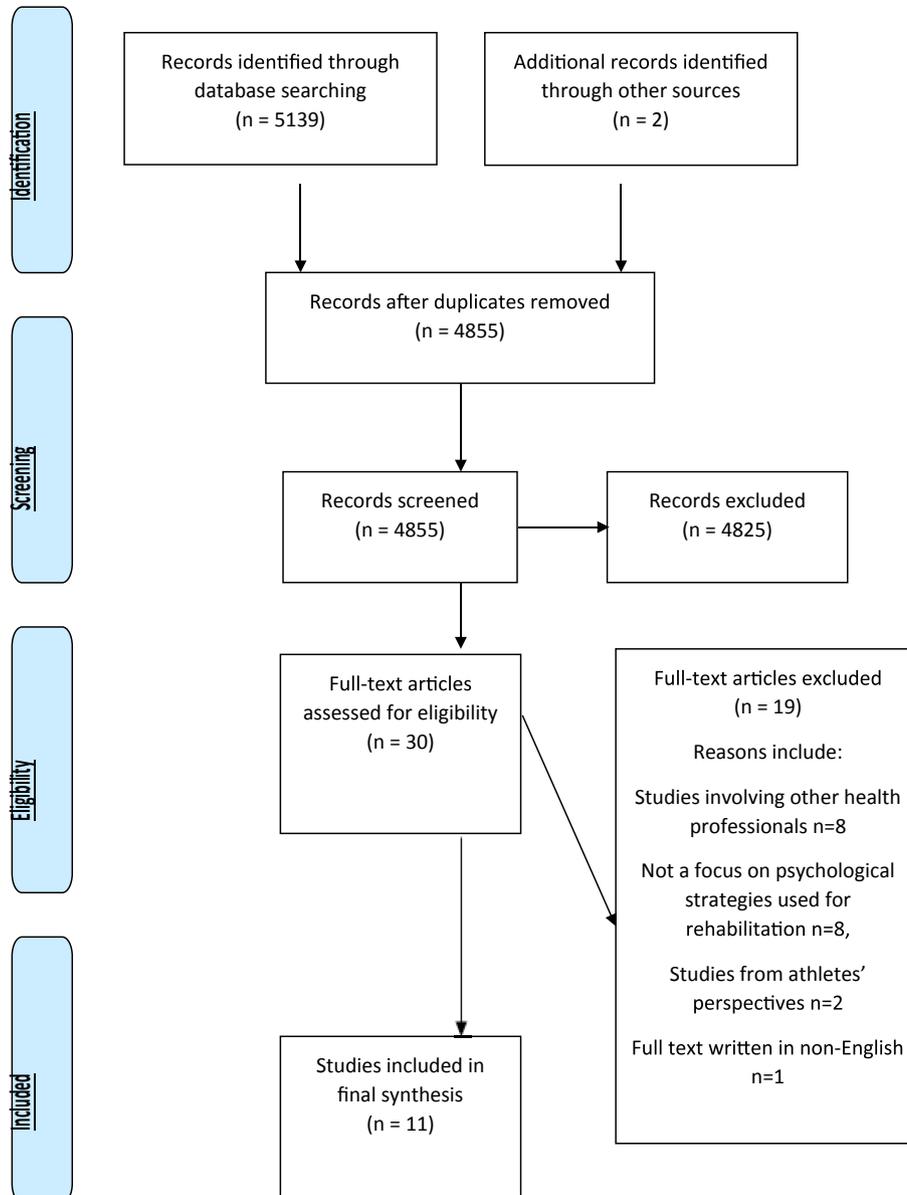


Fig. 1. PRISMA flow chart.

Goal setting was the most commonly prescribed psychological strategy, and majority of the sports physiotherapists were aware that athletes are psychologically affected from injury.

The included studies all scored highly according to the GCRF (Table 2). The quantitative studies demonstrated high levels of quality, scoring at least 8/9, and the qualitative studies scored

between 22/24 and 24/24.

3.2. Key themes

The main themes that emerged from the included studies were (a) current clinical practices, (b) aspirations and dilemmas, (c)

Table 2
Overview of studies.

Authors	Study aim	Study design	Participant number	Study methodology	Psychological strategies used	Key findings	Quality assessment
(Arvinen-Barrow et al., 2007)	To assess, on a national level, the views of chartered physiotherapists with regard to the psychological content of sport injury practice at diverse levels of competition.	Survey	361 sports or musculoskeletal physiotherapists	PSPQ questionnaire. Sent to national list of sport injury and physiotherapy clinics in England, Scotland, Wales, Northern Ireland	Short-term goal setting. Encouraging athletes to employ positive self-thoughts	99.7% of respondents believe all athletes psychologically affected by injury. Only 25% of sports physiotherapists have access to psychologist. Majority of sports physiotherapists want further training in psychological strategies.	9/9
(Arvinen-Barrow, Penny, Hemmings, & Corr, 2010)	To explore the UK chartered physiotherapists' personal experiences in using psychological intervention techniques as part of their work with injured athletes.	Semi-structured interview	Seven physiotherapists working in sports medicine in the United Kingdom	Interview. Thematic analysis of interviews. First topic focussed on physiotherapists' personal experience on views regarding psychological rehabilitation of injured athletes. Second topic asked physiotherapists about their psychological interventions	Long and short-term goal setting. Being positive as a physiotherapist during rehabilitation. The use of and recognising social support.	Lack of formal training in sports psychology for sports physiotherapists. Knowledgeable and comfortable implementing goal setting and encouraging social support. Decreased familiarity and experience using other psychological interventions. Physiotherapists implement psychological strategies at times based on "gut-feeling" and experience.	23/24
Ford and Gordon (1997)	To identify the most frequently occurring emotional and behavioural sequelae of sport injury reported by sports physiotherapists in Australia, New Zealand and Canada. To determine which psychological skills these practitioners believed they needed to treat injured athletes effectively.	Survey	257 sports physiotherapists	Questionnaire sent to sports physiotherapists in Australia, Canada and New Zealand	Goal setting. Communication and counselling skills. Confidence/assertiveness training. Anxiety management. Relaxation techniques.	Sports physiotherapists report decreased satisfaction with psychology training at undergraduate level. Sports physiotherapists demonstrate desire to learn more about psychological strategies when treating sports injuries. Majority of sports physiotherapists believe athletes are psychologically affected by injury.	9/9
Francis, Andersen, and Maley (2000)	To assess the opinions of physiotherapists who work in the management of sports injuries as to the characteristics of athletes who cope well with injury and rehabilitation, and the value of psychological skills in rehabilitation	Survey	57 physiotherapists working in sports clinics in Melbourne	ATSPQ used. Postal survey sent to sports physiotherapy clinics in Melbourne.	Setting realistic goals. Using a positive communication style. Understanding individual motivation. Positive reinforcement. Understanding stress/anxiety.	Sports physiotherapists realise psychological impact of injury, and that it can negatively affect athletes' rehabilitation. Sports physiotherapists need clear referral pathways to a sports psychologist. They need clear guidelines of identifying athletes who require referral to other health professionals	8/9
Hamson-Utley, Martin, and Walters (2008)	To examine whether current educational standards lead to the implementation of mental imager and other psychological skills during the rehabilitation process. To examine whether attitudes toward psychological skills of athletic trainers and physiotherapists who rehabilitate injured athletes are similar or different.	Survey	356 physical therapists from American Physical Therapy Association and employed in orthopaedic outpatient rehabilitation settings in the United States.	AAI survey sent to physical therapists employed in orthopaedic outpatient rehabilitation settings in the United States.	Mental imagery. Positive self-talk. Controlling pain. Goal setting.	Athletic trainers and physical therapists held positive attitudes on the effectiveness of psychological skills to improve the rehabilitation process. Injury rehabilitation programs that include the use of psychological interventions may benefit through increased adherence rates and faster recovery times.	8/9
(Heaney, 2006)	To explore British sports injury rehabilitation personal attitudes toward sports psychology intervention in the rehabilitation from sports injury within professional soccer. Qualitative interviews: to obtain further detail on the perceptions of	Part one: Survey. Part two: Semi-structured interviews.	39 sports physiotherapists completed survey. 10 also participated in semi-structured interviews	PSPQ completed by physiotherapists working with professional soccer teams in England and Wales. 10 of those also performed semi-structured interview.	Encourage positive self-thoughts. Use short-term goals. Encourage effective communication skills. Enhance self-confidence. Keeping the athlete involved with the team.	Physiotherapists demonstrated a positive attitude towards role of sports psychology in injury rehabilitation. High level of belief that soccer players are psychologically affected by injury. Physiotherapists report a high use of psychological interventions. Physiotherapists report a barrier to athletes seeking psychologist support	9/9

(continued on next page)

Table 2 (continued)

Authors	Study aim	Study design	Participant number	Study methodology	Psychological strategies used	Key findings	Quality assessment
Hemmings and Povey (2002)	physiotherapists beyond the scope of the questionnaire. To survey the views of chartered practising physiotherapists in England with regard to the psychological content of their practice.	Survey	90 chartered physiotherapists	PSPQ mailed to chartered physiotherapists registered in England Eastern Region Sports Medicine Directory	Short-term goal setting. Encourage positive self-talk. Encourage effective communication. Enhance self-confidence. Keeping athlete involved with the team.	was due to the perceived stigma of athletes in receiving psychological help. Sports physiotherapists have limited access to sports psychologists. Sports physiotherapists show desire to increase knowledge regarding psychological strategies. Physiotherapists feel athletes are psychologically affected by injury majority of the time. Majority of sports physiotherapists employ psychological strategies.	9/9
Jevon and Johnston (2003)	To investigate the knowledge and attitudes of chartered physiotherapists towards the psychological aspects of rehabilitation, their perceived need for training, and reported access to an accredited sports psychologist or chartered clinical psychologist for onward referral.	Semi-structured interview	19 chartered physiotherapists working with Great Britain Olympic athletes	Grounded theory approach during the open-ended interviews, then grounded model developed to represent the key themes that emerged from the interviews.	Goal setting. Relaxation. Visualisation.	Sports physiotherapists play an important role in providing psychological support to injured athletes. Physiotherapists gain knowledge of psychology of injured athletes through clinical experience.	24/24
Lafferty et al. (2008)	To explore whether there were any differences in the psychological content of practice between club-contracted and nonclub-contracted physiotherapists when treating sports injuries.	Survey	87 chartered physiotherapists. 45 club-contracted. 42 non-contracted.	PSPQ mailed to chartered physiotherapists in the United Kingdom.	Short-term goal setting. Enhance self-confidence. Encourage effective communication. Encourage positive self-thoughts. Reduce stress/anxiety.	Apart from short-term goal setting, non-club physiotherapists used more of each psychological skill compared to club-physiotherapists.	9/9
Ninedek and Kelt (2000)	To investigate sports physiotherapists views of psychological characteristics that distinguished athletes who cope well with injury from those who cope poorly. To examine physiotherapists' opinions on the role of psychological skills in rehabilitation.	Survey	150 physiotherapists completing, or had completed, a postgraduate sports physiotherapy program	PSPQ completed by physiotherapists who had completed, or were currently enrolled in, postgraduate sports physiotherapy programs at Australian universities.	Setting realistic goals. Using a positive and sincere communication style. Understanding individual motivation. Understanding stress/anxiety. Encouraging positive self-thoughts.	Patients' ability to communicate effectively with rehabilitation personal important skill for enhancing injury recovery. No significant differences between physiotherapists with less than 10 years of experience with those with 14 + years of experience. Physiotherapists desire further training in psychological strategies.	9/9
Tracey (2008)	To examine health professionals' perceptions of the roles they play, and their influence on the psychological recovery of their clients.	Semi-structured interviews	17 physiotherapists, one athletic trainer, working at clinics specialising in sport and physical-activity related injury.	Semi-structured interviews, transcripts analysed using interpretational analysis to reveal key themes.	Build rapport. Understanding individual athlete holistically. Educating athlete.	Three major themes: (1) Build rapport with athletes, mediation, finding common ground, (2) Education regarding physical and psychological aspects of injury and rehabilitation. (3) Being an effective communicator via listening, reassurance and patience.	22/24

PSPQ – Physiotherapist and Sport Psychology Questionnaire.

ATSPQ – Athletic Trainer Sport Psychology Questionnaire.

AAI – Attitudes About Imagery Survey.

Table 3
Key emerging themes from included studies.

First order themes	Second order themes	Third order themes
Current clinical practices	Strategies most used	Goal setting Encouraging athletes to employ positive self-thoughts Encourage effective communication Enhance self-confidence of athletes Understanding the individual athlete and treating them holistically
	Strategies least used	Treating depression Imagery Relaxation Visualisation
Attitudes and beliefs	Reasoning in selecting intervention	Will provide psychological interventions based on intuition, gut feeling
	Awareness	Vast majority of sports physiotherapists believe athletes psychologically affected by injury Vast majority of sports physiotherapists believe it is important to treat psychological aspect of injury Aware that they are first line practitioners, and part of that is delivering psychological interventions. Feel like more specialised areas should be dealt with by psychologists
Perceived barriers	Positive attitudes	Majority of sports physiotherapists want to learn more about psychological strategies Want to treat the athlete holistically, aware they need to provide some psychological strategies/rehab
	Lack of knowledge and skills	Minimal training in psychological strategies during undergraduate study
	Lack of access to ongoing upskilling	Lack of access to formal postgraduate sports psychology training. Postgraduate psychology training makes up less than 5% of offered courses in physiotherapy continuing professional development. In those who received postgraduate psychology training, majority of it was indirectly through other courses, not through a specific sports psychology course.
	Lack of access to sports psychologist	Minimal to no ability of physiotherapists to perform a psychological needs analysis with athletes. Minimal access to sports psychologist. <10–69% sports physiotherapists report having access to a sports psychologist. Lack of clear guidelines to refer athletes to sports psychologist. Athlete lack of education regarding psychological strategies influencing injury rehabilitation.
Training needs	Stigma attached to seeing sports psychologist by athletes	In elite sports teams, many other health professionals involved in treatment of athlete, resulting in many sports physiotherapists feel other health professionals more suited to role of prescribing psychological strategies during rehabilitation.
	Potential professional strategies	Many sports physiotherapists show a decreased desire to learn about psychological skills which they are not familiar with. Online module shown to improve attitudes towards, and implementation of, sports psychology strategies. Sports Physiotherapists acknowledge undergraduate may be too early to effectively teach psychological strategies.

challenges in implementation, and (d) ongoing professional development needs (Table 3).

3.2.1. Current clinical practices

From the quantitative studies (Arvinen-Barrow et al., 2007; Ford & Gordon, 1997; Francis et al., 2000; Hamson-Utley et al., 2008; Heaney, 2006; Hemmings & Povey, 2002; Lafferty et al., 2008; Ninedek & Kelt, 2000), common psychological strategies employed by sports physiotherapists included goal setting to facilitate recovery, encouraging athletes to employ positive self-thoughts, communication and counselling skills, anxiety management, using a positive communication style, enhancing self-confidence, and keeping the athlete involved with their team. Goal setting was the most common strategy used, as suggested by a sports physiotherapist “there is no question you cannot use it” (Arvinen-Barrow et al., 2010).

Sports physiotherapists appeared to use strategies that reflected their own personal attitudes. For example, goal-orientated physiotherapists were more likely to use goal setting as a strategy (Arvinen-Barrow et al., 2010): “I think it probably just comes down to ... what I am like as a person” (Arvinen-Barrow et al., 2010). Physiotherapists implemented psychological strategies based on their intuition or gut feeling, rather than on formal training (Arvinen-Barrow et al., 2010; Jevon & Johnston, 2003): “I would without a doubt say that I use my gut most of the time ...” (Arvinen-Barrow et al., 2010).

3.2.2. Aspirations and dilemmas

The majority of sports physiotherapists were aware of athletes' psychological responses to injuries (Arvinen-Barrow et al., 2007; Ford & Gordon, 1997; Francis et al., 2000; Heaney, 2006;

Hemmings & Povey, 2002; Lafferty et al., 2008). The sports physiotherapists' involvement in addressing psychological aspect was considered essential, particularly as first-line practitioners (Arvinen-Barrow et al., 2007; Arvinen-Barrow et al., 2010; Ford & Gordon, 1997; Francis et al., 2000; Heaney, 2006; Hemmings & Povey, 2002; Jevon & Johnston, 2003; Lafferty et al., 2008). Sports physiotherapists aspired to treat athletes holistically, and expressed treating the psychological aspect is crucial to recovery. “But I think as time went on, you start to realise that the person is the integral part of the problem, and if you're not understanding how they're individually responding to the situation, then you can't understand the problem fully either” (Tracey, 2008). Most of the sports physiotherapists aspired to improve their knowledge of psychological strategies, and how to successfully implement them (Arvinen-Barrow et al., 2007; Ford & Gordon, 1997; Hamson-Utley et al., 2008; Heaney, 2006; Hemmings & Povey, 2002; Jevon & Johnston, 2003).

Sports physiotherapists were also aware of their professional boundaries and many felt psychology falls outside of their scope (Arvinen-Barrow et al., 2010; Jevon & Johnston, 2003): “we've got to be careful we don't move outside our remit” (Jevon & Johnston, 2003). The team context may also influence use of psychological strategies: sports physiotherapists working in professional sports teams reported using psychological strategies less often when compared to physiotherapists working in private practice (Lafferty et al., 2008). Further, it was suggested that athletes with more complex psychological needs they should be referred to a sports psychologist (Francis et al., 2000; Heaney, 2006; Hemmings & Povey, 2002; Jevon & Johnston, 2003). “The better physiotherapists are the ones who can identify what they can affect ... and know who to refer to if they can't” (Arvinen-Barrow et al., 2010).

3.2.3. Challenges in implementation

Limited knowledge and training regarding the use of psychological strategies in rehabilitation during undergraduate training was reasoned as a common challenge by sports physiotherapists (Arvinen-Barrow et al., 2010; Ford & Gordon, 1997; Heaney, 2006; Jevon & Johnston, 2003). “I only had three weeks in my three years of training” (Arvinen-Barrow et al., 2010). Due to limited training, physiotherapists reported challenges in conducting a psychological needs analysis for athletes, making it difficult to know what techniques to implement, and appeared to limit their confidence in prescribing psychological interventions (Jevon & Johnston, 2003). Limited continuous professional development opportunities in psychological strategies was also reported as a challenge. Post-graduate psychology contributed less than 5% of offered courses for physiotherapy continued development (Jevon & Johnston, 2003). 21% of physiotherapists in one of the included studies (Heaney, 2006) had received post-graduate psychology training, but the majority of this training was via another course, and not through a primarily psychology course.

Lack of clear referral pathways to a sports psychologist was also perceived as a challenge. Sports physiotherapists seemed to have limited access to sports psychologists, reporting rates of access to sports psychologists between 10 and 69% (Arvinen-Barrow et al., 2007; Heaney, 2006; Hemmings & Povey, 2002).

Another barrier perceived by sports physiotherapists included the stigma that athletes have regarding receiving psychological support (Heaney, 2006). Athletes' lack of education regarding the psychological aspect of injury was felt to negatively influence their rehabilitation (Heaney, 2006).

3.2.4. Ongoing professional development needs

Consensus existed from the included studies for the need for ongoing professional training for sports physiotherapists in implementing psychological strategies (Arvinen-Barrow et al., 2007; Ford & Gordon, 1997; Lafferty et al., 2008; Ninedek & Kelt, 2000). While some believed undergraduate study may be too early in physiotherapists' career to learn about the use of psychological strategies (Heaney, 2006), sports physiotherapists who have had formal training in the use of psychological skills whilst treating athletes appeared to hold more positive attitudes towards further education in this area (Hamson-Utley et al., 2008).

4. Discussion

The aims of this systematic review were to investigate the current practices of sports physiotherapists in implementing psychological strategies during athletes' return-to-play rehabilitation, and explore their attitudes and challenges in doing so. We found goal setting and encouraging athletes to employ positive attitudes throughout rehabilitation to be the most commonly used psychological strategies that physiotherapists found effective. Limited knowledge, training and lack of ongoing professional development opportunities specific to sports psychology appeared as the main challenges reported by sports physiotherapists.

This review found that both short and long-term goal setting were employed by sport physiotherapists. Short-term goals seemed to focus on impairments (e.g. decreasing pain, increasing range of motion) while long-term goals focused on functional tests relevant for return to play (Arvinen-Barrow et al., 2010). Goal setting has also been shown to be successful in the rehabilitation of injured athletes in the literature. A five-week goal setting intervention delivered by one sports psychologist alongside physiotherapy demonstrated significant positive effects for 77 athletes during their rehabilitation from injury (Evans & Hardy, 2002). Adherence to the rehabilitation program and athletes' self-efficacy both

showed significant improvements due to this goal setting intervention (Evans & Hardy, 2002). These findings may be due to feelings of accomplishment by athletes as they achieved goals throughout their rehabilitation (Evans & Hardy, 2002). For example, use of short, intermediate and long-term goal setting in tennis players was reported to increase the players' self-confidence, motivation and focus (Vidic & Burton, 2010). Whilst this study was performed with healthy athletes, the results from both these studies show goal setting can be used to improve athletic performance, as well as holistic wellbeing of injured athletes.

The majority of sports physiotherapists understand that athletes are likely to have psychologically responses to an injury and appeared to show willingness and interest to address those responses during rehabilitation. The results from our review indicated that sports physiotherapists were confident in implementing psychological strategies (Jevon & Johnston, 2003). Clinical experience was cited as a major factor in the decision-making process by physiotherapists for implementing psychologically-informed strategies (Wainwright, Shepard, Harman, & J., 2011). As physiotherapists apply specific techniques, their experience in doing so contribute towards the development of their knowledge and skill set. It is recognised that prior experience informs the clinical decision-making process of experienced physiotherapists (Wainwright, Shepard, & Harman, 2011), who are more likely to use the interaction between patient and physiotherapist to direct clinical decision-making as compared to newly-graduated physiotherapists, (Wainwright et al., 2011), a process especially important when dealing with psychological factors.

Psychological strategies identified in our review could be grouped into those that enhance core physical therapy practice, and those that address psychological issues or emotional responses to injury. For example, collaborative goal setting is one of the four dimensions of expert physical therapy practice as part of empathetic patient-centred care (Jensen, Gwyer, Shepard, & Hack, 2000). Setting goals and milestones and creating a positive environment throughout rehabilitation improve adherence to rehabilitation programs. From a sports physiotherapy context, individualised and sports-specific goal setting enhances motivation and provides athletes with something to work toward throughout their rehabilitation (Arvinen-Barrow, Massey, & Hemmings, 2014).

Psychological strategies implemented in sports physiotherapy can also be used to address underlying psychological issues or emotional responses to injury. For example, athletes may suffer isolation and a loss of identity when injured, as their identity is often aligned with their chosen sport (Covassin et al., 2015). Keeping an athlete connected with their team may help reduce these feelings of isolation and facilitate athletes' return-to-play rehabilitation (Biggin, Burns, & Uphill, 2017; Podlog & Dionigi, 2010). Furthermore, anxiety associated with return to sports following injury and fear of re-injury may be considered an acceptable response, however, if excessive, may need to be treated with specific psychological strategies. Such strategies may include the ‘least used’ approaches (Table 3) of imagery and visualisation, alongside graded exposure to return to play (Driediger, Hall, & Callow, 2006).

This review indicated that many sports physiotherapists perceived psychology to be outside their scope during athletes' return to sport rehabilitation. This may relate to multi-disciplinary settings, where physiotherapists work alongside sports physicians, massage therapists, athletic trainers and sports psychologists (Gardner, 2001; van der Horst, Backx, Goedhart, Huisstede, & Group, 2017). It can be argued that, in multi-disciplinary teams, many different health professionals contribute to the psychological rehabilitation (Bianco, 2001; Hamson-Utley et al., 2008; Larson, Starkey, & Ziachkowsky, 1996). In such contexts, physiotherapists

do not need to assume the role of explicitly addressing psychological aspects of an athletes' rehabilitation. However, individual athletes and those part of community-level or non-elite sports teams may have limited access to psychologists (Heaney, 2006; Reverter-Masia et al., 2008). The sports physiotherapists may be their sole or primary health care provider, thus, have a more significant role than those working in multi-disciplinary health teams in terms of addressing psychologically-informed interventions during athletic rehabilitation (Lafferty et al., 2008).

There is consensus amongst sports physiotherapists that there is a need for specific psychology education and training. Most sports physiotherapists have positive attitudes towards use of psychological strategies during rehabilitation. Those physiotherapists who have studied psychological strategies, either directly or indirectly, were significantly more likely to implement them during athletic rehabilitation (Hamson-Utley et al., 2008). Thus, education regarding psychological strategies appears to be critical in effectively changing physiotherapists' clinical practice. There is some evidence supporting use of an online education module to improve understanding of injury-related sport psychology, knowledge of psychological skills and techniques and learning referral processes and professional boundaries (Heaney, Walker, Green, & Rostron, 2016). Approximately 12 h of online education regarding the above areas improved sports physiotherapists' attitudes towards implementing psychological techniques during athletic rehabilitation and frequency of implementing such strategies (Heaney et al., 2017).

The stigma attached to seeking psychological support by athletes was perceived as a barrier to implement psychological strategies (Heaney, 2006). It has been suggested that adolescent athletes' largest barrier to seeking assistance with mental health issues was stigma attached to it, and underreporting of such issues (Gulliver, Griffiths, & Christensen, 2012). Social history, pressure of parental expectations, and media pressure may contribute towards such stigma (Bauman, 2016).

Athletes' coaches can help reduce this stigma (Podlog & Dionigi, 2010). The majority of coaches acknowledge athletes have to overcome psychological barriers, and coaches will typically try to address these barriers with athletes using individual-specific strategies (Podlog & Dionigi, 2010). Proposed effective strategies include coordination of a "team approach" to rehabilitation, fostering open communication with athletes and team members, positive thinking and goal setting. Goal setting and positive thinking reaffirm the findings in this current review. Open communication with athletes and team members appears to be central to reducing stigma, as it encourages open conversations about psychological barriers during athletes' return-to-play rehabilitation (Sebbens, Hassmen, Crisp, & Wensley, 2016).

Most of the quantitative studies used the Athletic Trainers Sports Psychology Questionnaire (ATSPQ) to evaluate the type of psychological strategies used. The ATSPQ is adapted from instruments developed by Wiese, Weiss, and Yukelson (1991). The fifth question of the questionnaire consists of 13 psychological skills and techniques suggested by sport psychology researchers to be important during an athletes' rehabilitation from injury (Larson et al., 1996). Four studies used the Physiotherapists' Sports Psychology Questionnaire (PSPQ), adapted from the ATSPQ, to reflect differences in professional title used by British physiotherapists (Hemmings & Povey, 2002). Psychometric properties have not been reported for the ATSPQ, but face and content validity has been explored (Larson et al., 1996). Although no reliability measures were reported for the ATSPQ, studies completed in the United Kingdom have findings comparable with those of Larson et al., and nil authors of studies utilising the ATSPQ reported any problems regarding the reliability or validity of the measure (Clement,

Granquist, & Arvinen-Barrow, 2013). In contrast, the reliability of the PSPQ has shown good to excellent internal consistency (Ninedek & Kelt, 2000).

4.1. Strengths of the review

Both qualitative and quantitative studies were included in this mixed-methods systematic review. Qualitative study findings provided an in-depth exploration and enhanced the interpretation of findings from the quantitative studies. Despite its limited psychometric properties, the Athletic Trainers Sport Psychology Questionnaire was used across the majority of the quantitative studies, which enhanced the comparability of studies. Further, the studies demonstrated high levels of reporting quality according to assessment via GCRF, strengthening the review findings.

4.2. Limitations of the review

The results of this review need to be interpreted under the following limitations. Firstly, as most of the quantitative studies used ATSPQ that includes closed-ended questions, key contextual information about how those strategies were implemented and their potential outcomes could not be identified. Secondly, this review was undertaken under the context of competencies outlined for sports physiotherapists by the International Federation of Sports Physical Therapy and in the context of physiotherapists in Australia and New Zealand (Bulley et al., 2005). Under those competencies, physiotherapists play important roles in rehabilitation from immediate and acute management, post-surgical rehabilitation and return to play. However, we acknowledge that in some countries, athletic trainers would typically rehabilitate athletes to return to play (Prentice & Arnheim, 2006), thus have overlapping roles with sports physiotherapists. Thirdly, due to lack of studies assessing the effectiveness of psychological strategies in athletes' return-to-play rehabilitation, we were unable to report this finding in our review, which was altered from our published PROSPERO protocol. Lastly, we only included articles that were published in English, mainly due to limited availability of translation services.

4.3. Clinical implications

The most common psychological strategies implemented by sports physiotherapists were goal setting to facilitate recovery, and encouraging injured athletes to employ positive self-thoughts. Such strategies may be implicit to a patient-centred approach to assessment and planning of rehabilitation. However, sports physiotherapists demonstrated a strong desire to upskill or advance their knowledge and clinical application of psychological techniques. The most effective ways of upskilling may be through online modules or postgraduate or continued professional development courses. Sports physiotherapists may want to use the ATSPQ to self-check their current use of psychological strategies, encouraging them to employ strategies they perhaps are not using in their clinical practice.

Mapping of current physiotherapy undergraduate curricula for psychological principles and approaches would improve understanding of strategies taught implicitly and explicitly at entry level. Most of the studies included in this review (Table 2) were conducted more than 10 years ago. Since then, physiotherapy curricula have changed, with a stronger focus on roles as educators, communicators and managers (Physiotherapy Board of New Zealand Te Poari Tiaki Tinana o Aotearoa & Physiotherapy Board of Australia, 2015). While sports psychology may not be explicitly visible, we can argue that professional registration requires that psychologically-informed principles are implicitly threaded as part of patient-centred care into such curricula. There is a need for

further research to explore how sports physiotherapists implement psychological strategies in their clinical practice, and how successful the implementation of these strategies are in fostering athletes' return-to-play.

5. Conclusion

This mixed methods systematic review found goal setting and encouraging athletes to employ positive attitudes as implicit psychological strategies most commonly implemented by sports physiotherapists during athletes' return-to-play rehabilitation. Although physiotherapists acknowledge the value of implementing psychological strategies in their current practice, limited knowledge and training regarding psychological techniques at undergraduate level, stigma towards receiving psychological care by athletes, and a lack of ongoing professional development opportunities specific to sports psychology, appeared to impact integration of psychological strategies in current practice. There is a need for targeted psychology education and training opportunities at undergraduate curriculums and post-professional training opportunities for sports physiotherapists for better integration of such strategies in clinical practice.

Conflicts of interest

None.

Ethical statement

None required.

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Appendix a. Guidelines for Critical Review Form (GCRF) for qualitative studies scores.

GCRF for qualitative studies criteria	(Arvinen-Barrow et al., 2010)	Jevon and Johnston (2003)	Tracey (2008)	(Heaney, 2006)
Q1	1	1	1	1
Q2	1	1	1	1
Q3	1	1	1	0
Q4	1	1	1	1
Q5	1	1	1	1
Q6	1	1	1	0
Q7	0	1	1	0
Q8	1	1	1	1
Q9	1	1	1	0
Q10	1	1	0	1
Q11	1	1	1	1
Q12	1	1	1	1
Q13	1	1	1	1
Q14	1	1	1	1
Q15	1	1	1	1
Q16	1	1	1	0
Q17	1	1	1	0
Q18	1	1	1	1
Q19	1	1	1	0
Q20	1	1	1	1
Q21	1	1	1	1
Q22	1	1	1	0
Q23	1	1	1	1
Q24	1	1	1	1
Final Score:	23	24	23	16

Appendix b. Guidelines for Critical Review Form (GCRF) for quantitative studies scores.

Article	GCRF for quantitative studies criteria									Final score
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	
(Arvinen-Barrow et al., 2007)	1	1	1	1	1	1	1	1	1	9/9
Ford and Gordon (1997)	1	1	1	1	1	1	1	1	1	9/9
Francis et al. (2000)	1	1	1	1	0	1	1	1	1	9/9
Hemmings and Povey (2002)	1	1	1	1	1	1	1	1	1	9/9
Lafferty et al. (2008)	1	1	1	1	1	1	1	1	1	9/9
Ninedek and Kelt (2000)	1	1	1	1	1	1	1	1	1	9/9
(Heaney, 2006)	1	1	1	1	1	1	1	1	1	9/9
Hamson-Utley et al. (2008)	1	1	1	1	0	1	1	1	1	9/9

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